DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT/ ENVIRONMENTAL MANAGEMENT PLAN

FOR

LYNTI DKHAR LIMESTONE MINE

PROJECT AREA: 1.36 Ha.

PEAK PRODUCTION CAPACITY: 0.050 MTPA

AT RI-U-SIAR, LYNTI DKHAR AREA, SOHBAR SIRDARSHIP, DISTRICT: EAST KHASI HILLS, MEGHALAYA

PROJECT PROPONENT :

Idalis Ryngnga

PREPARED BY :

Novomine India Private Limited

NABET Category 'A' Certified Organisation [Sector 1 (a) (i)] Vide Certificate No. NABET/EIA/2326/IA 0124

www.novomineindia.com

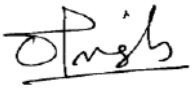
March 2025

NOVOMINE INDIA PVT. LTD.

DECLARATION BY THE EIA CO-ORDINATOR

I, Dr. Om Prakash Singh, hereby declare that I was involved in the capacity of an EIA Coordinator for developing, supervising, and preparing the EIA-EMP Report of the opencast limestone mining project of Lynti Dkhar Limestone Mine for a Mine Lease area of 1.36 Ha. located at Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, East Khasi Hills District of Meghalaya. I certify that the details furnished in this report are correct and complete to the best of my knowledge.

Name: **Dr. Om Prakash Singh** (NABET Approved Category-A EIA Coordinator)

Signature: 

Contact Information: N6/2, 150 S, Indira Nagar Colony, Chitaipur, Varanasi- 221005, Uttar Pradesh

E-mail: opsinghnovomine@gmail.com

Date: 10-03-2025

APPENDIX I

File No: ML/SEAC/SEIAA/PP/EKH/83/2024

Government of India

Ministry of Environment, Forest and Climate Change

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

****

Dated **06/12/2024**

To,

Idalis Ryngnga
Sohbar, Shella Bholaganj, East Khasi Hills, Meghalaya, 793108
idalisstone@gmail.com

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

Sir/Madam,

This is in reference to your application for Grant of Terms of Reference under the provision of the EIA Notification 2006-regarding in respect of project Lynti Dkhar Limestone Mine for an area of 1.36 hectare submitted vide proposal number SIA/ML/MIN/493873/2024 dated 31/08/2024.

2. The particulars of the proposal are as below :

(i) TOR Identification No.	TO24B0108ML5865378N
(ii) File No.	ML/SEAC/SEIAA/PP/EKH/83/2024
(iii) Clearance Type	TOR
(iv) Category	B1
(v) Project/Activity Included Schedule No.	1(a) Mining of minerals
(vii) Name of Project	Lynti Dkhar Limestone Mine
(viii) Name of Company/Organization	Idalis Ryngnga
(ix) Location of Project (District, State)	EAST KHASI 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 SEAC 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) in the meeting held on 20/11/2024. 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)/EIA & EMP Reports/presented during SEIAA are annexed to this EC as Annexure (1).
6. The SEIAA, 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 SEAC hereby decided to grant Terms of Reference for instant proposal of M/s. Idalis Ryngnga 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. of Meghalaya, Forests & Environment Department, Shillong, for information.
4. The Secretary to the Govt. of Meghalaya, Mining & Geology Department, Shillong for information.
5. The Deputy Commissioner, East Khasi Hills District, Shillong for information and necessary action.
6. The Divisional Forest Officer, East Khasi Hills & Ri Bhoi Territorial Division, Shillong for information and necessary action.
7. he Director, Directorate of Mineral Resources, Meghalaya, Shillong for information.
8. The Member Secretary, Meghalaya Pollution Control Board, 'Arden', Lumpyngngad, Shillong – 793 014 for information and necessary action.
9. The Member Secretary, State Expert Appraisal Committee, Meghalaya for information.

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

S. No	Terms of Reference
	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 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

S. No	Terms of Reference
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
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

S. No	Terms of Reference
	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
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

S. No	Terms of Reference
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	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
1.35	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
1.36	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
1.37	Detailed environmental management plan (EMP) to mitigate the environmental impacts which,

S. No	Terms of Reference
	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
1.38	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
1.39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given
1.40	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out
1.41	A Disaster management Plan shall be prepared and included in the EIA/EMP Report
1.42	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
1.43	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
1.44	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

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	50544	Tons per Annum (TPA)	Road	Highest Production during 5th year of operations.

Signature Not Verified

Digitally Signed by : Badonlang Wahlang IFS
Member Secretary, SEIAA

Date: 06/12/2024

APPENDIX I-A

Table 1-A: Reference for the Terms of Reference issued by the State Environment Impact Assessment Authority (SEIAA) of Meghalaya vide file no. ML/SEAC/SEIAA/PP/EKH/83/2024 dated 6/12/2024

S. No.	Description of Terms of Reference (ToR)	Terms of Reference (ToR) Compliances
1	**Specific Terms of Reference for (Mining of Minerals)**	
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.	Details have been furnished in **Chapter 3** of this 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.	Duly complied by the Project Proponent. Refer **Annexure 11** of this EIA-EMP Report.
1.3	GPS coordinates of each pillar should be carved/painted clearly on the pillars with red colour.	Duly complied by the Project Proponent. Refer **Annexure 11** of this EIA-EMP Report.
2	**Standard Terms of Reference for (Mining of Minerals)**	
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	This is a new project proposal. Hence, no mineral has been excavated from the proposed mine lease area till now. Letter of Intent (LOI) was issued by the Divisional Forest Officer, east Khasi Hills & Ri-bhoi (T) Division, Shillong vide Letter No. **KH/8/ML/Limestone/68/6085** dated Shillong, the **26th March, 2024**. The same has also been attached to this EIA-EMP Report as **Annexure 3**.
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	The Registered Land Document (Deed of Declaration) attached in

		Annexure 2 in this EIA_EMP Report.
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	All documents including the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine, the Final EIA Report, and all other documents are compatible with one another in terms of the mine lease area (1.36 ha), peak production level (50544 TPA), waste generation & management, and mining technology, etc. All such documents have been approved on behalf of Smt. Idalis Ryngnga.
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)	The ML boundary with coordinates superimposed on the project area's google satellite map has been provided in EIA-EMP Report. **Chapter and Figure No.:** Fig 1.2 (Coordinate Plan) of Chapter 1 **Page No.:** 1-10 A Study Area map of the core zone (project area) and 10km area of the buffer zone (1:50,000 scale) has been provided in this EIA-EMP Report. **Chapter and Figure No.:** Figure 2.1 (Study Area Map of 10km Radius-Lynti Dkhar Limestone Mine) of Chapter 2 **Page No.:** 2-4
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	78 O/12 – (Key plan prepared from the satellite image generated from Google Earth Pro as the Toposheet is restricted for common public use).

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	A No Objection Certificate obtained from the Office of the Sohbar Sirdarship, Sohbar, east Khasi Hills District, Meghalaya has been attached to this EIA-EMP Report as **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	The Lessee is a private land holding individual. An Environmental Monitoring and Management Programme will be developed and deployed after the commencement of mining operations. Details are given in **Chapter 6** of this 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	Mining will be carried out using an opencast semi-mechanized mining method as per the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine. Regular examination will be carried out to look for slope failure on open cast mine faces, gritty soil dump and overburden benches etc. Details are given in **Chapter 7** of this report.
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	Incorporated into this EIA-EMP Report in **Chapters 2, 4** and **10**
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	Land use Pattern of the Study Area is incorporated in **Chapter 3** of this EIA-EMP report. **Chapter and Table No.:** Table 3.3 of

	post operational phases and submitted. Impact, if any, of change of land use should be given	Chapter 3 **Page No.:** 3-6 Land use plan for pre-operational, operational and post-operational phases of the mine lease area is incorporated in Chapter 2 of this Report. **Chapter and Table No.:** Table 2.9 of Chapter 2 **Page No.:** 2-17
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	No overburden dump has been planned outside the proposed mine lease boundary.
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	No forest diversion has been proposed for this project. A Non-Forest Land Certificate for the entire project/ML area has been attached to this EIA-EMP Report as **Annexure 4**.
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	A Non-Forest Land Certificate for the entire project/ML area has been attached to this EIA-EMP Report as **Annexure 4**.
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	**Not applicable for the current project proposal.**
1.15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given	The study area does not contain any protected or reserved forest.
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	Impact on the biological environment including wildlife and other protected areas has been thoroughly detailed in

	protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted	**Chapter 3** of this EIA report. Mitigation measures have been proposed in **Chapter 4**.
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	The study area does not contain any National Park, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar Site Tiger/ Elephant Reserves.
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	A detailed biological study has been carried out for the study area and the same has been furnished in **Chapter 3** of this EIA-EMP report.
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	**Not applicable for the current project proposal as the proposed project is located in Meghalaya where the Garo-Khasi-Jaintia Range is the primary mountain range.**
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)	**Not applicable for the current project proposal.**
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	**Not applicable for the current project proposal as no R&R is involved.**

	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	Primary baseline data has been collected and analysed for one non-monsoon season (Summer Season) from March – May 2024 by an NABL accredited laboratory. The results have been detailed in **Chapter 3** of this report.
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	Air quality modelling has been carried out by taking into account all relevant input parameters such as emission during blasting, transportation of limestone from haul road to the storage area etc. and the report has been attached as **Annexure 12** to this EIA-EMP report. The wind roses showing the pre-dominant wind direction has been indicated in **Fig 3.6** in **Chapter 3** of this report. **Page No.: 3-14**
1.24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be	The total water requirement for the proposed project, its availability in

	provided. Fresh water requirement for the Project should be indicated	the vicinity of the project area and their sources are detailed in **Chapter 2** of the report. **Table No.:** 2.10; **Page No.:** 2-19
1.25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided	Not required as domestic & industrial water requirement for the proposed mine will be met from nearby surface water bodies, harvested rainwater and recirculated water from the proposed project. The same has been described in **Figure 2.6**, **Chapter 2** of this 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 such as rainwater harvesting is provided in the **Chapter 4** of this EIA-EMP report.
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	Both surface and ground water quality has been assessed to establish a baseline environmental data status for the proposed project. The details of anticipated impacts and necessary safeguard measures have been detailed in **Chapter 4** of this report.
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	Mining will be carried out till the Ultimate Pit Limit (UPL) level, i.e., 26 m b.g.l for the proposed project as per the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine. The UPL will be restricted at least 4 meters above the local water table which is at a depth of 50 m b.g.l. A detailed Hydrogeological Study

		report is attached as **Annexure 8** to this EIA-EMP report.
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	As there is no stream - perennial/non-perennial passing through the proposed mine lease area, no diversion/modification of any stream is proposed.
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	Information on site elevation, working depth, etc. is provided in the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine, which has been attached as **Annexure 7** to this report. Water table contour maps of the study area have been furnished as **Figures 11 and 12** of the Hydrogeological Study Report which has been attached as **Annexure 8** to this EIA-EMP report.
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	All details are given in Chapter 4 of this report. **Section and Page No.:** Section 4.7.2.1 on Page 4-33
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	A traffic impact assessment study has been carried out as per Indian Road Congress (IRC) guidelines and the same has been detailed in **Chapter 3** of this EIA-EMP report.

	other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines	**Section:** 3.4.3; **Page No.:** 3-17
1.33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report	Details of the onsite shelter and facilities shall be provided to the mine workers upon the commencement of mining operations as described in the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine, which has been attached as **Annexure 7** to this EIA-EMP report.
1.34	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	The Project Proponent will take full responsibility for all occupational health impacts and protection measures thereof for the mine workers. The project specific details have been listed in **Chapters 4 and 7 (Section 7.7)** of this EIA-EMP report.
1.35	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations	Details have been listed in **Chapters 4 and 10** of this EIA-EMP report.
1.36	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	Details have been listed in **Chapters 4** of this EIA-EMP report. **Section and Page No.:** Section 4.8 on Page No. 4-34
1.37	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	Details have been listed in **Chapters 10** of this EIA-EMP report.
1.38	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	Details of the points raised and commitments made by the project proponent during the Public Consultation shall be furnished in

		Chapter 7 of this report.
1.39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given	At present, there are no litigations/ court cases – filed/ pending regarding the proposed project.
1.40	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out	Detailed costs – capital and recurring, for the proposed project as well as the cost towards implementation of the EMP has been detailed in **Chapters 2 and 10** of this EIA-EMP report. **Section and Page No.:** Section 2.1 on Page 2-1 and Section 10.2.4 on Page 10-17.
1.41	A Disaster management Plan shall be prepared and included in the EIA/EMP Report	A detailed Risk Assessment Plan, Vulnerability Analysis, and Disaster Management Plan is detailed in **Chapter 7** of this EIA-EMP report.
1.42	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	Detailed in **Chapters 8 and 10** of this EIA-EMP report.
1.43	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	Complied

	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	
1.44	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	Conceptual post mining land use and land reclamation details for the proposed project has been detailed in **Chapter 2** of this EIA-EMP report. Conceptual Plan and section has been attached as **Annexure 10** to this EIA-EMP report.

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Annexure 5	Mining Plan Approval Letter
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Chapter 1 – INTRODUCTION

1.1. PURPOSE OF THE REPORT

The purpose of this Environmental Impact Assessment (EIA) is to study the potential environment impacts and to assess the technical feasibility, economic viability and sustainable development of the **"Lynti Dkhar Limestone Mine"** which is located in Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, East Khasi Hills District, State: Meghalaya for an area of 1.36 Ha and for appraisal by the State Environment Impact Assessment Authority (SEIAA) of Meghalaya. Limestone mining is one of the important economic activities for setting up of basic infrastructure facilities, roads, housing, ports, railways, irrigation projects, power infrastructure, etc. It has great potential for employment and overall development of any region while contributing to the state exchequer.

The project proponent plans to implement systematic and scientific mining methods to ensure sustainable development, prioritizing safety, environmental protection, and the well-being of local communities.

The project proponent has engaged **M/s NOVOMINE INDIA PRIVATE LIMITED** (NABET Accredited EIA Consultant Organisation) to prepare the Environmental Impact Assessment Report and Environment Management Plan as per the approved ToR granted by the State Environment Impact Assessment Authority of Meghalaya. EIA has been carried out for the core and buffer areas of the mining area including one season baseline monitoring from March 2024 to May 2024 (summer season).

As per the MoEF&CC's EIA Notification dated **14th September 2006 vide S.O. 1533** and all subsequent amendments till date, the project is classified as **"Category – B2"** [Sl. No. 1(a) of Schedule: "List of project or activities requiring prior Environmental Clearance"]. Thus, EIA studies were not required for the project. However, as per the NGT order dated **13th September 2018** and subsequent Office Memorandum of the MoEF&CC vide **F. No. L-11011/175/2018-IA-II (M) dated 12th December 2018**, which states that "if a cluster or an individual lease size exceeds 5 Ha., the EIA-EMP including Public Hearing be made applicable in the process of grant of prior environmental clearance." Following this, the project is characterized at par with **"Category – B1"** projects by the SEIAA/SEAC of Meghalaya, making EIA-EMP applicable in the process of grant of prior environmental

clearance.

Bases on the recommendation of SEAC, Meghalaya for grant of Terms of Reference (ToR) for the preparation of an EIA/EMP report, the SEIAA of Meghalaya issued the ToR vide File No. **ML/SEAC/SEIAA/PP/EKH/83/2024** dated **6th December 2024** to Smt. Idalis Ryngnga **(Refer Appendix I)**.

Based on ToR conditions stipulated by the SEIAA, the draft EIA/EMP has been prepared for identification, prediction, evaluation and communication of the anticipated environmental impacts on the study area (10 km from boundary of the project site) that may emanate due to the continuation of mining.

1.2. IDENTIFICATION OF PROJECT & PROJECT PROPONENT

1.2.1. Identification of the Project

The project proponent has identified the project site considering the mineral deposit (deposit of limestone) in the mine lease area for Lynti Dkhar Limestone Mine. The details of the statutory clearances, permissions, approvals, consents, etc. under various Acts, Rules, and legislations and their statuses are listed below:

Letter of Intent (LoI) was granted to **Smt. Idalis Ryngnga** for granting of mining lease for limestone from the Office of the Divisional Forest Officer, East Khasi Hills & Ribhoi (T) Division, Shillong, Government of Meghalaya vide Letter No. **KH/8/ML/Limestone/68/6085** dated **26th March 2024** over an area of 1.36 ha **(Refer Annexure 3)**. As per letter vide No. **KH/8/NOC/Limestone/41/Pt.IV/2720** dated **2nd September, 2022** issued by the Office of the Divisional Forest Officer, East Khasi Hills & Ribhoi (T) Division, Shillong, Government of Meghalaya, the proposed mine lease area is certified as Non-Forest Land **(Refer Annexure 4)**. The No Objection Certificate for this project was granted by the Office of the Sohbar Sirdarship, Sohbar, East Khasi Hills District, Meghalaya vide Reference No. **SSS/Adm/A-48/2022-24/39** dated **26th April 2024 (Refer Annexure 1)**. The Mining Plan with Progressive Mine Closure Plan was approved by the Mining Engineer, Directorate of Mineral Resources, Shillong vide letter **No. DMR/MM/199/2024/04** dated **6th July 2024 (Refer Annexure 5)**. Besides the approval of the Mining Plan with Progressive Mine Closure Plan, the project proponent has obtained a cluster certificate from the Mining Engineer, Directorate of Mineral Resources, Shillong vide Letter **No.**

DMR/MM/199/2024/09 dated **23rd July 2024** **(Refer Annexure 6)**.

As per the cluster letter, 2 approved Mining Plans with a total area of 3.64 Ha. are lying within 500 m from the periphery of this approved Mining Plan of Lynti Dkhar Limestone Mine.

Summarized details of the project are given in **Table 1.1** below.

Table 1.1: Summarized details of the Lynti Dkhar Limestone Mine

Name of the Project	Lynti Dkhar Limestone Mine
Type of Project	Opencast Limestone Mining Project
Bounding Latitudes	25°10'43.83"N to 25°10'49.27"N
Bounding Longitudes	91°44'29.03"E to 91°44'33.20"E
Project Area	1.36 Ha.
Life of Mine	10 years

1.2.2. Identification of the Project Proponent

Name of the Applicant : Smt. Idalis Ryngnga

Address of the Applicant : Sohbar Area, Sohbar Sirdarship, East Khasi Hills District, Meghalaya.

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

The proposal is for appraisal by the SEAC/SEIAA of Meghalaya for mining of minor mineral (limestone) through open cast semi-mechanized method. The Mining Plan with Progressive Mine Closure Plan which describes the nature, size, location of the project is prepared by RQP Ashok Kumar Sarkar. The Mining Plan was prepared under the provisions of The Meghalaya Minor Mineral Concession Rules of 2016 (MMMCR, 2016) for extraction of limestone with due consideration of environmental parameters so as to obtain EC for this project. The mine lease area is for 1.36 Ha. with the proposal of total production capacity of 505197 T, in which the average annual production is 50519.7 T. The expected life of mine is about 10 years. The average estimated cost of the project is ₹23 Lakhs. As per the Approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine, the project is expected to employ about 25 persons (13 skilled, 7 semi-skilled, and 5 unskilled).

The overview of the project such as nature, size and location are further depicted in **Table 1.2** below.

Table 1.2: Brief Description of the Project

Particulars	**Details**		
Project Report	Lynti Dkhar Limestone Mine		
Location	Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, East Khasi Hills District, Meghalaya		
GPS Co-ordinates of the Project	Project Co-ordinates		
	Boundary Pillar No.	**Latitude (N)**	**Longitude (E)**
	1	25°10'43.83"	91°44'29.65"
	2	25°10'43.95"	91°44'32.36"
	3	25°10'47.91"	91°44'33.20"
	4	25°10'48.29"	91°44'31.71"
	5	25°10'49.27"	91°44'31.65"
	6	25°10'49.03"	91°44'30.08"
	7	25°10'48.19"	91°44'29.03"
	8	25°10'48.19"	91°44'29.48"
Toposheet No.	78 O/12 – (Key plan prepared from the satellite image generated from Google Earth Pro as the Toposheet is restricted for common public use).		
Total area	1.36 Ha. (Private land)		
Total Mineral Reserves	5,05,197 Tonnes		
Proposed Production Capacity	50,519.7 TPA (Average annual production) 50,544 TPA (Targeted Peak Production)		
Life of Mine	10 years as per the approved Mining Plan		
Method of Mining	Opencast Semi-Mechanized Mining		
No. of Working Days	300 days		
Manpower	25		
Estimated Project Cost (inclusive of only Capital Cost)	₹ 23.00 L		
EMP Cost	**Capital Cost (₹L)**	**Annual Recurring Cost (₹L)**	

	15.00	4.65
Elevation	**Highest Elevation:** 145 mRL **Lowest Elevation:** 133 mRL	
Land-use	Private Land	
Nearest village/town	Bholaganj/Majai village is about 1.45 km towards S direction from the ML area via MDR 27	
Nearest airport	Shillong Airport (103 km, NE Direction)	
Nearest railway station	Guwahati Railway Station (168 km, N Direction)	
Nearest highway	SH 5 (~1.2 km, NE Direction)	
International/State Boundary	Indo-Bangladesh International Boundary is at ~0.74 km (aerial distance) towards South-South East direction from the Mine Lease boundary Meghalaya-Assam State Boundary is at ~80 km (aerial distance) towards North direction from the Mine Lease boundary	
Power supply	None as mining shall be carried out only in one shift from sunrise till sunset. Provisions for solar lighting shall be made available for low-power lighting needs in the mine office.	
Nearest Dispensary/Health Centre/Govt. Hospital	Majai Sub Health Centre in Bholaganj/Majai ~2.3 km towards S direction from the mine lease boundary via road	
Educational Facility in the area	Anderson LP School Umdud Bholaganj in Bholaganj (~1.41 km, North Direction)	
Water demand & supply	Water will be taken from nearby water sources by tankers. Total water requirement is about 7.25 KLD (~7.5 KLD) which shall include the following: (Dust suppression- 2.0 KLD, Drinking & domestic- 1.25 KLD, Cleaning of HEMMs and other machinery = 2.0 KLD, Plantation-2.0 KLD).	
Nearest tourist places	Wahrew Arch bridge over River Tharia (~2.6 km via road, NE Direction)	

Ecologically Sensitive Zones (ESZ)/Ecologically Sensitive Areas (ESA)	None within the study area
Archaeological features	None within the study area
Nearest Forest area	None within the study area
Nearest stream/river/water body	Um Sohryngkew (Wah Tharia river) (~1.6 km, NE Direction)
Seismic Zone	**Zone V** (As per the Seismic Zonation Map of India, Bureau of Indian Standards, 2002)

***(Source:** PFR of Lynti Dkhar Limestone Mine)*

1.3.1. Importance of the project to the Country and Region

Mineral wealth of the state of Meghalaya provides multiple employment opportunities to the people of the state. Mining is one of the major core sector industries which plays a crucial role in the process of the state's socio-economic development. The state has a total reserve of ~15100 MT of limestone (cement, metallurgical and chemical grade) *(Minerals of Meghalaya: Department of Mining and Geology)*. Limestone is a basic building and construction material that is widely used for constructing houses, bridges and roads. It is cheaper than the RCC construction material due to its easy workability. It has high demand in the market due to increased domestic, industrial and other infrastructural activities. As a result of continuation of the mining project, the demand-supply position will remain balanced.

Thus, keeping in mind this requirement, mining of limestone is necessary for the durability of buildings, bridges, and roads and to beautify by carving as per the requirement of the consumer.

Demand-Supply Gap

Limestone is one of the essential components for building and infrastructural development projects. It has high demand in the market due to increased domestic, industrial and other infrastructural activities. As a result of continuation of the mining project, the demand-supply position will remain balanced. Demand of Limestone in the region will be partially fulfilled by this project.

Imports vs. Indigenous Production

There will be no import for the project. There will be indigenous inputs in the entire mining project. This mining project is not prospecting any export.

The Proponent would like to sell the mineral in domestic markets, as per requirement. No export is proposed.

1.4. SCOPE OF STUDY

The EIA process is a crucial tool for ensuring that potential environmental impacts of a project are identified, assessed, and mitigated before, during, and after construction. The broad scope that has been followed in preparing the EIA for Lynti Dkhar Limestone Mine can be explained in the following four stages:

i. **Characterizing the Baseline Environment:** This involves collecting data on the existing environmental conditions at the project site and surrounding areas. This data has been used as a benchmark to compare potential impacts from the project. It includes ambient air quality, water quality, ambient noise levels, land use, flora and fauna, and the socioeconomic characteristics of the local community.

ii. **Identifying and Quantifying Environmental Impacts:** In this stage, the potential impacts of the project on the environmental attributes identified in the baseline study were assessed. This involved considering two phases of the project, from operation to post-closure. The assessment quantified the significance of these impacts, considering factors like duration, reversibility, and magnitude.

iii. **Evaluating Pollution Control and Preparing an Environmental Management Plan (EMP):** Based on the identified impacts, potential pollution control measures were evaluated. The Environmental Management Plan (EMP) outlines specific actions to avoid, minimize, mitigate, or compensate for adverse environmental effects. The EMP also includes monitoring plans to track the effectiveness of these measures.

iv. **Developing a Post-Project Monitoring Program:** This final stage establishes a program to monitor the environmental effects of the project after it is operational again. The monitoring program should track environmental quality against the established baselines and ensure compliance with regulatory limits set by the Meghalaya State Pollution Control Board (MSPCB)

and the State Environment Impact Assessment Authority (SEIAA) of Meghalaya.

The overall content of this draft EIA report has been prepared by following the generic structure prescribed in **Appendix III of the S.O. 1533** dated **14th September, 2006**; the MoEF&CC's EIA Guidance Manual for Mining of Minerals released in 2010, and the standard and additional ToR issued by the SEIAA of Meghalaya vide **File No. ML/SEAC/SEIAA/PP/EKH/83/2024** dated 6th December 2024. A copy of the ToR grant letter is enclosed as **Appendix I**.

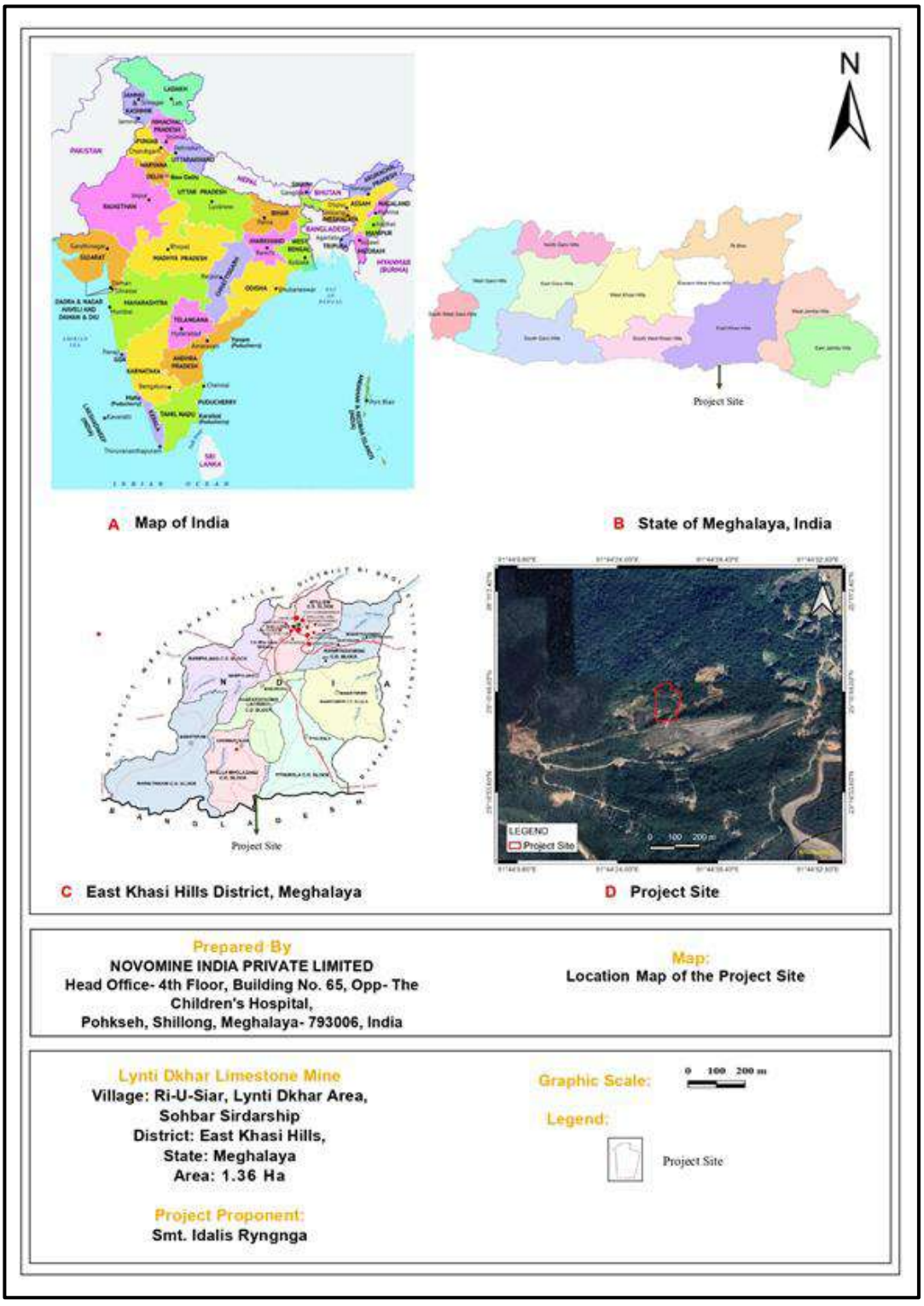
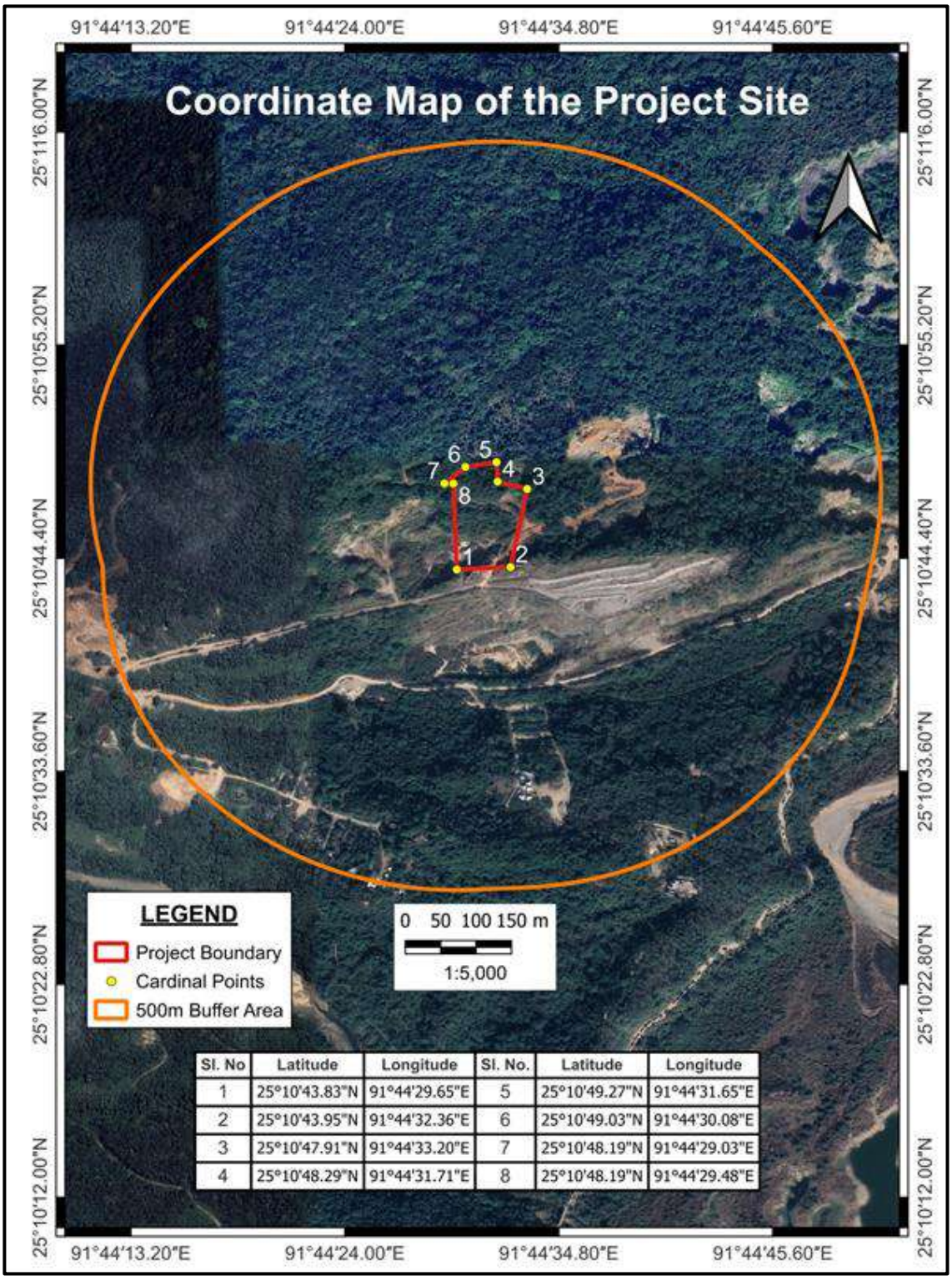


Fig 1.1: Location Plan of the proposed Lynti Dkhar Limestone Mine



Sl. No	Latitude	Longitude	Sl. No.	Latitude	Longitude
1	25°10'43.83"N	91°44'29.65"E	5	25°10'49.27"N	91°44'31.65"E
2	25°10'43.95"N	91°44'32.36"E	6	25°10'49.03"N	91°44'30.08"E
3	25°10'47.91"N	91°44'33.20"E	7	25°10'48.19"N	91°44'29.03"E
4	25°10'48.29"N	91°44'31.71"E	8	25°10'48.19"N	91°44'29.48"E

Fig 1.2: Coordinate Plan of the proposed Lynti Dkhar Limestone Mine

Chapter 2 – PROJECT DESCRIPTION

2.1. BRIEF DESCRIPTION OF THE PROJECT

This chapter contains information related to the project like type of the project, need for the project, project location and its layout details, project schedule and its implementation, technology and process and others on various facets of environment.

This brief description of the project reveals that the limestone mining project is located in Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, District: East Khasi Hills. Within 500 m from the periphery of the project, there are **2 more existing projects totalling 5.00 Ha**. Details of cluster are given in the following table:

Table 2.1: Cluster Details

S. No.	Approved Mining Plan	Area (Ha.)	Mineral	Distance from the Proposed Project (in metres)
1	Smt. Aliadmon Japang	2.40	Limestone	10
2	Shri Nebarson Tymmenniang	1.24	Limestone	487

The present proposal pertains to opencast semi-mechanized mining with drilling and blasting of limestone in the district of East Khasi Hills, Meghalaya. The mine lease area of 1.36 Ha. is located at Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, East Khasi Hills, Meghalaya. According to the Hon'ble NGT order dated **13th September 2018** and subsequent Office Memorandum of the MoEF&CC vide **F. No. L-11011/175/2018-IA-II (M)** dated **12th December 2018** "if a cluster or an individual lease size exceeds 5 Ha., the EIA-EMP including Public Hearing be made applicable in the process of grant of prior environmental clearance". Therefore, the project is characterized at par with **"Category – B1"** projects by the SEIAA/SEAC of Meghalaya, making EIA-EMP applicable in the process of grant of prior environmental clearance.

The estimated project cost is ₹23 Lakhs. The expected Life of Mine is 10 years with a maximum peak capacity of 50544 T which is projected to be achieved in the 5th year of operations.

All stipulations of environment, forestry, and mining shall be duly complied by the Project

Proponent.

2.2. TYPE AND NEED OF THE PROJECT

The applicant, Smt. Idalis Ryngnga has obtained the Letter of Intent (LoI) for mining of limestone from the Divisional Forest Officer, East Khasi Hills and Ri-Bhoi (T) Division, Shillong vide letter No. **KH/8/ML/Limestone/68/6085, dated 26/03/2019** over an area of 1.36 Ha. at Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, East Khasi Hills District, Meghalaya. **(Refer Annexure 3)**. However, according to the cluster certificate issued by the Mining Engineering, Directorate of Mineral Resources, Shillong vide letter No. **DMR/MM/199/2024/09 dated 23/07/2024**, two projects or mines with a total area of 3.64 ha are lying within 500 m from the periphery of this mining lease area **(Refer Annexure 6)**.

Mining is one of the major core sector industries which plays a crucial role in the process of Meghalaya's socio-economic development. The state has a total reserve of ~ 15100 MT of limestone (cement, metallurgical and chemical grade) (Minerals of Meghalaya: Department of Mining and Geology). Limestone is a basic building and construction material that is widely used for constructing houses, bridges and roads. It is cheaper than the RCC construction material due to its easy workability. It has high demand in the market due to increased domestic, industrial and other infrastructural activities. As a result of continuation of the mining project, the demand-supply position will remain balanced. Demand of Limestone in the region will be partially fulfilled by this project as a result of continued extraction of the mineral - the demand-supply position will remain balanced.

2.3. PROJECT LOCATION AND LAYOUT

The mine lease area is located at Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, East Khasi Hills District, Meghalaya. The bounding coordinates of the mine lease area are Latitudes 25°10'43.83"N to 25°10'49.27"N and Longitudes 91°44'29.03"E to 91°44'33.20"E. The project location details are shown in **Figures 1.1: Location Plan of the proposed Lynti Dkhar Limestone Mine**, and **1.2: Coordinate Plan of the proposed Lynti Dkhar Limestone Mine** of **Chapter 1**.

The details of location of the project are furnished in **Tables 1.1: Summarized details of the Lynti Dkhar Limestone Mine** and **1.2: Overview of the Project** in Chapter 1 of this draft EIA-EMP report.

Table 2.2: Details of environmental settings in and around the proposed project

S. No.	Aspects	Description
1	Project Name	Lynti Dkhar Limestone Mine
2	Mining Lease Area	1.36 Ha.
3	Minerals of Mine	Limestone
4	Land Type	Private Land
5	Category of the Project	**"B1"**
6	Total Mineral Reserve	5,05,197 Tonnes
7	Life of Mine	10 years
8	Average Annual Production	50519.7 Tonnes
9	Method of Mining	Opencast Semi-mechanised
10	Working Days/Year	300
11	Average Man Power/Day	25 (13 skilled, 7 semi-skilled, and 5 unskilled)
12	Water Requirement	7.5 KLD (Dust Suppression – 2.0 KLD, Cleaning of HEMMs and other machinery – 2.0 KLD, Drinking and Domestic Purposes – 1.25 KLD, Greenbelt Development – 2.0 KLD)
13	Source and Supply of Water	Water will be taken from nearby water sources by hiring tankers
14	Solid Waste Generation	The generated gritty soil will be dumped at NE side of the applied area with standard safety precautions and will be used for road maintenance and greenbelt development.
15	Seismic Zone	**Zone V** as per IS 1893 (Part 1): 2002

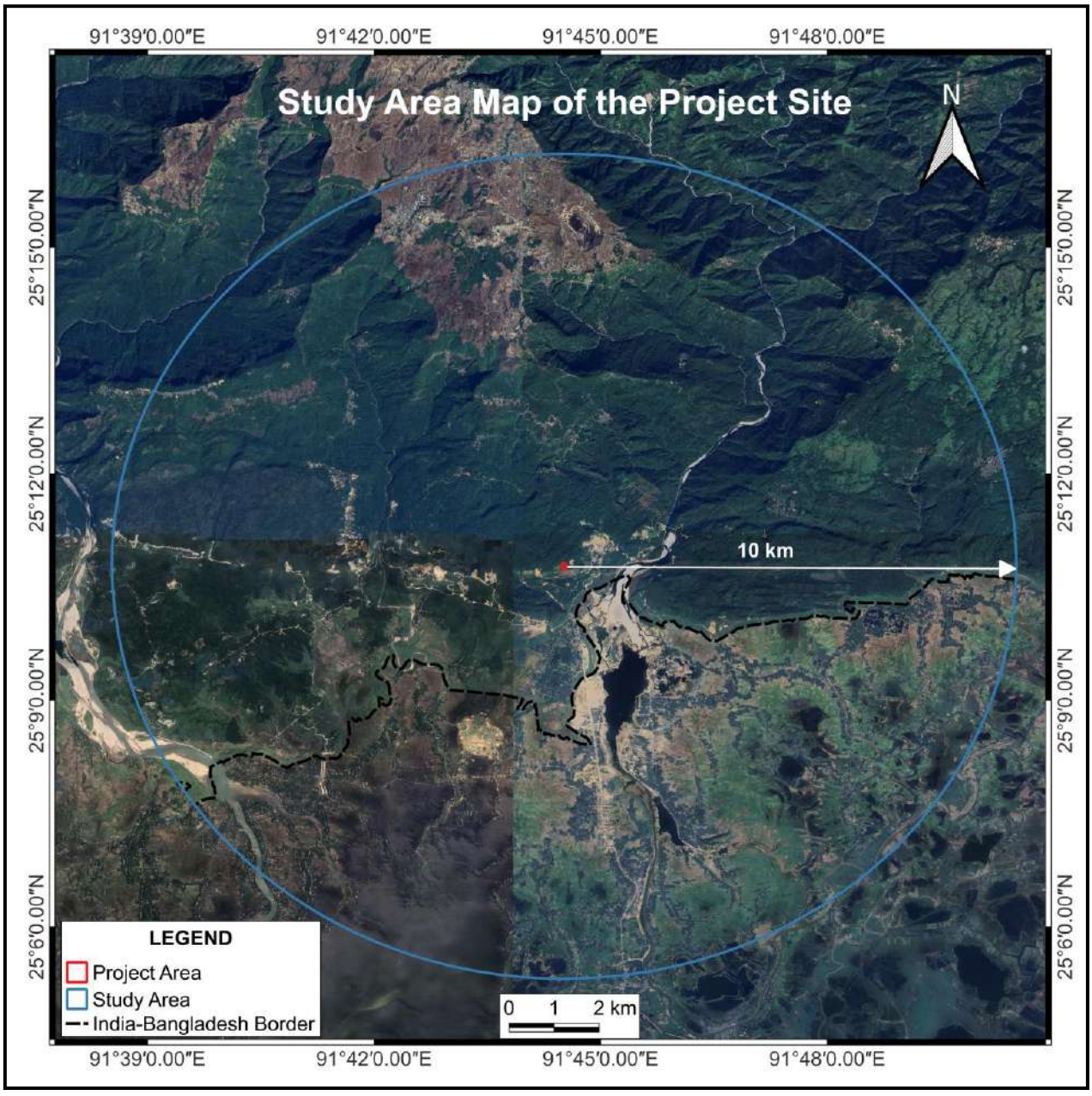


Fig 2.1: Study Area Map of 10 Km Radius – Lynti Dkhar Limestone Mine

Shillong, the District HQ and capital of Meghalaya is accessible from the project site via MDR 27, SH 5, and NH 206. MDR 27 is located ~0.60 km away towards East from the site. There is also a well-established haul road that provides sufficient transportation capacity for trucks and dumpers to transport materials to and from the project site. The 10 km radius study area map from the boundary of the project site is elaborated in **Figure 2.1** and details of environmental settings of

the project are given in **Table 2.2** above.

2.4. SIZE OR MAGNITUDE OF OPERATION

The size and magnitude of the project is given in **Table 2.3** below:

Table 2.3: Size or magnitude of the project

S. No.	Particulars	Details
1	Area of the project	**1.36 Ha.**
2	Mineable Reserve	**505197 T**
3	Average Annual Production	**50519.7 TPA**
4	Production of Gritty Soil	**4650 T (for LoM)**
5	Life of Mine (LoM)	**10 Years**
6	Employment Potential	**25 (13 skilled, 7 semi-skilled, and 5 unskilled)**
7	Machinery Required for limestone transportation	**2 Tippers of 10 MT capacity**

2.4.1. Mining Technology

Opencast semi-mechanized mining will be adopted to extract limestone. The targeted peak production of limestone is about 50544 T.

Table 2.4 below provides a brief overview of the scope of operations (Mine Design Parameters) in the project.

Table 2.4: The Mine Design (Physical) parameters

Parameter	Description
Average depth of the quarry	**15 m**
Width x Height of the Benches	**6 m x 6 m**
Overall Pit Slope	**45°**

2.5. PROPOSED SCHEDULE FOR APPROVAL & IMPLEMENTATION

The project will be implemented after completion of essential administrative procedures, including issuance of Environment Clearance (EC) from SEIAA and Consent to Establish/Operate from the SPCB. The project implementation shall be done as per the conditions stipulated in the approved Mining Plan and Grant of EC Letter.

This is a new proposal and there is no past production of mineral from this project. Mineable reserve of 5,05,197 Tonnes will be extracted in 10 years with an average annual production of 50,519.7 TPA. The average annual production may vary from the yearly production in the upcoming plan period. Proposed production in the first 5 years would be 2,52,570 Tonnes. Targeted Peak production during LoM is 50,544 T. Future production programme has been planned as per the details given in **Table 2.5** below.

Table 2.5: Year-wise development of Lynti Dkhar Limestone Mine

Year	Production of Limestone in Tonnes	Removal of Gritty Soil in Tonnes
1st	50504	3402
2nd	50528	1248
3rd	50463	0
4th	50531	0
5th	50544	0
6th	50525	0
7th	50525	0
8th	50525	0
9th	50526	0
10th	50526	0
Total	**505197**	**4650**

(***Source:*** *As per the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine)*

The project will be executed after getting all the necessary statutory clearances and a timeline for the same has been furnished in **Table 2.6** below.

Table 2.6: Tentative schedule of obtaining/already obtained statutory clearances till grant of EC

S. No.	Description	Tentative Schedule/Date
1	Non-Forest Land Certificate from the Office of the Divisional Forest Officer, East Khasi Hills & Ribhoi (T) Division, Shillong, Government of Meghalaya vide letter No. **KH/8/NOC/Limestone/41/Pt.IV/2720**	2nd September, 2022
2	Letter of Intent (LoI) for granting mining lease from the Office of the Divisional Forest Officer, East Khasi Hills & Ribhoi (T) Division, Shillong, vide letter No. **KH/8/ML/Limestone/68/6085**	26th March, 2024
3	No Objection Certificate from the office of the Sohbar Sirdarship, Sohbar, East Khasi Hills District, Meghalaya vide Reference No. **SSS/Adm/A-48/2022-24/39**	26th April 2024
4	Approval of the Mining Plan and Mine Closure Plan from the Mining Engineer, Directorate of Mineral Resources, Shillong vide letter **No. DMR/MM/199/2024/04**	6th July, 2024
5	Details of approved Mining Plans lying within 500 metres of the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine certified by Mining Engineer, Directorate of Mineral Resources, Shillong vide Letter **No. DMR/MM/199/2024/09**	23rd July, 2024
6	Grant of Terms of Reference (ToR) for Lynti Dkhar Limestone Mine vide letter No. **ML/SEAC/SEIAA/PP/EKH/83/2024**	6th December, 2024
7	Submission of Draft EIA/EMP for Public Consultation	
8	Conduct of Public Consultation by the project proponent at a prescribed venue	
9	Submission of Final EIA/EMP for grant of EC	
10	Approval/Grant of Environmental Clearance from SEIAA, Meghalaya	

2.6. MINING TECHNOLOGY AND PROCESS DESCRIPTION

2.6.1. Mining Technology

Under the prevailing geo-mining conditions, opencast semi-mechanized mining will be carried out with drilling and blasting during the proposed plan period in the area as the deposit is massive and compact in nature. Jack hammer drill machine, rock breaker, excavator and air

compressor will be deployed for drilling and blasting operation.

The benching system of 6 m x 6 m will be practiced in the area in order to comply with the provisions of Metalliferous Mines Regulations, 1961. Bench slope angle for stabilization of the benches will be maintained at 45°.

2.6.2. Mining Process

Jack hammer drill machine will be deployed for drilling of shot holes ranging from 35 to 32mm diameter and breaking of limestone at the required size will also be done manually. For blasting of holes with burden and spacing of 0.8m x 1.0m in a staggered grid pattern would be adopted. Muffle blasting will be adopted as precautionary measure to control fly rocks. Excavation and handling of gritty soil, if necessary, will be done by excavator. The maximum bench height and width will be restricted to the statutory 6m x 6m due to compactness of the hardstone as per the DGMS norms and the overall pit slope of 45° will be maintained. A Flowchart showing the sequence of mining process details as described above has been furnished below:

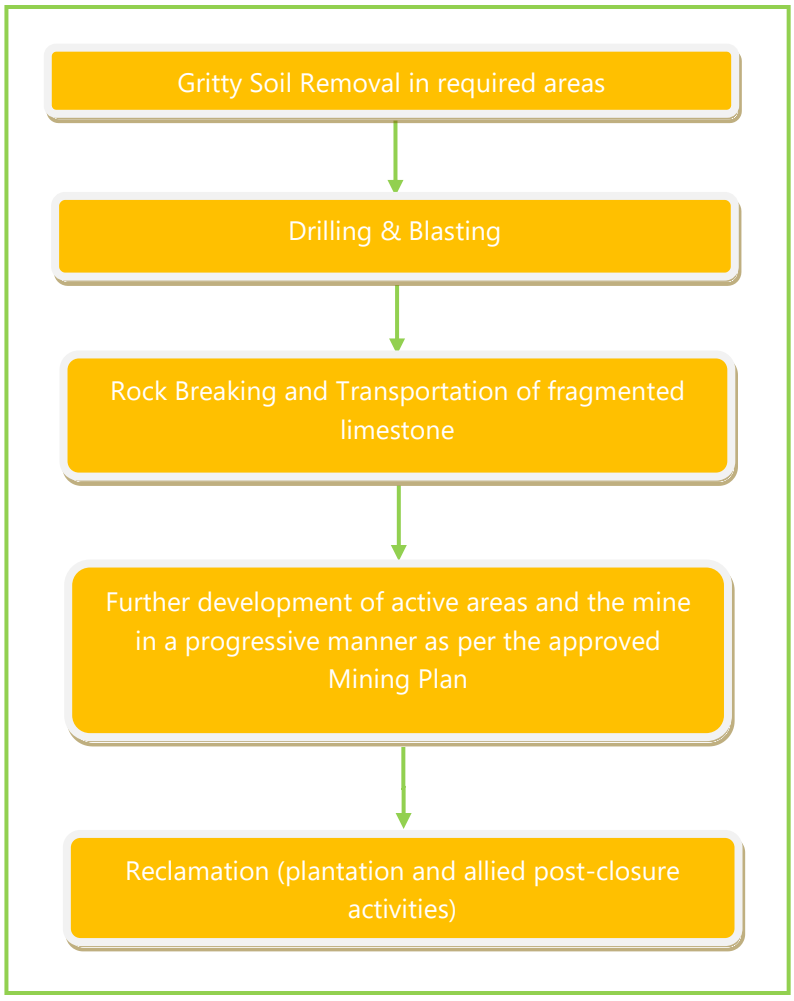


Fig 2.2: Mining Process Flow Chart

2.6.2.1. Drilling and Blasting

Blasting is one of the most critical activities of any mining operation. For forming the working benches, drilling and blasting is done in the stone deposit over the specified floor level. The depth of drilling and the quantity of explosives to be charged are determined so that after the blasting is carried out, the breakage of stone will be up to the proposed floor levels.

In this mine, shallow - hole drilling would be in practice. Holes would be drilled in hard formation by Jack hammer drill having diameter from 35 mm to 32 mm. The holes are generally made up to 1.76 m (including 0 16 m sub-grade drilling to break the toe) depth. Burden and spacing would be maintained at 0.8 m and 1.0 m depending upon the compactness of formation. The pattern of delay blasting will take into account existence of

any natural cleavage layout and sequence of firing of the blast-holes pattern proposed for blasting.

The distribution of charge in the blast hole will be bottom charge is to column charge in the ratio of 15:85.

Blast holes shall be initiated by non-electric (NONEL) down-the-hole (DTH) delay detonators. NONEL trunk-line delay detonator will be used for trunk line connections. The shots will be fired using exploder approved by DGMS. In case of non-availability of detonators provision will be kept for ordinary fuse blasting.

Diesel-operated air compressors of 120 cfm capacity - 2 Nos and Air operated Jackhammer Drills of 1800 to 2000 RPM – 2 Nos., will be utilised for drilling of blastholes.

2.7. GEOLOGICAL PLAN AND SECTIONS

The Surface Plan (Plate – 3), and Geological Plan and Section (Plate – 4) are shown below as **Figures 2.3** and **2.4**, respectively.

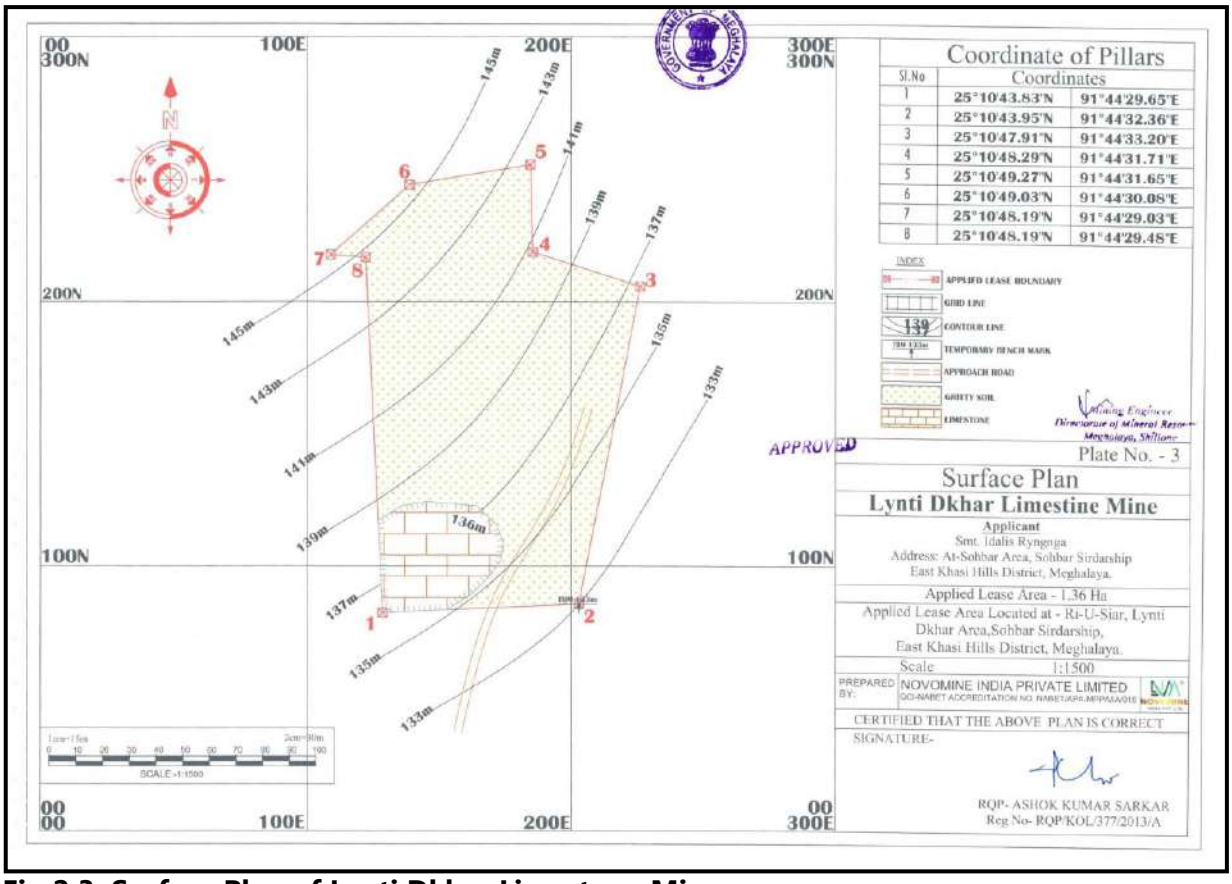


Fig 2.3: Surface Plan of Lynti Dkhar Limestone Mine

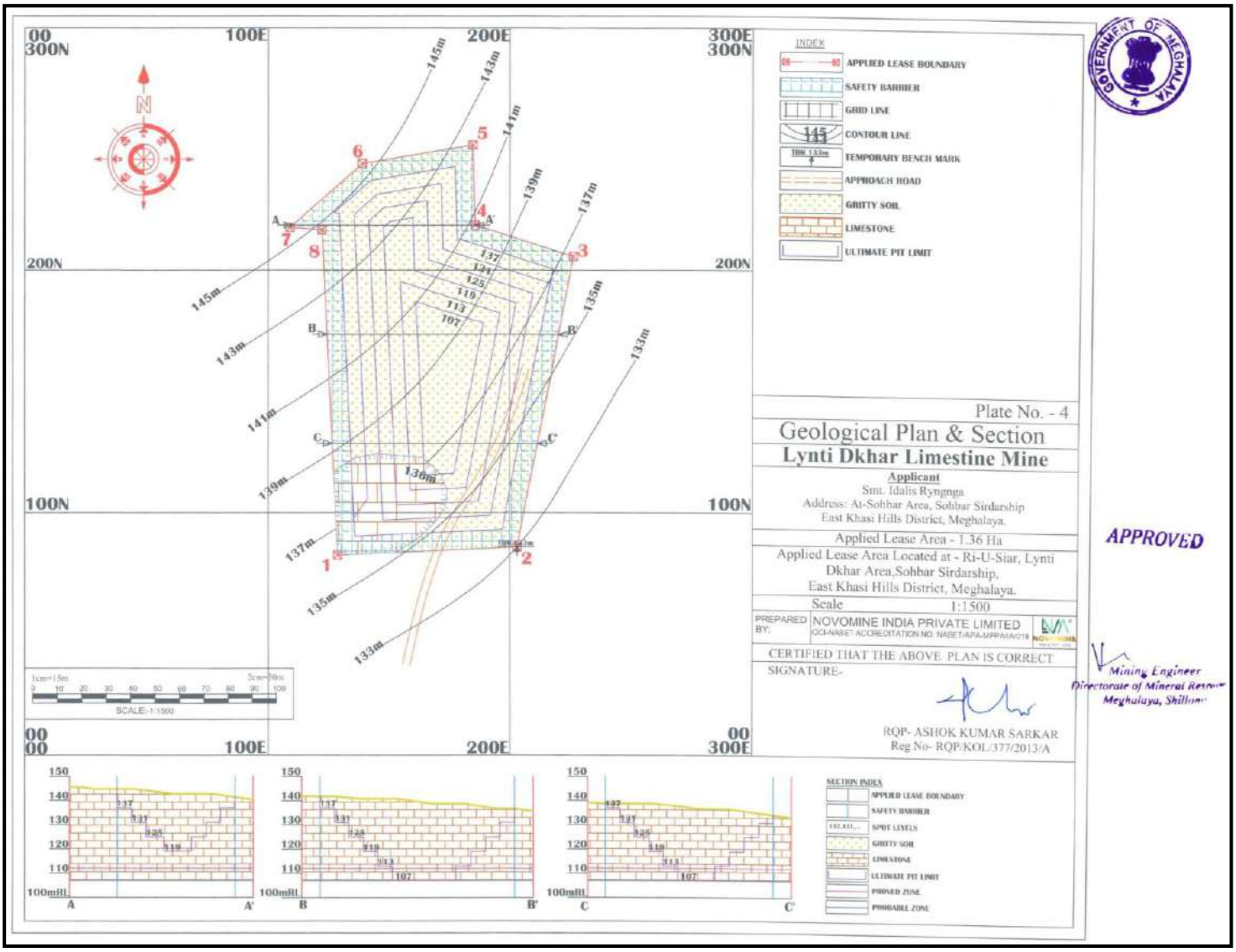


Fig 2.4: Geological Plan & Section of Lynti Dkhar Limestone Mine

2.8. GEOLOGICAL RESERVES

Resources have been divided into two categories: **Proved Reserve** and **Probable Reserve**.

Up to an average depth of 29 metres from average ground level has been taken as Proved Reserve Category on the basis of Limestone exposed in the quarry face of the nearby mines and also from the exposure on hill top and slope as well from the nala cutting section around the applied area and further up to a depth of 5 metres has been taken as Probable Reserve Category.

Mineable reserve is based on the mineable part of the reserve. Mineable mineral (Limestone) reserve has been calculated from the geological reserve in the area considering the stone which is to be left out and maintained as Safety Barrier of 7.5 meters within the ML boundary and in consideration of the ultimate pit limit as calculated from the Geological Plan and Section.

Details of the estimated mineral reserves are provided in **Table 2.7** below:

Table 2.7: Geological Reserves

Reserves	Quantity (T)
Proved Geological Reserve	977986
Mineable Proved Reserve	**475559**
Probable Geological Reserve	179739
Mineable Probable Reserve	**29638**
Total Mineable Reserve	**505197**

2.9. YEAR-WISE DEVELOPMENT AND PRODUCTION PROGRAMME

Mining will be continued from northern side of the area and advanced towards southern direction attaining further depth. Details of advancement and formation of benches are shown in the Development Plan & Section (Plate – 5) in the scale of 1:1500.

1st year: Working will be started from top hilly portion of the northern side of the area with one bench having benching dimension of 6 m x 6 m up to the RL 137 m. During quarry advancement of gritty soil will be removed and dumped on the northern side with suitable precautions. For haulage of the stone, ramp will be maintained at the quarry face. Details of calculations are given below:

LIMESTONE PRODUCTION 1ST YEAR						
BENCH RL (m)	**SECTION**	**SECTIONAL AREA (m^2)**	**LENGTH OF INFLUENCE (m)**	**VOLUME (m^3)**	**T. F**	**LIMESTONE (TONNES)**
143-137	A-A'	291	45	13095	2.7	35357
143-137	B-B'	170	33	5610	2.7	15147
TOTAL				**18705**		**50504**

SOIL REMOVAL 1ST YEAR						
BENCH RL (m)	**SECTION**	**SECTIONAL AREA (m^2)**	**LENGTH OF INFLUENCE (m)**	**VOLUME (m^3)**	**T. F**	**GRITTY SOIL (TONNES)**
143-137	A-A'	24	45	1080	1.5	1620
143-137	B-B'	36	33	1188	1.5	1782
TOTAL				**2268**		**3402**

2nd year: During 2nd year, working will be advanced towards southern part in the same working face with two benches having 6 m x 6 m with up to the RL 131 m RL. During quarry advancement some quantity of gritty soil will be removed and would be dumped on the north-eastern side of the ML area with suitable precaution. For haulage of the stone, ramp will be maintained at the quarry face. Details of calculations are given below:

LIMESTONE PRODUCTION 2nd YEAR						
BENCH RL (m)	**SECTION**	**SECTIONAL AREA (m^2)**	**LENGTH OF INFLUENCE (m)**	**VOLUME (m^3)**	**T. F**	**LIMESTONE (TONNES)**
143-137	C-C'	47	22	1034	2.7	2792
137-131	C-C'	340	52	17680	2.7	47736
TOTAL				**18714**		**50528**

SOIL REMOVAL 2ND YEAR						
BENCH RL (m)	**SECTION**	**SECTIONAL AREA (m^2)**	**LENGTH OF INFLUENCE (m)**	**VOLUME (m^3)**	**T. F**	**GRITTY SOIL (TONNES)**
137-131	C-C'	16	52	832	1.5	1248
TOTAL				**832**		**1248**

3rd year: During 3rd year, working will be continued in the central part In the same working face and further depth with one bench of 6 m x 6 m in dimension up to the RL 131 m. During this year no gritty soil will be also removed. For haulage of the stone, ramp will be maintained at the quarry face. Details of calculations are given below:

LIMESTONE PRODUCTION 3rd YEAR						
BENCH RL (m)	**SECTION**	**SECTIONAL AREA (m^2)**	**LENGTH OF INFLUENCE (m)**	**VOLUME (m^3)**	**T. F**	**LIMESTONE (TONNES)**
137-131	B-B'	445	42	18690	2.7	50463
TOTAL				**18690**		**50463**

4th year: During this year working will be continued towards northern direction in the same working face with two benches of 6 m x 6 m in dimension up to the RL 125 m. No gritty soil will be generated during this year of mining. For haulage of the stone, ramp will be maintained at the quarry face. Details of calculations are given below:

LIMESTONE PRODUCTION 4th YEAR						
BENCH RL (m)	**SECTION**	**SECTIONAL AREA (m^2)**	**LENGTH OF INFLUENCE (m)**	**VOLUME (m^3)**	**T. F**	**LIMESTONE (TONNES)**
137-131	A-A'	250	54	13500	2.7	36450
131-125	A-A'	149	35	5215	2.7	14081
TOTAL				**18715**		**50531**

5th year: During this year working will be continued in the same working face and further depth with one bench of 6 m x 6 m in dimension up to the RL 125 m. No gritty soil will be generated during this year of mining. For haulage of the stone, ramp will be maintained at the quarry face. Details of calculations are given below:

LIMESTONE PRODUCTION 5th YEAR						
BENCH RL (m)	**SECTION**	**SECTIONAL AREA (m^2)**	**LENGTH OF INFLUENCE (m)**	**VOLUME (m^3)**	**T. F**	**LIMESTONE (TONNES)**
131-125	B-B'	390	48	18720	2.7	50544
TOTAL				**18720**		**50544**

*(**Source:** As per the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine)*

The year-wise limestone production is shown in **Figure 2.5**.

2.10. LIST OF MINING EQUIPMENT

The details of equipment for the proposed limestone production are given below:

Mine working days : 300

No. of operating shifts/day : 1 (8-10 working hours/day)

Limestone to be produced/day : 168 T (considering annual average production of 50519.7 TPA)

The project requires involvement of transportation systems like loading/excavating machines, power, water, manpower and supporting services like mine office, rest shelter, canteen, washroom facility and other temporary infrastructure. The detailed description of the proposed HEMM configuration is presented in **Table 2.8** below:

Table 2.8: List of proposed machinery and equipment*

S. No.	Type of machine	No.	Size/capacity	Motive power	hp
1	Excavator	2	0.6 cum	Diesel	115
2	Compressor	2	120 cfm	Diesel	–
3	Jackhammer Drill	2	–	Compressed Air	–
4	Tipper	2	10 MT	Diesel	98.5
5	Rock Breaker	1	–	Diesel	–
6	Water Tanker	1	–	Diesel	–

*(All machines will be deployed on a hire basis)

*(**Source:** As per the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dhar Limestone Mine)*

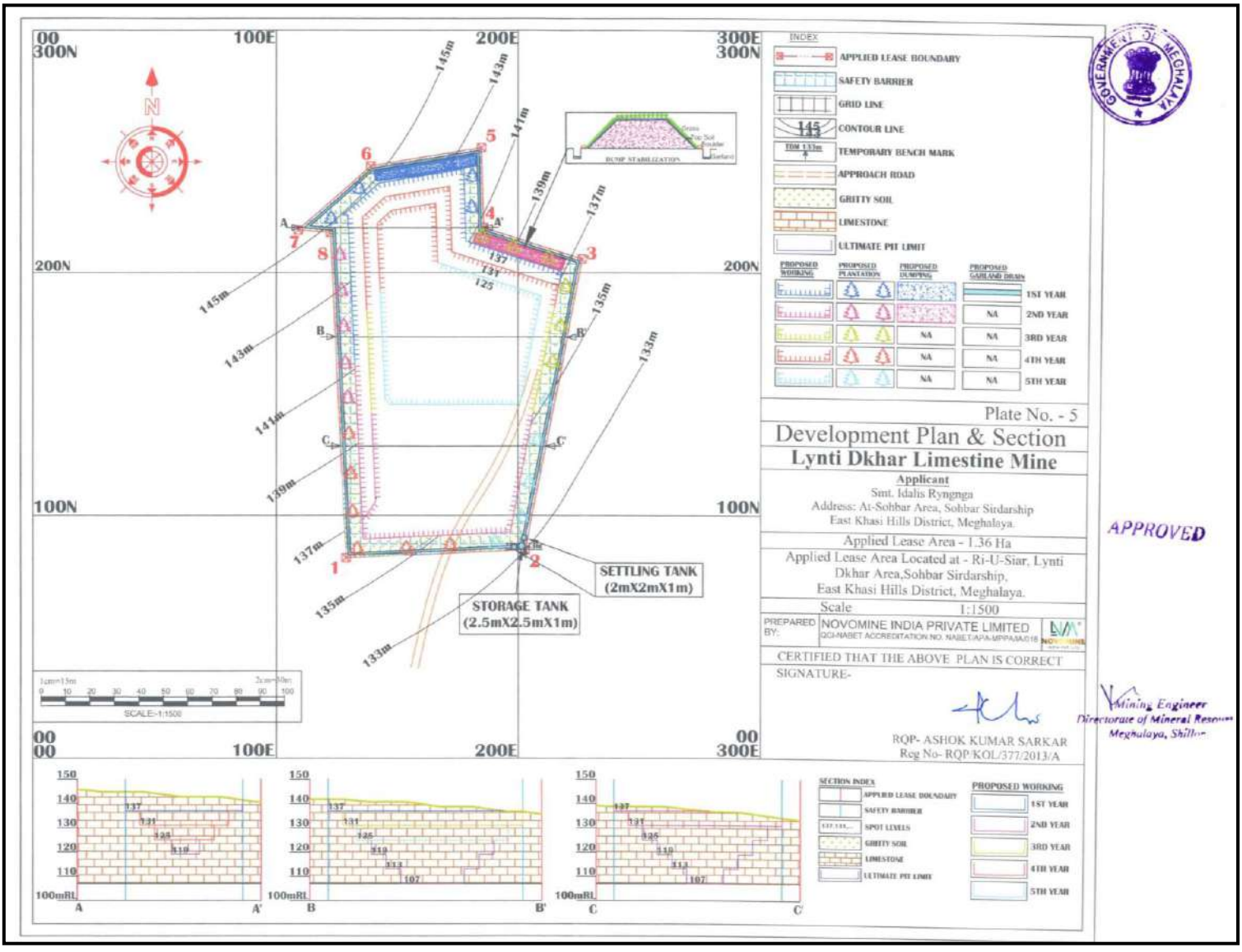


Fig 2.5: Development Plan and Section of the proposed Lynti Dkhar Limestone Mine

2.11. MINE DRAINAGE

There exists no surface water body within the proposed area of mining. Wah Tharia River, the nearest waterbody, is flowing at about 1.1 km south-east of the block. There are no wells or natural springs inside the proposed mining lease area. However, from secondary data, it is observed that the depth of the water table is varying from summer to monsoon seasons. The area is sloping and working will be kept restricted above groundwater table. Groundwater levels in the dug/bore wells present in the neighbouring areas will be regularly monitored. During the rainy season, rain water falling on the mine with silt and clay, wash off particles of the surrounding area will be flown through the garland drain to the settling tank into which the transported suspended particles will be precipitated and allow clear sump water to overflow to the storage tank from where it will be used for plantation, water sprinkling on haul road and daily washing of machineries / transport vehicles during the dry season for plantation and to meet the mine's day-to-day requirements. Two settling or siltation tanks will be constructed. No water will be discharged to any natural drainage systems surrounding the mine lease boundary. If any discharge is required, the mine pit water shall be treated through the siltation tanks. De-siltation will be done at regular intervals. A garland drain will be constructed along the boundary of the pit as the mine progresses. So, adequate control measures will be taken to prevent water pollution/contamination.

2.12. EXISTING AND PROPOSED LAND USE PATTERN

The land use pattern of the mine lease area across different phases: existing, after first five years, and after the end of Life of Mine is tabulated in **Table 2.9** below:

Table 2.9: Land Use Pattern of the Mine Lease Area

Existing Land Use Pattern		
S. No.	**Category**	**Area in Ha.**
1	Excavated land	0.16
2	Road	0.01
3	Balance unused area	1.19
Total		**1.36**
Land Use pattern after first five years		
S. No.	**Category**	**Area in Ha.**
1.	Excavated land including road	1.01
2.	Greenbelt in safety barrier	0.26
3.	Dump with parapet wall and garland drain	0.09
Total		**1.36**
Land Use pattern at the end of Life of Mine (LoM)		
S. No.	**Category**	**Area in Ha.**
1.	Excavated land including reclamation	1.01
2.	Greenbelt	0.35
3.	Balance unused land	0.00
Total		**1.36**

(***Source:*** *As per the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine)*

Notes on Conceptual Plan for the Lease Period:

Mining will be continued in a similar manner with the help of machinery and manual manpower for digging, excavation and removal of limestone in conjunction with shot hole drilling by jack hammer drill. Mining operation shall be carried out in compliance with the provisions of the MMR, 1961.

During the first five years, the area will be worked out maintaining a 7.5 m Safety Barrier. The voids created by mining will be reclaimed after the conceptual period of mining.

2.12.1. Proposed Greenbelt Development and Plantation Details

A progressive biological reclamation exercise will be undertaken to ensure restoration by means of revegetation in all areas impacted by mining operations during the backfilling of mine voids, road preparation, and rehandling of OB. Within the plan period of 5 years, greenbelt over 0.26 Ha.

will be developed within the safety barrier of 7.5 meters and after the end of LoM, greenbelt cover will be 0.35 Ha (indicated in **Table 2.9**).

Additionally, the reclaimed area of 1.01 Ha, will also be developed as green cover, to restore and enhance the site's natural condition.

Therefore, approx. **100%** of the 1.36 Ha. within the block will be targeted for ecological reclamation at the end of the life of mine (LoM) and post-closure period. To develop the area of 1.36 Ha., native species will be acquired from the nearest available State Forest Nursery/Horticulture Department. However, the proponent will take steps towards the development of a nursery within the mine lease area to substantiate the availability of saplings as and when required.

A list of species recommended in the afforestation/plantation programme of Lynti Dkhar Limestone Mine is furnished in **Table No. 4.8**.

2.13. RESOURCE REQUIREMENT

2.13.1. Water Requirement

The water required for the project will be made available by hiring water tankers on a rotational basis from the nearby village of Bholaganj. However, a combination of various water sourcing options will be provided, including which water from temporary sumps created during mining operations, water accumulated in the dip end places of surface voids due to natural seepage as well as rainwater, water collected from the proposed rainwater harvesting infrastructure cum settling tanks, and water sourced from nearby Tharia River. The total water requirement is estimated at 3.5 KLD. The use wise water requirement is presented in **Table 2.10** below:

Table 2.10: Requirement of Water in the proposed Lynti Dkhar Limestone Mine

Details	KLD
Dust Suppression	2.00
Cleaning of HEMMs and other machinery	2.00
Drinking and Domestic	Water requirement for drinking & domestic purposes per person in the mine is 50 L/day. Therefore, requirement is 25 x 50 = 1250 L/day (**~1.25 KLD**)
Green Belt Development/Plantation	2.00
Total	**7.25 (~7.5 KLD)**

2.13.2.Manpower Requirement

For mines safety under the provisions of the Metalliferous Mines Regulations of 1961 (MMR 1961) under the Mines Act of 1952, whenever the number of workers employed is more than 10, it is preferred to have a qualified Mines Mate to keep all the production workers directly under his control and supervision. The following manpower is proposed for quarrying limestone to achieve the proposed production and to comply with the provisions of the government norms.

This project has generated and will continue to generate direct & indirect employment in the locality. About 25 people were directly employed and some persons were also benefitting indirectly and employed in allied industries such as transportation of the mineral and overburden/topsoil, mine maintenance, HEMM maintenance, etc. Manpower that shall be required during the project's operational phase is given in **Table 2.11** below:

Table 2.11: Manpower Required

Employees	Proposed
Manager	1
Supervisor	1
Storekeeper	1
Attendance Clerk cum Register Keeper	1
Excavator Operator	2
Driller	1
Driller helper	1
Tipper Driver	3
Rock Breaker Operator	1
Water Tanker Driver	1
Miners (Semi-skilled)	7 (inclusive of absentees & leave)
Unskilled	5
Total	**25**

(***Source:*** *As per the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine)*

2.14. DESCRIPTION OF MITIGATION MEASURES INCORPORATED INTO THE PROJECT TO MEET ENVIRONMENTAL STANDARDS

Environmental mitigation measures for this project have been discussed in detail in **Chapter 4**.

2.15. ASSESSMENT OF NEW & UNTESTED TECHNOLOGY FOR THE RISK OF TECHNOLOGICAL FAILURE

The technology described and proposed in this Draft EIA Report is time tested, and there is no such new and untested technology for risk of technological failure known till so far. Hence, not described here.

2.16. FEASIBILITY DRAWINGS PROVIDING INFORMATION IMPORTANT FOR EIA PURPOSE

i. A detailed water balance (**Figure 2.6**) describing the use of water in the proposed project

ii. A Mine Layout Plan (**Figure 2.7**) describing the conceptualised layout for the proposed project.

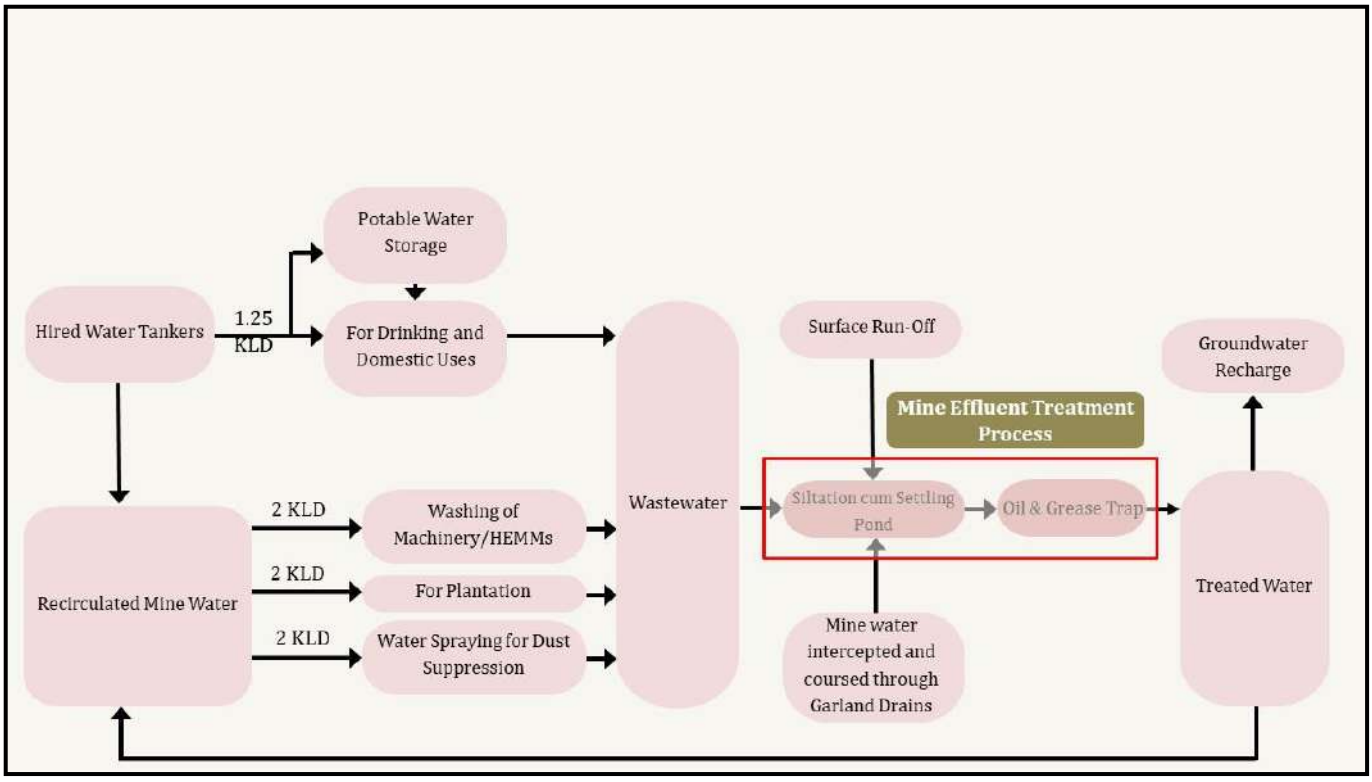


Fig 2.6: Proposed Water Balance Diagram for Lynti Dkhar Limestone Mine

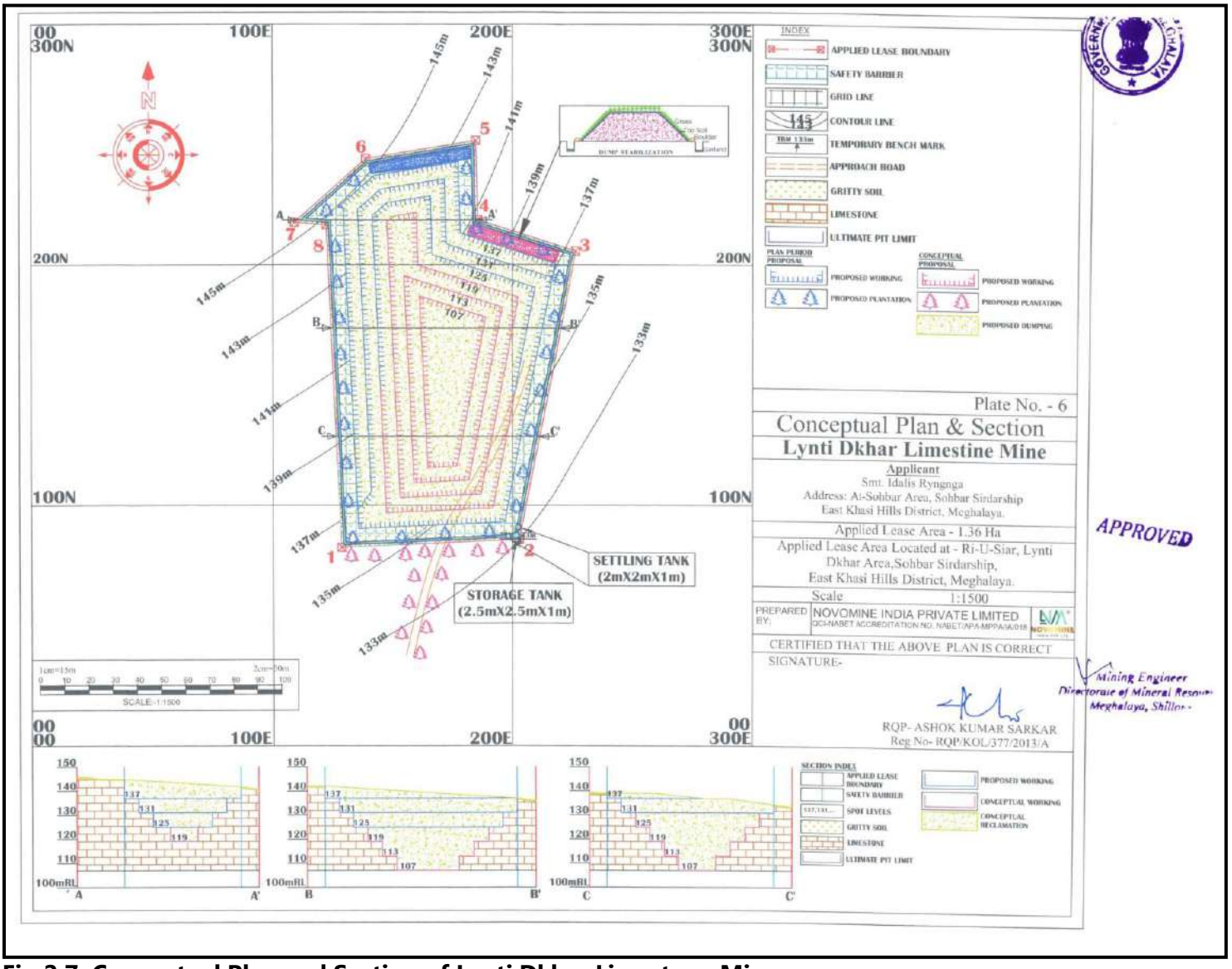


Fig 2.7: Conceptual Plan and Section of Lynti Dkhar Limestone Mine

Chapter 3 – DESCRIPTION OF ENVIRONMENT

3.1. INTRODUCTION

Baseline data collection is a crucial component of an Environmental Impact Assessment (EIA) study. It involves gathering comprehensive information on the existing environmental conditions in the study area. This data is essential for evaluating the anticipated impacts of a project on various environmental aspects using established impact assessment methodologies. Baseline environmental studies were carried out in and around Lynti Dkhar Limestone Mine project to determine the baseline environmental trends and anticipated impacts of mining in the area once the project commences after receiving all statutory clearances. This is done to formulate an effective and comprehensive Environmental Management Plan (EMP).

3.2. STUDY AREA, PERIOD, SCOPE OF BASELINE ENVIRONMENTAL STUDIES

3.2.1. Study Area

The study area is defined as the Core Zone (entire ML area) and the Buffer Zone (area falling within 10 km radius from the periphery of the ML area).

3.2.1.1. Core Zone

The core zone consists of 1.36 Ha. of land, located in the south of East Khasi Hills District of Meghalaya, India. It lies between Latitudes 25°10'43.83"N to 25°10'49.27"N and Longitudes 91°44'29.03"E to 91°44'33.20"E and is covered in Toposheet No. 78O/12 (R.F 1:50,000) of Survey of India, the Datum is WGS-84. The Toposheet is restricted for public use.

3.2.1.2. Buffer Zone

The 10 km buffer zone of this project lies within Survey of India Toposheet Nos. 78O/11, 78O/12 (Restricted for Public Use), 78O/15, and 78O/16 (Restricted) and is covered in Shella Bholaganj and Pynursla C&RD Block of East Khasi Hills district in the state of Meghalaya. The district lies in **Zone V** of seismic activity. The study area is primarily undulatory one. Yet, this topography is disrupted by the dramatic geographical features created by its river systems. In the study area rivers Umiew (or Shella, also known as Bagra), Um Sohryngkew (or Wah Tharia), Wah Rew and countless other fast-flowing streams have passed through the study area.

The study area map showing core and buffer zones is given in **Figure 3.1**.

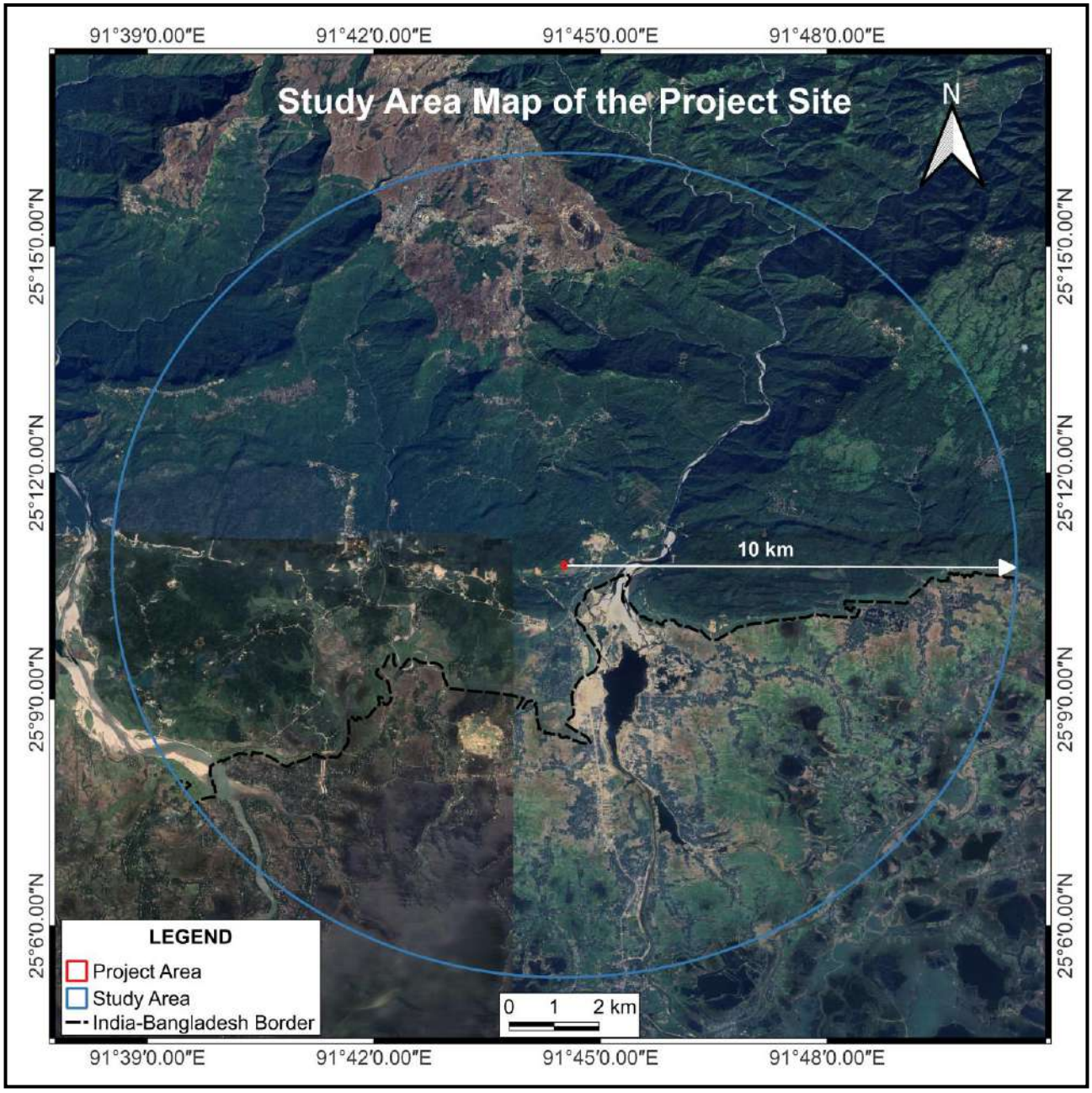


Fig 3.1: Study Area Map showing the core and buffer zones of Lynti Dkhar Limestone Mine

3.2.2. Study Period

Baseline data was collected for one season during the summer period (March 2024 – May 2024) in accordance to BIS, CPCB guidelines, IMD specifications, and MoEF&CC's EIA Guidance Manual for Mining of Minerals.

3.2.3. Study Method & Scope

Baseline data was generated for various environmental components including ambient air, surface and groundwater, land and soil, ecology, and socio-economic factors. A temporary field station was established at Bholaganj village, close to the mine lease area, to facilitate data collection. The team consisted of experts in relevant fields, along with field and office assistants. The Environmental Coordinator (EC) visited the site twice during the study period to ensure proper data collection. The baseline data collection team carried out soil and water sampling, monitored ambient air quality and noise levels, and collected other field data from this field station. Table 3.1 in the report provides details on the sampling methodologies, frequency, and analysis methods for the various environmental parameters required for the study.

The scope of baseline data collection including attributes, monitored components, sampling period, frequency and measurement methods are detailed in **Table 3.1** below.

Table 3.1: Methodology used for Sample Collection & Analysis

Sl. No.	Component	Primary Data					Secondary Sources/ Reference
		Frequency of sampling	No. of Locations	Parameters	Instrument/ Software	Method	
A	**LAND ENVIRONMENT**						
i	Land use & Land cover	Study Area	Core & buffer zone	Land utilization Pattern	QGIS	Supervised Classification	SOI Toposheet, Sentinel 2 & Google Earth Satellite Images
ii	Soil Quality	Once in study period	4	pH, texture, EC, Organic carbon, available N, P, K	Kjeldahl Nitrogen, PH meter, conductivity meter, hydrometer	Gravimetric, photometric	Agriculture Handbook
B	**AIR ENVIRONMENT**						
i	Meteorology & Climatology	Continuous for whole season on hourly basis	1	Temperature, Humidity, rainfall, wind speed and direction	Automatic weather monitoring machine with data logger	-	30-years IMD data from Climatologic-al Tables (1981 - 2010)
ii	Ambient Air Quality	24 hourly samples twice a week for 3-months	5	PM10	Respirable Dust Samplers (APM 460 BL) with gas attachment	Gravimetric	IS-5182 (23)
				SO2		West & Gaeke	IS-5182 (2)
				NO2		Jacobs & Hochheiser	IS-5182 (6)
				PM2.5	Fine Particle Sample	-	-

iii	Noise Level	Once in study period	5		Integrated sound level meter	Measurements were taken by following CPCB procedure	-
C	**WATER ENVIRONMENT**						
i	Water Quality	Once in study period	5 GW 3 SW	Physical, chemical and heavy metals	Spectro-photometer Atomic Absorption Spectro-photometer, Flame Photometer	Titrimetric, gravimetric, photometric, AAS	APHA IS10500: GW Designated Best Use of Water as per CPCB: SW
D	**ECOLOGICAL ENVIRONMENT**						
i	Ecology	Once in study period	Study Area	Flora, fauna	Field data collection	Quadrat Count	Forest Working Plan
E	**SOCIO-ECONOMIC ENVIRONMENT**						
i	Socio-economic	Once in Study period	Buffer zone	Demographic, social, economic & infrastructure	Survey Schedules and Questionnaires	Village-level Survey, and Group Discussion	Census of India 2011

3.3. LAND ENVIRONMENT

The land-use distribution of the study area is given in **Table 3.3**. This table can be meaningfully interpreted from the Land Use Land Cover map of the study area in **Figure 3.4** and from the pie chart in **Figure 3.3**. Further, a map showing the core zone delineating the ML area's physical features such as its land use in the form of haul roads, plantation areas, excavated areas, locations of the overburden and topsoil dump sites, etc.

3.3.1. Environmental Sensitivity

The environmental sensitivity as per Part-III of Appendix-I (Paragraph-6) of Form-I provides for sensitive receptors within 10 km radius of the ML area. **Table 3.2** and **Figure 3.2** also provides the spatial locations of these receptors within the 10km radius of the ML area.

Table 3.2: Environmentally Sensitive Locations within 10 km of ML Area

S. No.	Particulars	Aerial Distance (km)	Direction
Streams			
1	Wah Umiam	9.27	SW
2	Wah Tharia	1.27	ESE

Waterfalls			
3	Shangliar Waterfalls	8.02	ENE
4	Kynrem Waterfalls	5.78	NNW
5	Khlieh Kshaid Kynrem Waterfalls	5.96	WNW
6	Double Drive Water Falls	5.69	NNW
7	Seven Sisters Waterfalls	6.93	N
8	Mawsmai Nongthymmai Eco Park	7.27	N

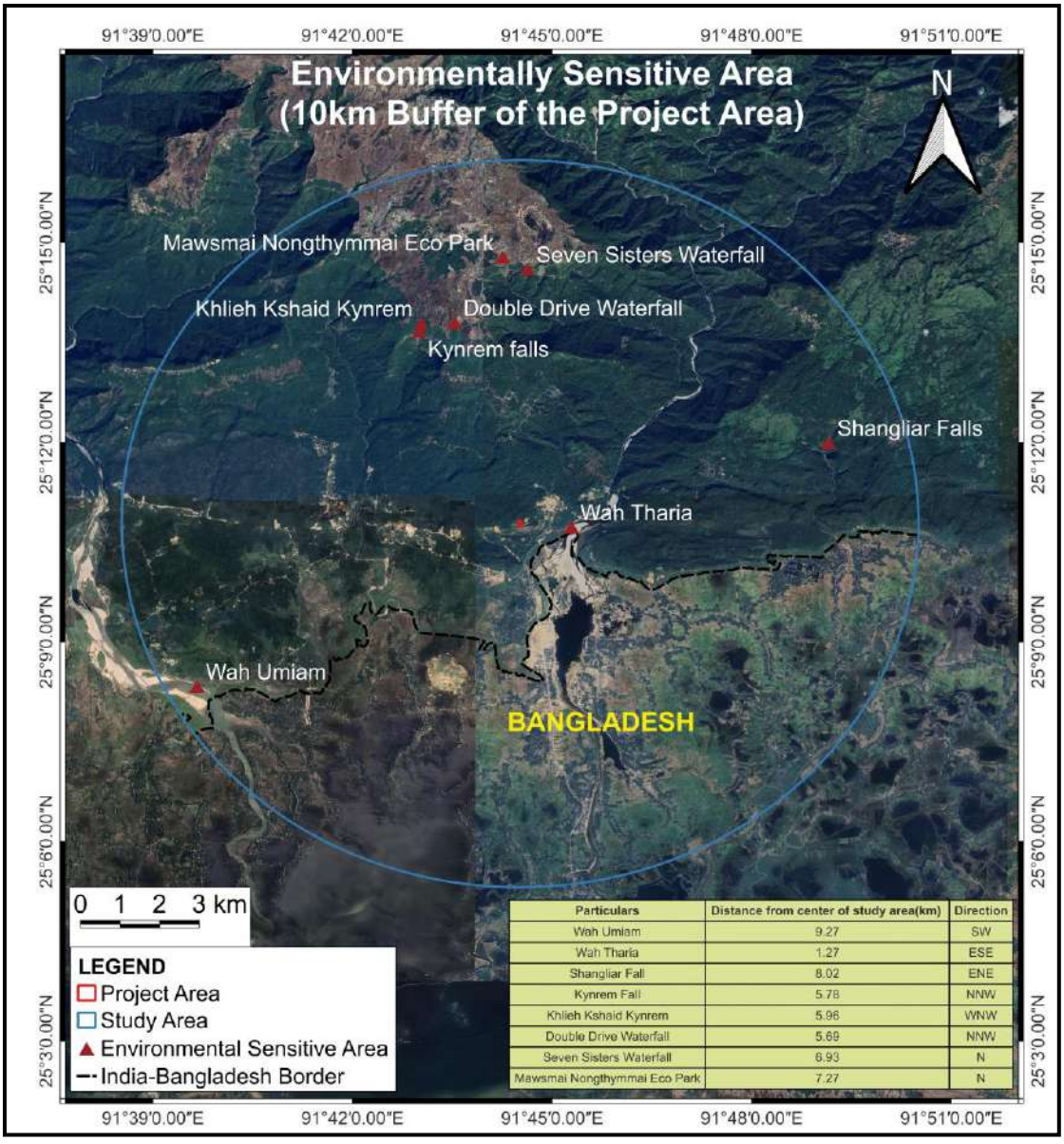


Fig 3.2: Study Area Map of Environmentally Sensitive Locations

3.3.2. Land Use Pattern – Study Area & ML Area

The land-use distribution of the study and ML areas is given in **Table 3.3**. The land use table can be meaningfully interpreted from the Land-Use map of the study area in **Figure 3.4** and from the pie diagram in **Figure 3.3.**

Table 3.3: Details of Land use and Land Cover (LULC) of the Study Area

Land use	Study Area	
	Area in hectare	%
Built-up Area (Urban/Rural)	716.23	3.42
Mining Area	244.78	1.17
Waterbodies	361.37	1.73
Barren/Rocky/Fallow Land	1281.74	6.12
Agricultural Land	974.24	4.65
Vegetation	17338.38	82.84
Plantation	13.54	0.07
Total	**20930.28**	**100.00**

Source: *Chapter 3 of Draft EIA Report of Lynti Dkhar Limestone Mine*

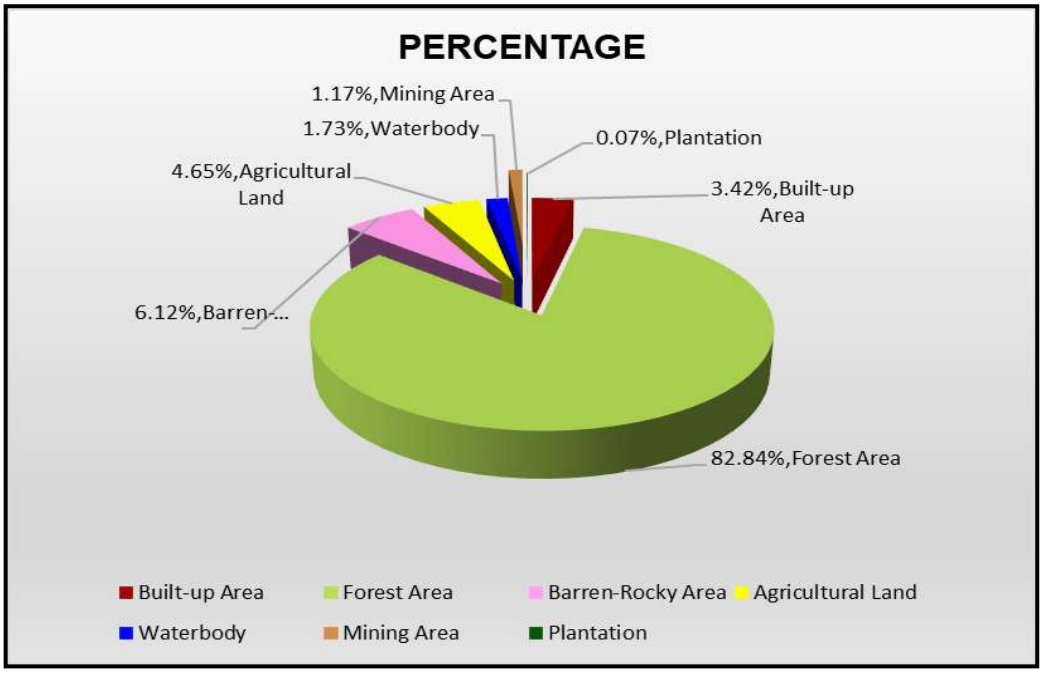


Fig 3.3: Pie diagram of Land Use Pattern of the Study Area

The pie chart clearly illustrates the land use distribution in the study area. Vegetation comprises approximately 82.84% of the area, followed by Barren/Rocky/Fallow land nearly 6.12%. Agricultural area and built-up areas occupy about 4.65% and 3.42% respectively. The remaining portion consists of waterbodies (1.73%), mining area (1.17%) and plantation (0.07%). The land where the proposed mining activities will be carried out has been taken on lease by the project proponent. There are no R&R issues involved with this project. The relevant land document and the LoI are attached as **Annexure 2** and **3** respectively.

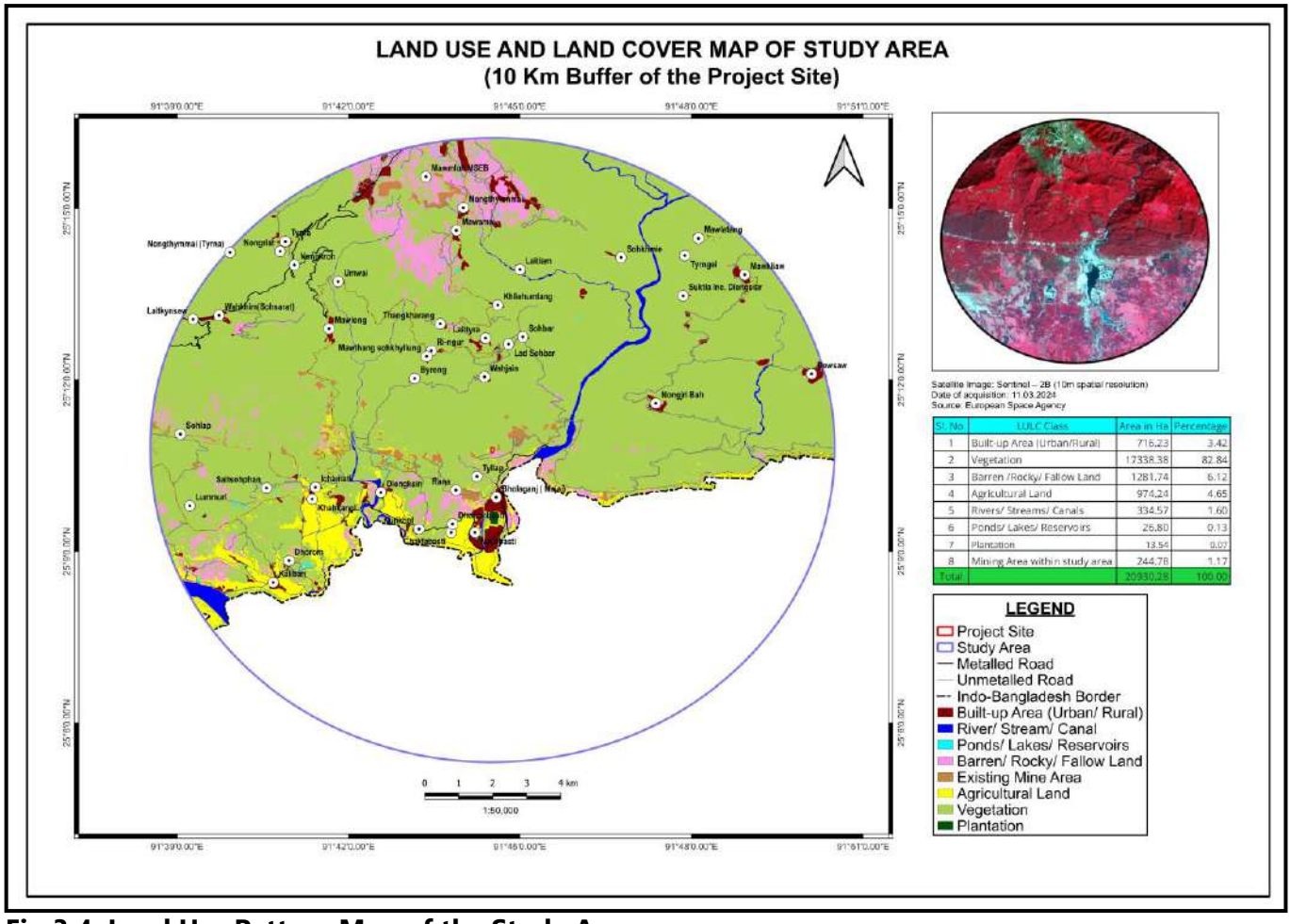


Fig 3.4: Land Use Pattern Map of the Study Area

3.3.3. Seismology

The proposed project site falls in **Zone V** as per the BIS's Seismic Zonation map of India.

3.3.4. Flood Hazard

The area is much above HFL and there is no record of flooding around the mine lease area.

Mining operations will be conducted above the local ground water table.

3.3.5. Soil Quality

Soil quality within the core and buffer zones has been evaluated with respect to physical and chemical parameters. The physico-chemical properties of soil, which are important for plant growth and agricultural productivity such as, soil texture, bulk density, water holding capacity, soil pH, electrical conductivity, and nutrients such as Nitrogen, Phosphorus, Potassium, organic carbon, etc. were analysed for **four soil samples** in the study area. The soil quality as analysed from the samples collected from different sampling locations are given in **Table 3.4** and depicted in **Figure 3.5**.

Table 3.4: Soil Characteristics of the Study Area

Sl. No.	Parameters	Unit	S-1: (Core Zone)	S-2: Bholaganj	S-3: Ichamati	S-4: Sohbar
		Direction	-	SSW	WSW	N
		Distance in Km	0.0	1.83	6.43	3.28
1	pH	----	7.2	6.5	6.9	6.6
2	Electrical Conductivity	µmhos /cm	380.5	387.3	362.5	380.5
3	Soil Texture	----	Sandy Loam			
4	Clay	%	9.4	8.8	11.3	9.6
5	Silt	%	22.2	25.6	21.1	28.1
6	Sand	%	68.4	65.2	67.6	62.3
7	Bulk density	gm/cc	1.32	1.48	1.38	1.49
8	Water Holding Capacity	%	24.4	22.9	24.0	23.2
9	Cation Exchange Capacity	meq/100g	7.1	7.3	6.9	7.0
10	Available Nitrogen	Kg/ha	246.5	272.3	258.0	286.1
11	Available Phosphorus	Kg/ha	4.6	4.4	4.8	5.7
12	Available Potassium	Kg/ha	378.5	461.8	376.7	348.7
13	Organic Carbon	%	1.46	1.35	1.36	1.41

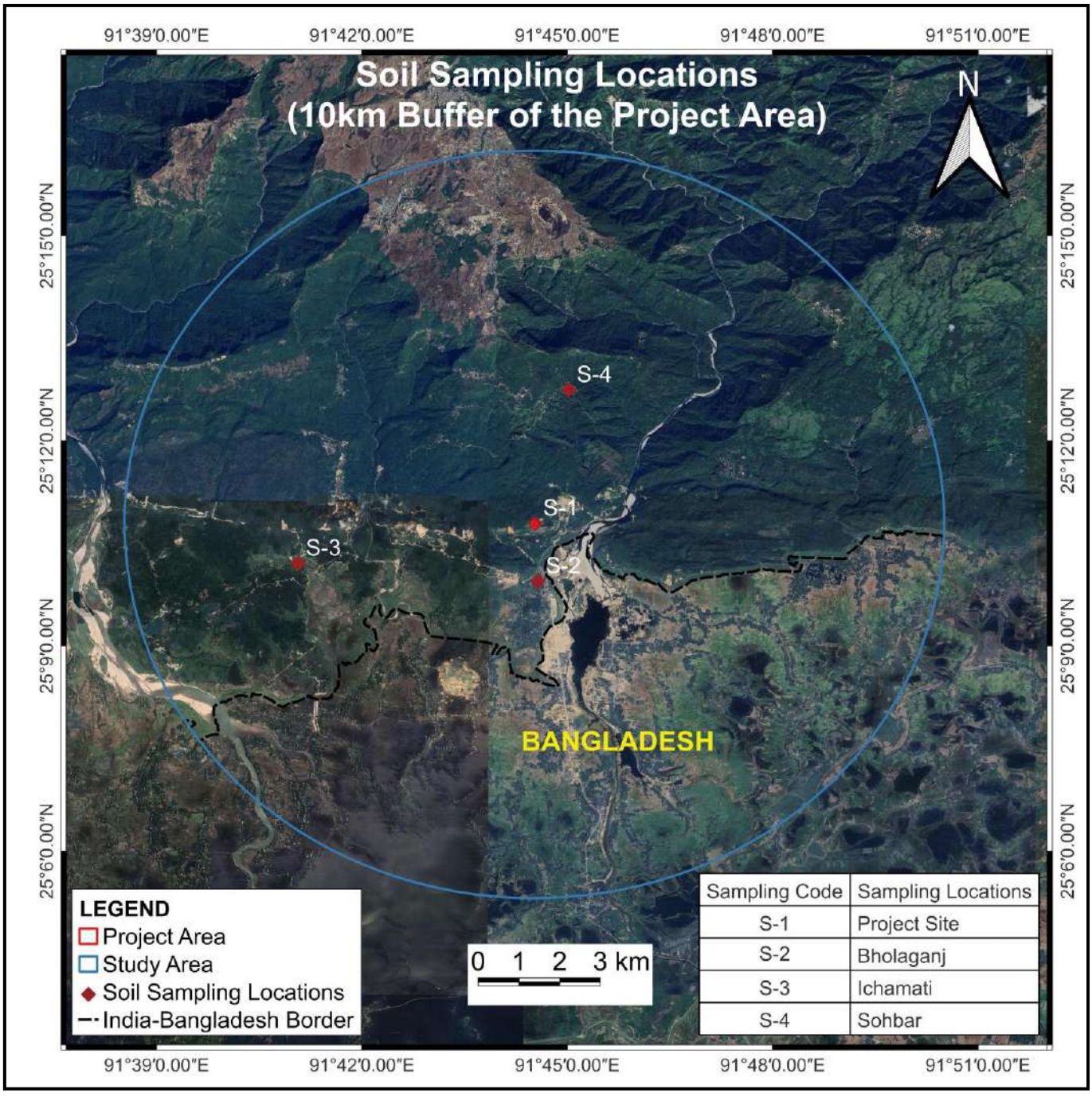


Fig 3.5: Soil Quality Sampling Stations for Lynti Dkhar Limestone Mine

3.4. DESCRIPTION OF PRESENT ENVIRONMENTAL STATUS

3.4.1. Micro-Meteorological Study

3.4.1.1. Importance of micro-meteorological study

The concentration and quality of air pollutants is characterised by such qualities of the ambient air mass into which they are emitted as wind speed, direction of movement, and

other similar attributes. Pollutant concentrations will rise if the atmosphere is still and they are unable to disperse. On the other hand, pollution produced will be quickly distributed throughout the atmosphere and result in lower concentrations close to the pollution source if a strong, turbulent wind is blowing. In the study of air quality monitoring, measures of wind direction, speed, temperature, humidity, and rainfall are crucial factors. Thus, measuring meteorological data is crucial for comprehending how a region's weather affects air pollution concentrations. However, due to the fluctuations of meteorological data with time, interpretations are only valid for long-term reliable data sources such as the IMD (India Meteorological Department). The nearest AWS station from the project site is in Shillong, East Khasi Hills, Meghalaya, approximately 45 km (aerial distance) from the project boundary and the nearest Automatic Rain Gauge Station (ARG) is in Sohra (Cherrapunjee) of East Jaintia Hills district of Meghalaya, approximately 8.5 km (aerial distance) from the project boundary.

3.4.1.2. Analysis of Long-Term IMD Data

The Indian Meteorological Department records the data at two times a day viz. 08:30 hr and 17:30 hr, while the site-specific data was recorded at an hourly interval. Comparison of the site-specific data generated during the study period vis-à-vis the data monitored by IMD shows that by and large these are comparable. The climate condition of the region over 30 years are tabulated in **Table 3.5** below:

Table 3.5: Meteorological Conditions in the Study Area

Sl. No.	Parameter	Season	Months	Monthly Total (mm)	Heaviest fall in 24 hours (mm)	No. of Rainy Days
1	**Rainfall in mm**	Winter (Dec to Feb)	December	21.8	189.7	0.9
			January	17.8	97	1.6
			February	59.8	376.9	2.9
			Seasonal Total	**99.4**	**376.9**	**5.4**
		Summer (Mar to May)	March	341.4	587.4	8.5
			April	846.7	644.2	16.7
			May	1383.9	**812**	20.1
			Seasonal Total	**2572**	**812**	**45.3**
		Monsoon (Jun to Sept)	June	2589.6	**1563.3**	25.3
			July	3093.3	838.2	28.2
			August	1818.6	853.4	24.5
			September	1154.8	985.5	19.1
			Seasonal Total	**8656.3**	**1563.3**	**97.1**
		Post Monsoon (Oct to Nov)	October	464.4	**594**	7.9
			November	64.7	332.2	1.8
			Seasonal Total	**529.1**	**594**	**9.7**
		Annual Total		**11856.8**	**1563.3**	**157.5**
2	**Mean Daily Temperature (°C)**	**Season**		**Months**	**Mean Highest (°C)**	**Mean Lowest (°C)**
		Winter (Dec to Feb)		December	20.8	5.4
				January	19.6	3.6
				February	21.2	5
				Seasonal Mean	**20.53**	**4.67**
		Summer (Mar to May)		March	24.5	8
				April	25	10.5
				May	26.1	12.4
				Seasonal Mean	**25.2**	**10.3**
		Monsoon (Jun to Sept)		June	26.3	15.2
				July	26.2	16.4

			August	27.2	16.5
			September	27	15.7
			Seasonal Mean	**26.68**	**15.95**
		Post Monsoon (Oct to Nov)	October	26.8	12.1
			November	24.7	8.6
			Seasonal Mean	**25.75**	**10.35**
		Annual Mean	**24.62**	**10.78**	**31.1**
3	**Cloud Cover (Oktas of sky)**	**Season**	**Months**	**All cloud**	**Low cloud**
				08:30	**17:30**
		Winter (Dec to Feb)	December	1.8	2.8
			January	2	2.9
			February	2.4	3.1
			Seasonal Mean	**2.07**	**2.93**
		Summer (Mar to May)	March	3.3	3.5
			April	5.1	4.8
			May	5.8	5.4
			Seasonal Mean	**4.73**	**4.57**
		Monsoon (Jun to Sept)	June	7	5.4
			July	7.1	6.6
			August	6.9	6.2
			September	6.3	5.8
			Seasonal Mean	**6.83**	**6**
		Post Monsoon (Oct to Nov)	October	3.8	4.2
			November	2.4	3.2
			Seasonal Mean	**3.1**	**3.7**
		Annual Mean	**4.49**	**4.49**	**3.33**
4	**Relative Humidity in (RH) %**	**Season**	**Months**	**8:30hrs**	**17:30hrs**
		Winter (Dec to Feb)	December	59	79
			January	60	76
			February	60	73
			Seasonal Mean	**59.67**	**76**

		Summer (Mar to May)	March	64	72
			April	77	82
			May	83	86
			Seasonal Mean	**74.67**	**80**
		Monsoon (Jun to Sept)	June	93	91
			July	95	93
			August	92	90
			September	88	90
			Seasonal Mean	**92**	**91**
		Post Monsoon (Oct to Dec)	October	72	85
			November	59	79
			Seasonal Mean	65.5	82
		Annual Mean		**75.17**	**83**

3.4.1.3. On-Site Micro Meteorological Data

Hourly continuous meteorological data were collected from the project area during the study period. The brief data are represented in **Table 3.6** below:

Table 3.6: On-Site Micro-Meteorological Data for Lynti Dkhar Limestone Mine

Month	Temperature (°C)			Humidity (%)			Wind Speed (km/hr)			Solar Radiation (W/m²)		
	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
1st–31st Mar 2024	30.3	13.6	20.4	97.5	14.6	58.6	22.3	0.3	6.9	964	5	253.0
1st–30th Apr 2024	35.1	15.4	24.5	100	18.4	61.0	38.9	0.1	8.0	1009	4	289.3
1st–30th May 2024	34.9	15.5	24.0	100	17.1	78.6	38.2	0.1	6.1	1023	1	257.4

During the study period, the on-site micro-meteorological data revealed the following trends

i. **Temperature:** Temperature varied from 13.6°C to 35.1°C with mean value of 23.0°C.
ii. **Relative Humidity:** It varied from 14.6% to 100% with mean value of 66.07%.
iii. **Wind Speed:** It was in the range of 0.02 m/s to 10.8 m/s excluding calm winds.
iv. **Total Rainfall:** 756.6 mm.
v. **No. of Rainy days:** 70
vi. **Predominant wind direction:** From North to South.

Wind rose diagram of the monitored data is given in **Figure 3.6**.

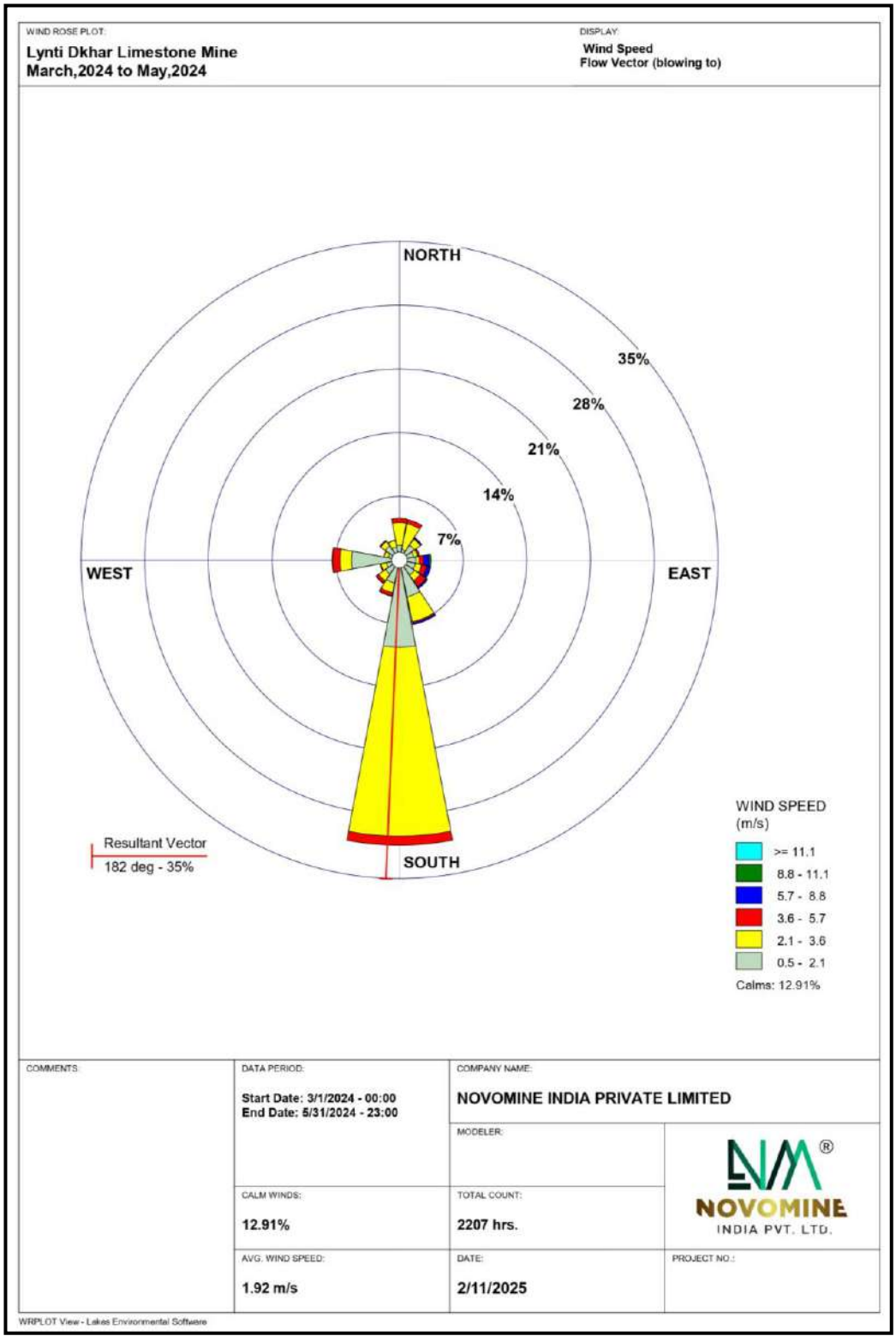


Fig 3.6: Seasonal (March 2024 - May 2024) Wind Rose Diagram for Lynti Dkhar Limestone Mine

3.4.2. Ambient Air Quality

According to the Terms of Reference (ToR) issued by the SEIAA of Meghalaya vide **File No. ML/SEAC/SEIAA/PP/WKH/83/2024** dated **6th December 2024**, various ambient air quality parameters, such as particulate matter/dust less than 10 µm (PM_{10}), particulate matter less than 2.5 µm ($PM_{2.5}$), sulphur dioxide (SO_2), and nitrogen oxides (NOx), have been identified as critical parameters relating to project activities for representing baseline status of ambient air quality within the study area. Five ambient air quality (AAQ) monitoring stations were selected in the project's core zone and buffer zone (10 km radius study area) to evaluate the baseline ambient air quality. The core zone of the project is represented by **one ambient air quality (AAQ) sampling location**, while the buffer zone is made up of **four such locations**. **Table 3.7** provides the summarized observed values for each air pollutant at different sampling locations. **Fig 3.7** provides a visual representation of the ambient air quality sampling station locations.

Table 3.7: Summarized results of AAQ Baseline Data for Lynti Dkhar Limestone Mine and its study area (March 2024 – May 2024)

Station Code	Location	Distance (km)	Direction	PM_{10}	$PM_{2.5}$	SO_2	NOx
				µg/m³ (98 Percentile)			
CA-1	**Project Site**	0.0	-	56.0	34.5	6.9	10.0
BA-1	**Bholaganj**	1.50	S	52.4	31.9	7.2	11.4
BA-2	**Ichamati**	5.84	WSW	44.5	20.9	5.5	10.6
BA-3	**Sohbar**	3.67	N	48.5	26.5	6.7	11.0
BA-4	**Nongjri Nongbah**	4.95	ENE	46.8	21.4	6.8	10.7
Standard Concentration (24 hrs)				**100**	**60**	**80**	**80**

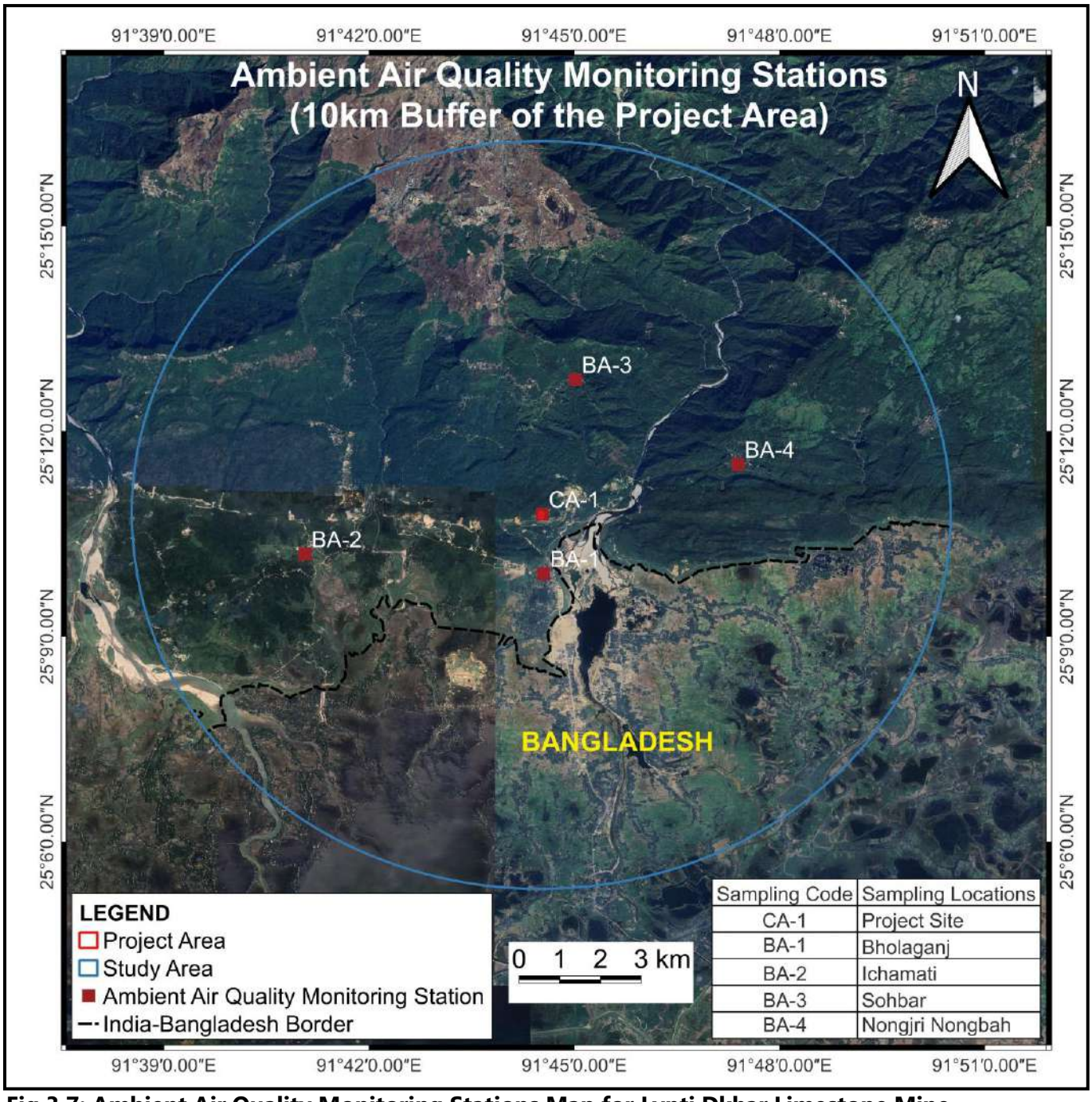


Fig 3.7: Ambient Air Quality Monitoring Stations Map for Lynti Dkhar Limestone Mine

3.4.3 Traffic Density Study

3.4.3.1. Linked End Use

Basket Linkage: Lynti Dkhar Limestone Mine is not linked to any end use project/plant. The extracted mineral (limestone) from the block shall be for sale in the open market, and to be utilized in the sectors of steel manufacturing, construction, in kilns, and other such industries that are based on demand of the mineral.

Distance of End Use Plant from the Site: Not applicable as it is basket linkage.

3.4.3.2. Transportation of Mineral

Transportation of Run of Mine (ROM) will be carried out by dumpers/conventional trucks of 10-12 T payload capacity within the mine lease area and beyond, through existing roads and highways. The trucks/dumpers will directly enter the lease from the eastern corner of the mine boundary for limestone transportation from the stackyard/working area and no additional land will be utilized for transportation of the mineral outside the Mining Lease.

Mode of Transport: It is proposed that point sale of the limestone that shall be produced from the mine be at the pit head. The produced mineral will be transported as per requirement, and customers will also be transporting the material to their destination consumption centers via roads using conventional goods carrying trucks.

MDR-27 is at a distance of around 0.6 km connected by an un-metalled road from the egress point of the mine. This may be considered as an approach road connecting the haul road within the ML from to the major transportation route. There are several other un-metalled roads connecting MDR-27 which may be used in case of increasing traffic for transportation. Existing Road network has been provided in **Fig 3.8** below. Roads leading out of the quarry shall be further developed and widened by the time the mine reaches its peak/rated production capacity again after reopening.

3.4.3.3. Traffic Study

A traffic survey was carried out to estimate probable impacts on the local traffic in the area that may occur due to the proposed mining operations at selected locations through manual counting method. The survey was carried out for 24 hrs. (hourly interval) from 7:00 AM to next day 7:00 AM, for different types of vehicles near the proposed site. The incremental traffic load due to mine operations is summarized below as per the *IRC 064: Guidelines for Capacity of Roads in Rural Areas:*

Table 3.8: Summary of the incremental traffic load due to mine operations

Description	Details
Peak Production	**50544 TPA**
Proposed Number (No.) of Working Days	**300**
Required transportation of extractable material per day	**168 T**
Working hours (*Work will be carried out in Single Shift*)	**8-10 hours/day**
Truck Payload Capacity (for carrying limestone outside the ML)	**10 T**
Maximum number of Trips (to and fro)	**(168/10) x 2 ≈ 34**
No. of Passenger Car Units (PCUs) deployed per day {considering an equivalence factor of 2.5 for tippers/dumpers}	**34 x 2.5 = 85**
No. of PCUs to be deployed per hour	**85/10= 8.5 ≈ 9**

Observed PCUs on MDR-27 (in vicinity of the Mining Lease):

Type of Vehicle	Equivalent PCU factor	No. of vehicles observed/hr	Volume (PCUs/hr)
Two-wheeler	0.5	20	**10**
Passenger Car, Pickup vans etc.	1	15	**15**
Light Commercial Vehicles	1.4	20	**28**
Bus/Truck	2.5	10	**25**
Total volume of PCUs/hour			**78**

Road	Existing PCUs on the road	V (Volume in PCUs/hour)	C (Capacity in PCUs/hour)	Calculated V:C ratio	Level of Service (LOS)
Approach Road out of ML	0	0+9=9	50	0.18	**A**
MDR-27 (within 0.6 km)	78	78+9=87	1000	0.087	**A**

The LOS of **"A" (<0.3)** for adjoining Local/Collector streets (transport channels leading to and in the vicinity of MDR-27) represents a condition of free-flow with average travel speeds usually about 90% of the free-flow speed for the arterial class roadways. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is high. The general level of comfort and convenience provided to the road users is excellent.

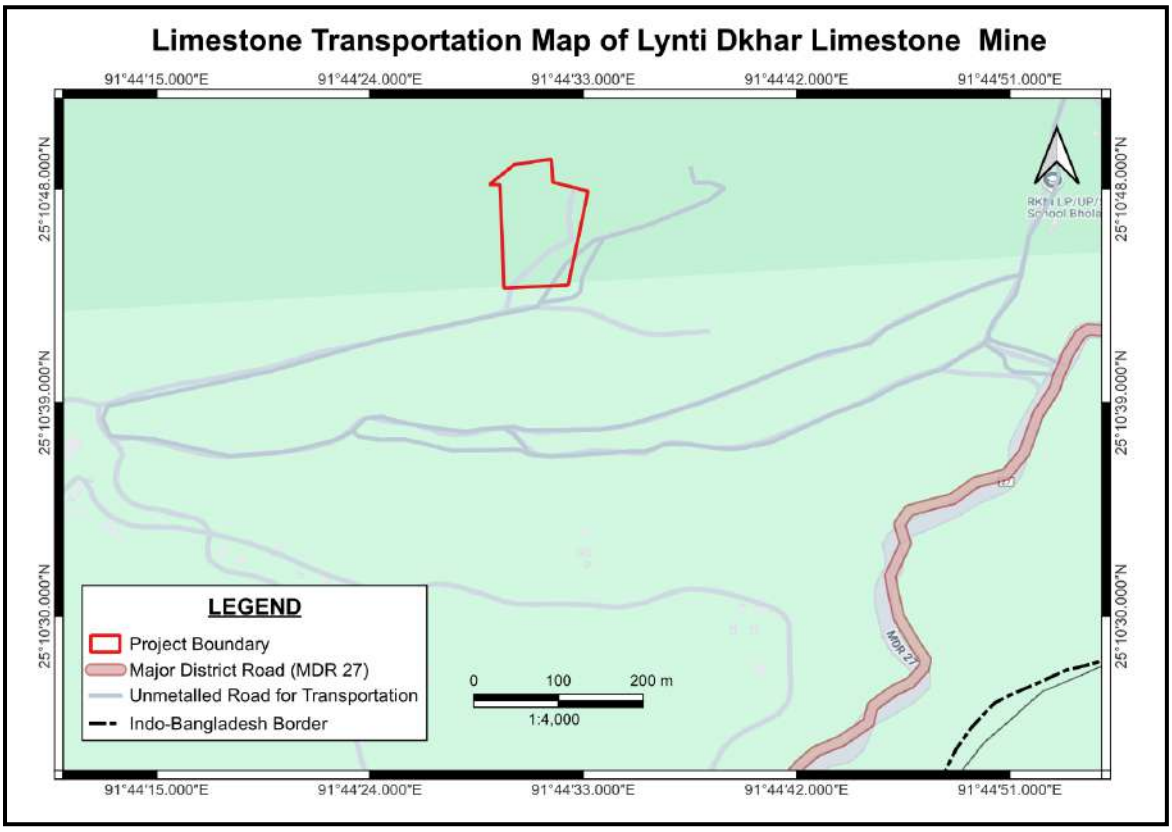


Fig 3.8: Limestone Transportation Road Map for Lynti Dkhar Limestone Mine

3.4.4. Ambient Noise Level

An exhaustive survey on ambient noise levels was carried out **to study the hourly equivalent noise levels** in accordance with the Noise Pollution (Regulation & Control) Rules, 2000, IS-9989 (1981) and IS-4954 (1968) standards. Ambient noise levels at the spot were measured for 24 hours on an hourly basis by using a high precision Integrated Sound Level Meter to represent the baseline status of ambient noise levels within the study area. Five ambient noise level (ANL) monitoring stations were selected in the project's core zone and buffer zone (10 km radius study area) to establish the area's baseline ambient noise level status. The core zone of the project is represented by **one ambient noise sampling station**, while the buffer zone is made up of **four stations**. **Table 3.9** provides the summarized observed values for the ambient noise levels at different sampling locations whereas, **Figure 3.9** provides a visual representation of the ambient noise level sampling station locations. The same is graphically represented as **Figure 3.10**.

From the data collected, it can be interpreted that the ambient noise levels measured during day time and night time (as per CPCB standards) in the core as well as in the buffer zone of Lynti Dkhar Limestone Mine are within the stipulated standards.

Table 3.9: Summarized results for Baseline ANL Data for Lynti Dkhar Limestone Mine and its study area (March 2024 – May 2024)

Code	Location	Distance in km	Direction	Day Leq (dBA)	Day Limits (dBA)	Night Leq (dBA)	Night Limits (dBA)
CN-1	**Project Site**	0.0	-	62.8	**75**	52.9	**70**
BN-1	**Bholaganj**	1.50	S	53.9	**55**	44.1	**45**
BN-2	**Ichamati**	5.84	WSW	46.3	**55**	39.7	**45**
BN-3	**Sohbar**	3.67	N	52.5	**55**	41.5	**45**
BN-4	**Nongjri Nongbah**	4.95	ENE	50.1	**55**	43.7	**45**

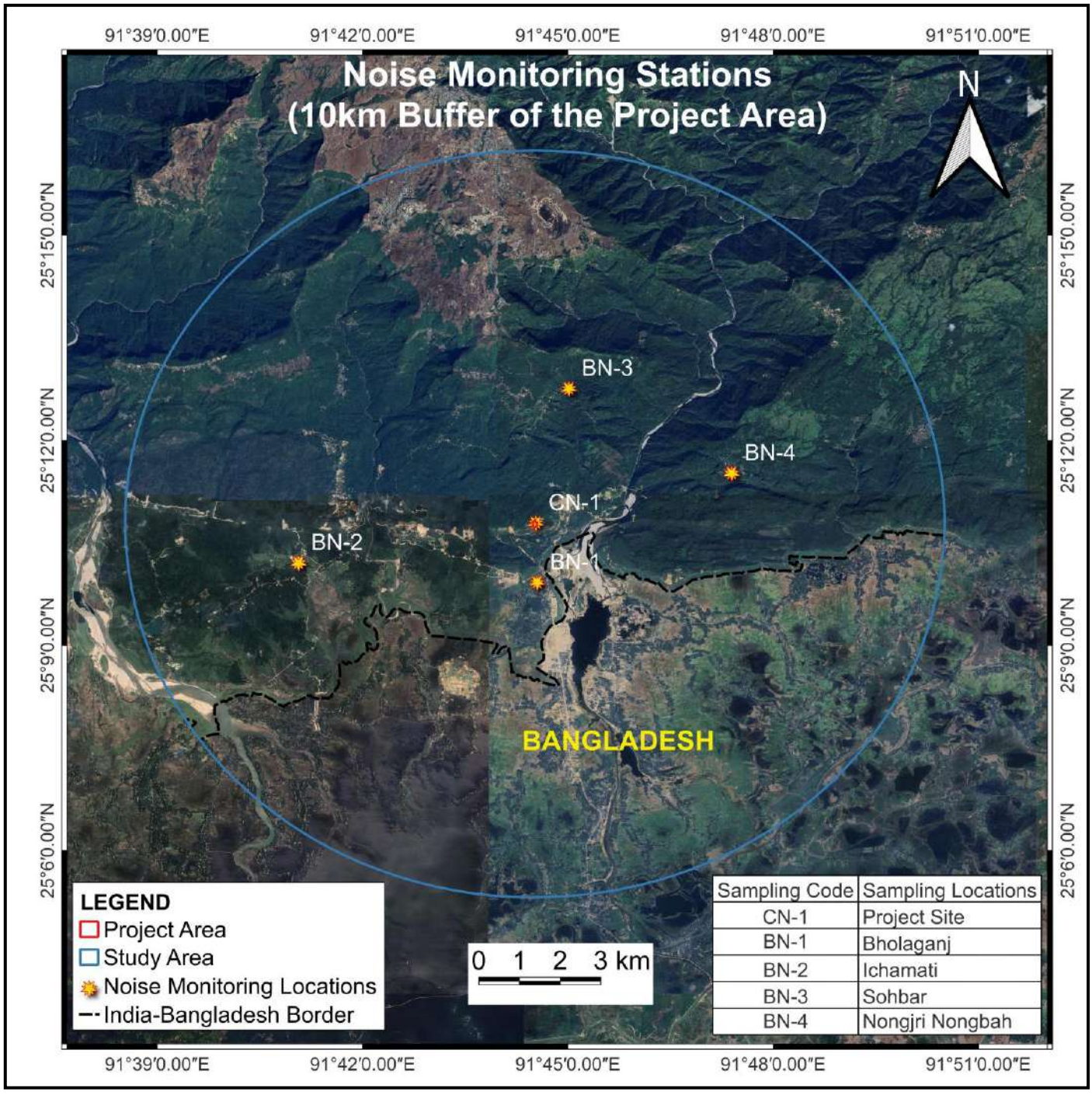


Fig 3.9: Ambient Noise Level Monitoring Stations Map for Lynti Dkhar Limestone Mine

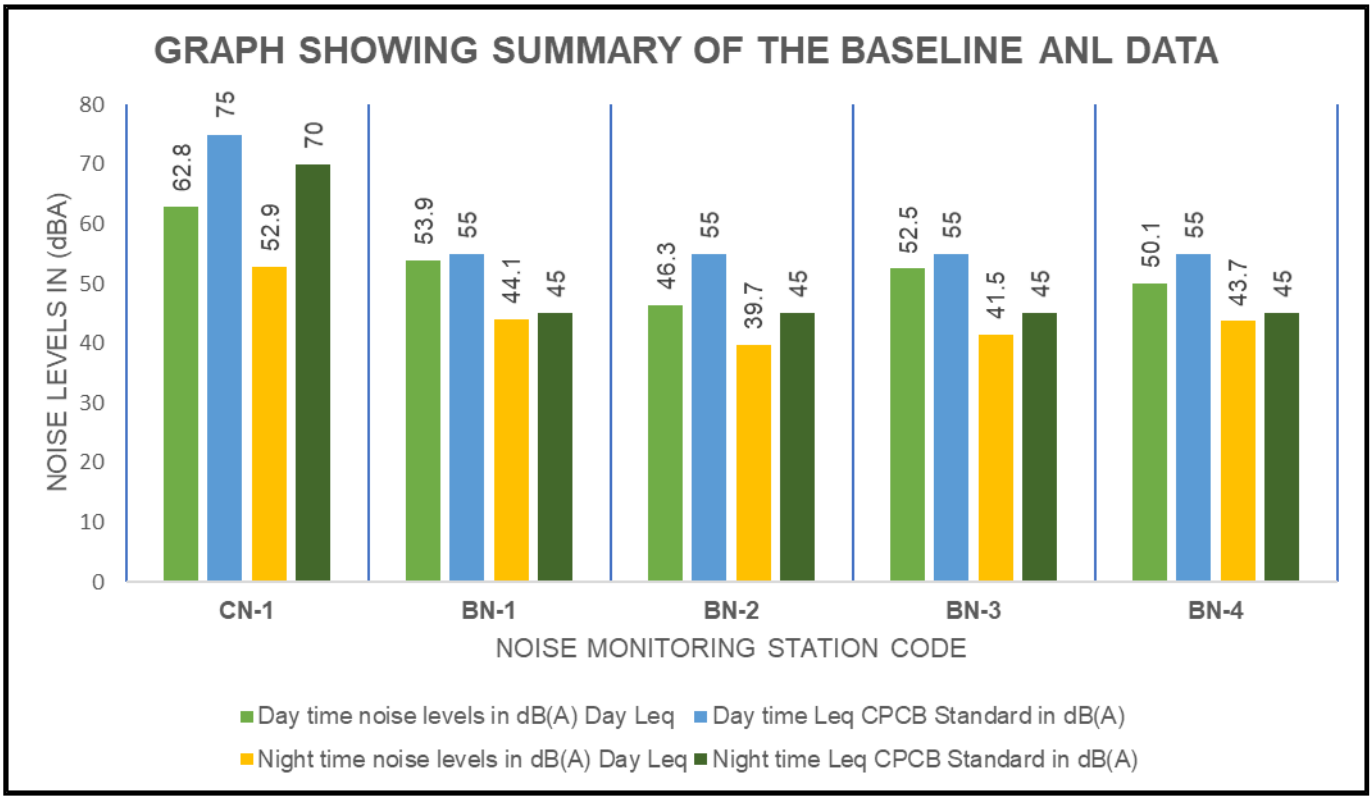


Fig 3.10: Graphical Representation of ANL data (daytime and night time) along with CPCB standards for Lynti Dkhar Limestone Mine

3.4.5. Geology

3.4.5.1. Regional Geology

In a regional scale, the area forms a part of the Meghalaya Plateau exposing geological milieu representing Precambrian to Tertiary sequence in this part of East Khasi Hills District of Meghalaya. Based on the Geology and Mineral Resource of Meghalaya, 3rd Revised Edition, 2023 and DRM of East Khasi Hills, 2023 published by GSI, regional stratigraphic succession and geology of the study area is presented in **Table 3.10** below.

Table 3.10: Regional Stratigraphic Succession

Geological Age	Group	Formation	Member	Lithology
Quaternary	Quaternary	Undifferentiated quaternary		Undifferentiated fluvial sediments – sand, silt and clay
Eocene to Palaeocene	Jaintia	Kopili		Sandstone, siltstone, shale & phosphatic nodules
		Shella	Sylhet Sandstone	Fossiliferous limestone/calcareous shale-sandstone
				Arkose/ gritty sandstone, clay & shale
				Arkose/ gritty sandstone, coal, fireclay and shale
Palaeocene to Upper Cretaceous		Langpar		Sandstone, limestone and calcareous shale
Cretaceous	Khasi	Jadukata		Gritty sandstone alternating with conglomerate
	Sylhet Traps			Basaltic/ gabbroic & doleritic dykes
				Basalt
Mesoproterozoic to Palaeoproterozoic	Shillong			Quartzite with thin phyllite interbands
Proterozoic	Assam – Meghalaya Gneissic Complex			Calc gneiss
				Biotite gneiss

3.4.5.2. Geology of the Mine Lease Area

The proposed mining area is small and exposes only the limestone of the Sylhet limestone Formation. **Table 3.11** provides a glimpse of the geology that is seen in the area.

Table 3.11: Local Geological Set-Up

Geological Age	Group Name	Formation Name	Summarized rock types
Recent	Newer alluvium	Unclassified	Unconsolidated soil, scree material
Eocene	Jaintia	Sylhet (=Shella)	Top part with grey/white limestone Bottom part with dark /steel grey limestone.

3.4.6. Hydrogeology

The hydrogeological formation of the study area comprised of Quartzite of Palaeo-Meso-Proterozoic, sandstone/ limestone of Ecocene to Upper Cretaceous. The presence of weak planes like fractures and joints in these hard rock formation forms the principal aquifer in the district. The ground water in the district occurs under unconfined, semiconfined to confined conditions.

3.4.6.1. Occurrence of groundwater

Occurrence of ground water in the East Khasi Hills district is mainly in weathered and fractured Gneissic, Granite pluton Quartzite formation. The aquifer system in this district can be divided as a two-aquifer system viz., first aquifer (shallow) and second aquifer (deeper). Shallow or first aquifer consists of weathered residum where ground water occurs under water table condition and is mainly developed through construction of dug wells. The depth of shallow aquifer in the district ranges from 1.5 to 10.74 meters. The second aquifer/ deeper aquifer occurs as semi-confined to confined condition where ground water is found in the fractured zone and is mainly developed through boring and construction of tubewells. Based on the study of litholog and analysis of depth of construction of dug wells and bore wells, it is found that the first aquifer occurs within 2 to 35 m bgl. Ground water in the second aquifer occurs under semi-confined to confined condition in the fractures upto the maximum explored depth of 247.6 m bgl. Study of springs was also carried out in the study area. Most of these springs are defined as depression and topographic or fractured springs. It is observed that the discharge of springs in this area ranges from 0.6 to 240 litre/minute during pre-monsoon and 3 to more than 360 litre/minute during post-monsoon season.

The Sandstone covers the major part of the study area. The occurrence of ground water in sandstone is largely controlled either by weathering and or by fractures patterns. This aquifer system comprises of limestone in which ground water occurs owing to secondary porosity viz. fracture, solution cavity etc. This aquifer is not very common and is confined to Shella Bholaganj block.

3.4.6.2. Stage of Groundwater Categorization

The stage of the ground water development in the region falls is in the **"SAFE"** category (*Report on "Aquifer Mapping and Management Plan of East Khasi Hills District, Meghalaya" (AAP 2018-19), by the Central Ground Water Board, India*).

3.4.7. Groundwater Quality

The physico-chemical characteristics of groundwater quality are depicted in **Table 3.12** and the locations are depicted in **Figure 3.11**.

Table 3.12: Results of Groundwater Quality Baseline Data at specific stations in the study area (March 2024 – May 2024)

Parameters	Unit	Permissible Limit*	Ground Water Samples				
			GW1	GW2	GW3	GW4	GW5
pH	-	6.5 to 8.5	6.6	7.1	7.3	6.7	6.9
Odour	-	Agreeable	No order observed				
Total Dissolved Solid	mg/l	500 (2000)	148.1	146.2	157.5	152.8	155.6
Electrical Conductivity at 25°C	µS/cm	-	244.9	243.7	262.5	251.7	259.3
Total Hardness ($CaCO_3$)	mg/l	300 (600)	68.6	69.3	77.5	68.1	70.0
Total Alkalinity ($CaCO_3$)	mg/l	200 (600)	89.2	77.0	82.0	81.3	84.3
Chloride as Cl	mg/l	250 (1000)	42.1	43.5	46.6	42.9	44.2
Sulphate as SO_4	mg/l	200 (400)	7.2	8.5	9.8	10.1	9.7
Calcium as Ca	mg/l	75 (200)	21.8	21.8	23.6	21.5	22.6
Magnesium as Mg	mg/l	30 (100)	3.7	3.6	4.5	3.5	3.3
Arsenic as As	mg/l	0.01	<0.01				
Iron as Fe	mg/l	0.3 (1)	0.21	0.22	0.24	0.21	0.20
Zinc as Zn	mg/l	5.0 (15)	0.2	0.3	0.3	0.3	0.2
Cyanide as CN	mg/l	0.05	<0.005				
Phenolic compound	mg/l	0.001 (0.002)	<0.001				

***Standard: IS 10500: 2012**
Ground water sampling stations:

GW1: Lynti Dkhar Area (0.55 Km, East Direction from the Project Site)
GW2: Bholaganj (1.50 Km, South Direction from the Project Site)
GW3: Ichamati (5.27 Km, WSW Direction from the Project Site)
GW4: Sohbar (3.67 Km, NNE Direction from the Project Site)
GW5: Nongjri Nongbah (4.95 Km, ENE Direction from the Project Site)

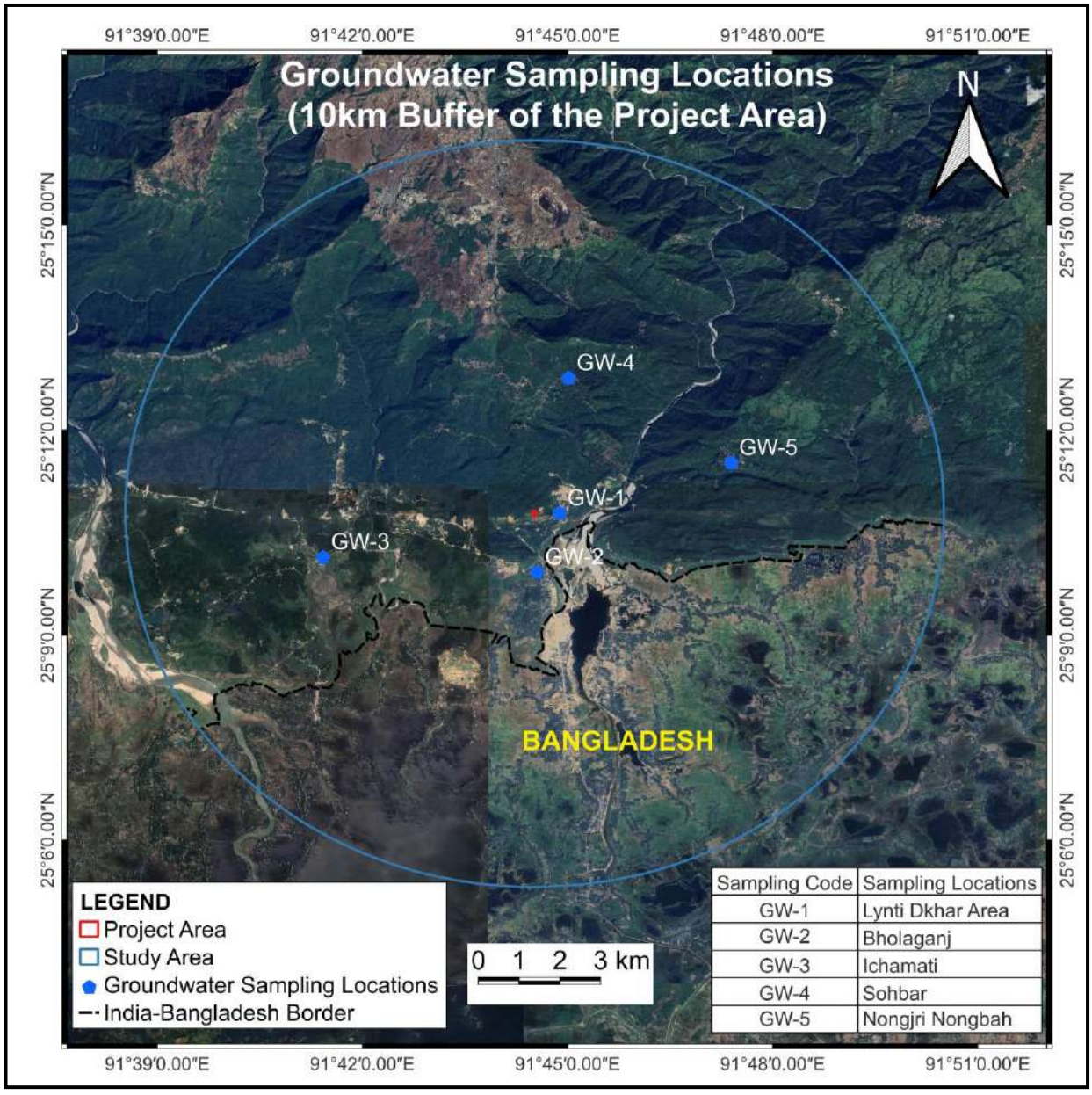


Fig 3.11: Groundwater Quality Sampling Stations for Lynti Dkhar Limestone Mine

3.4.8. Drainage Pattern

3.4.8.1. Drainage Pattern of the district

The drainage system of the district is controlled by its topography. Broadly, there are mainly two watersheds in the district, one river flowing in the northern direction toward the Brahmaputra and the other in the south, towards the Surma valley in

Bangladesh. The important rivers in the northern part are Umtrew, Umiam and Umkhen. The Umtrew (or Digaru) River originates from the west of the Sohpetbneng range in East Khasi Hills District, near Lum Raitong. It flows towards the west waters from the Umiam River which is being diverted by the Umiam Hydel Project. In the southern part, rivers Umiew (or Shella, also known as Bagra), Umngot, Umngi (Balat), etc. all tributaries of the Surma, originating from southern slopes of Khasi Hills, drain one of the world's heaviest rainfall areas and flow southwards into Bangladesh, have violent flows.

3.4.8.2. Drainage Pattern of the study area

There is no naturally-occurring surface water body within the mine block. The nearest surface water body is Tharia river (or Um Sohryngkew) that flows at the nearest distance of about 1.1 km SE direction from the project boundary.

The study area is primarily undulatory one. Yet, this topography is disrupted by the dramatic geographical features created by its river systems. In the study area rivers Umiew (or Shella, also known as Bagra), Um Sohryngkew (or Wah Tharia), Wah Rew and countless other fast-flowing first order and second order streams have passed through the study area. Natural drainage pattern of the area will not be altered due to mining activity. The drainage map of the study area is depicted in **Figure 3.12.**

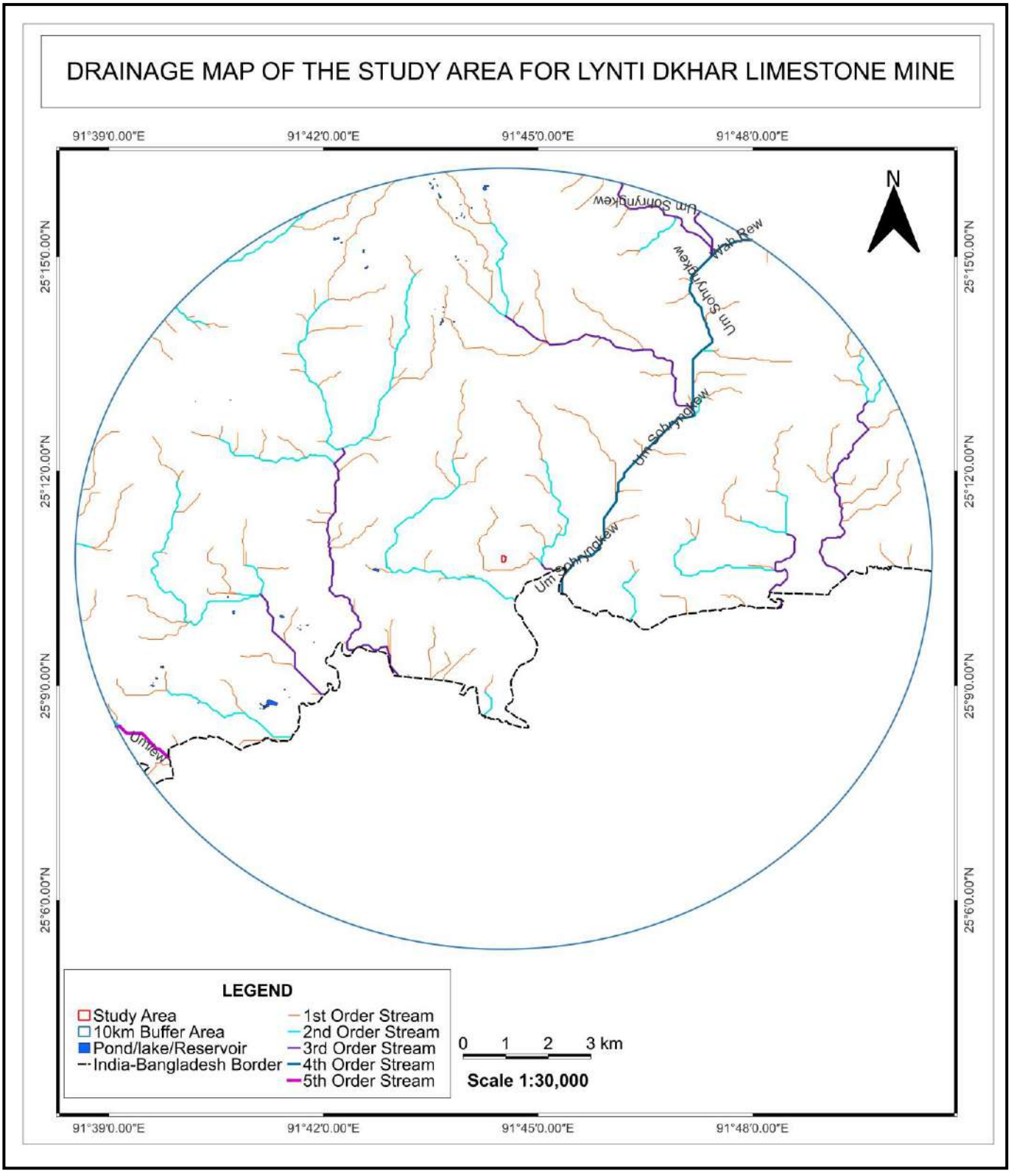


Fig 3.12: Drainage Map of the Study Area of Lynti Dkhar Limestone Mine

3.4.9. Surface Water Quality

The surface water samples were collected from two locations of the river Tharia or Um Sohryngkew (up-stream and down-stream) and from one location of another waterbody near Ichamati village. The surface water quality as analysed and the parameter wise results are given in **Table 3.13**. The locations are depicted in **Figure 3.13**.

Table 3.13: Results of Surface Water Quality Baseline Data at specific stations in the study area (March 2024 – May 2024)

Parameters	Unit	Permissible Limit*	Surface Water Samples		
			SW1	SW2	SW3
pH	-	6.5 to 8.5	7.1	7.3	7.5
Odour	-	Un-objectionable	Agreeable		
Total Dissolved Solid	mg/l	1500	157.5	161.2	150.2
Dissolved oxygen	mg/l	4.0	7.5	7.6	7.4
Biochemical Oxygen Demand (BOD) 5d, 25°C	mg/l	3	1.6	1.6	1.7
Arsenic as As	mg/l	0.2	<0.01		
Mercury as Hg	mg/l	-	<0.001		
Lead as Pb	mg/l	0.1	<0.01		
Chromium as Cr^{6+}	mg/l	0.05	<0.03		
Copper as Cu	mg/l	1.5	<0.02		
Cadmium as Cd	mg/l	0.01	<0.002		
Zinc as Zn	mg/l	15.0	<1.0		
Selenium as Se	mg/l	0.05	<0.01		
Cyanide as CN	mg/l	0.2	<0.001		
Chloride as Cl	mg/l	600	35.5	30.1	28.5
Nitrate as NO_3	mg/l	50	0.9	2.5	2.1
Fluoride as F	mg/l	1.5	<0.01		
Sulphate as SO_4	mg/l	400	11.5	25.7	20.2
Iron as Fe	mg/l	50	0.3	0.6	0.8
Calcium as Ca	mg/l	-	30.2	30.1	28.5
Magnesium as Mg	mg/l	-	6.4	8.5	7.5
Total Coliform	MPN/ 100 ml	Nil	48	65	72

***Standard 2296: 1992 Class – C, Inland Surface Water Quality Standard**

Surface water sampling stations:

SW1: Um Sohryngkew (US) (2.65 Km, NE Direction from the Project Site)

SW2: Um Sohryngkew (DS) (0.79 Km, ESE Direction from the Project Site)

SW3: River/ Stream near Ichamati (6.11 Km, WSW Direction from the Project Site)

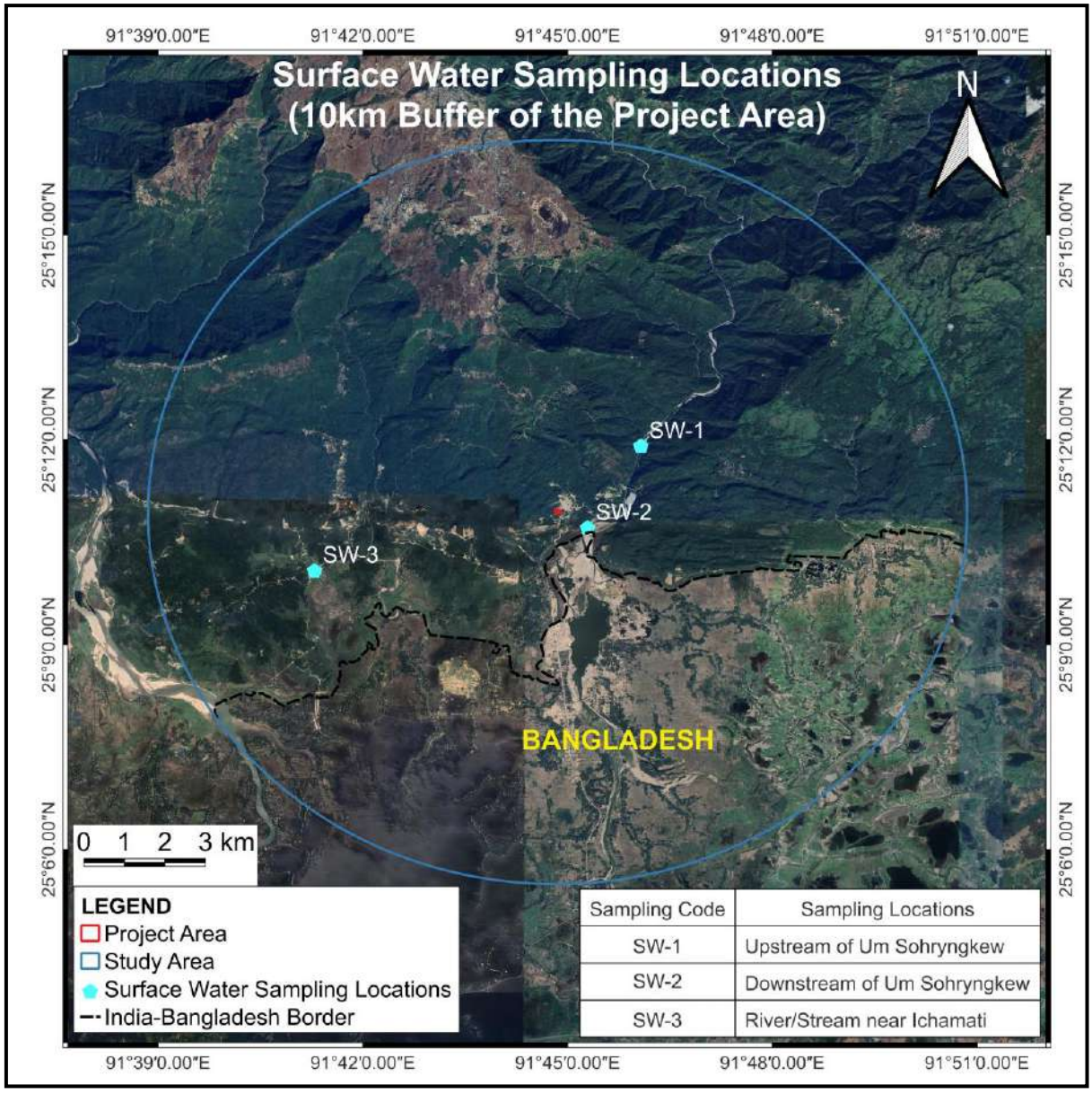


Fig 3.13: Surface Water Quality Sampling Stations for Lynti Dkhar Limestone Mine

3.4.10. Ecological and Biological Environment

3.4.10.1. Scope and Objective

The primary scope of the ecological and biological baseline survey is to:

i. Assess and predict the likely environmental impacts on the local biodiversity, once the project commences.

Some of the primary objectives of the ecological and biological baseline survey are as follows:

i. To enumerate the current floral and faunal resources in and around the project area, and how this project may be implemented keeping in mind these conditions, and

ii. To assess and identify potential impacts of the project on the region's ecological and biological diversity.

3.4.10.2. Study Period

The baseline study period of the proposed project was from March 2024 – May 2024 (summer season).

The study of ecology and biodiversity is to assess biodiversity in terms of forest type and distribution, composition and abundance of plants and animals and ecosystem functions in our dynamic environment. Documenting local species that are ecologically important may be helpful in mine closure and restoration and planning of the greenbelt development.

An ecological survey of the study area was conducted, particularly with reference to the list of species prepared from the secondary data collected from the Forest Department, Working Plan of the area, and available publications and reports and to update it through extensive field studies, consultation with locals, NGOs, and officials of various government departments.

3.4.10.3. Biodiversity in the Study Area

A detailed biological study of the study area i.e., 10 km radius of the project has been carried out to identify the composition of flora and fauna. For evaluation of floral composition of the area, the study was divided according to habitat types followed

by the random sampling, surveys, exploration, collection, and preparation of specimens toward building an inventory of floral diversity of the area. Phytosociological studies were conducted to assess the composition, diversity, distribution, and their status in the nature. The study area does not contain any protected or reserved forest or notified eco-sensitive zone (ESZ).

For faunal diversity, data collection via random sampling, opportunistic observations, direct sightings, and indigenous knowledge of the local communities was carried out. For enumeration of avifauna, only early morning (6.30 AM – 8.00 AM) and late afternoon (4.00 PM – 5.00 PM) hours were selected for surveying.

A. Flora

Core Zone: Due to rocky terrain and poor soil content, the plant density in the core zone is very low with patches of *Cynodon dactylon*, *Bambusa pallid*, Thysanolaena maxima, and *Trema orientalis*.

Buffer Zone: Due to heavy rainfall in the region, the buffer area is a mixture of scrub forests predominated by scanty shrubs and bushes, and trees mainly of deciduous nature. The detailed list of trees which was commonly found in the study area and cross-checked with the secondary data is given in **Table 3.14.**

Table 3.14: List of identified terrestrial flora in the study area of Lynti Dkhar Limestone Mine

S. No.	Scientific name	Common name/ Local name	Family	Habit
1	*Achyranthes aspera*	Prickly Chaff Flower	Amaranthaceae	Herb
2	*Aegle marmelos*	Heikhagok	Rutaceae	Tree
3	*Ageratum conyzoidas*	Imchenriza	Asteraceae	Herb
4	*Ailanthus grandis*	Ganmathai	Simaroubaceae	Tree
5	*Albizia lucida*	Siris	Fabaceae	Tree
6	*Albizia odoratissima*	Haya	Fabaceae	Tree
7	*Albizia procera*	Dieng Sohriew	Fabaceae	Tree
8	*Alstonia scholaris*	Chaton	Apocynaceae	Tree
9	*Amoora wallichi*	Agachi, Akshi	Meliaceae	Tree

10	*Areca catechu*	Betenut Palm	Arecaceae	Tree
11	*Artocarpus chaplasha*	Dewa-Sali	Moraceae	Tree
12	*Artocarpus integrifolia*	Jackfruit	Moraceae	Tree
13	*Azadirachta indica*	Baigaina	Meliaceae	Tree
14	*Bambusa pallida*	Shken	Poaceae	Tree grass
15	*Bambusa tulda*	Shkong	Poaceae	Tree grass
16	*Bauhinia acuminata*	Chingthrou	Fabaceae	Tree/Shrub
17	*Bauhinia purpurea*	Chingthao angauba	Fabaceae	Tree
18	*Bauhinia vahlii*	Bhorla	Caesalpiniaceae	Climber
19	*Bixa orellana*	Annatto	Bixaceae	Shrub/Small Tree
20	*Bridelia retusa*	Geio	Phyllanthaceae	Tree
21	*Buddleja macrostachya*	Tipoka-moli	Scrophulariaceae	Tree
22	*Careya arborea*	Gemble	Lecythidaceae	Tree
23	*Caryota urens*	Tamak	Arecaceae	Tree
24	*Cassia fistula*	Haunaruaraung	Fabaceae	Tree
25	*Castanopsis indica*	Khashi badam	Fagaceae	Tree
26	*Centella asiatica*	Khliang Syiar	Apiaceae	Herb
27	*Chukrasia tabularis*	-	Meliaceae	Tree
28	*Cinnamomum bejolghota*	Ashokhyphum	Lauraceae	Tree
29	*Cinnamomum tamala*	Lapynriang	Lauraceae	Tree
30	*Cocos nucifera*	Coconut	Arecaceae	Tree
31	*Combretum roxburghii*	Arkeng-rikang	Combretaceae	Climber
32	*Cynodon dactylon*	Bermuda Grass	Poaceae	Herb
33	*Dalbergia sissoo*	Sisoo	Fabaceae	Tree
34	*Dendrobium dinsiflorum*	Balgto	Orchidaceae	Herb
35	*Dendrocalamus hamiltonii*	Choya bans	Poaceae (Grass family)	Tree
36	*Derris elliptica*	Hiru rikang	Fabaceae	Climber
37	*Dillenia indica*	Dieng-soh-karbam	Dilleniaceae	Tree

38	*Dillenia pentagyna*	Agachi, Akshi	Dilleniaceae	Tree
39	*Dioscorea alata*	Eugin	Dioscoreaeae	Herb
40	*Dioscorea belophylla*	Ban-tarul	Dioscoreaceae	Herb
41	*Duabanga grandiflora*	Luaipap	Lythraceae	Tree
42	*Elaeocarpus floribundus*	Koying	Elaeocarpaceae	Tree
43	*Erythrina arborecens*	Hieto	Fabaceae	Tree
44	*Ficus benghalensis*	Bar	Moraceae	Tree
45	*Ficus glomerata*	-	Moraceae	Tree
46	*Ficus hispida*	Takpiang	Moraceae	Tree
47	*Ficus religiosa*	Aliot	Moraceae	Tree
48	*Ficus reticulate*	Fig	Moraceae	Tree
49	*Fimbristylis falcate*	Arza	Cyperaceae	Herb
50	*Garuga pinnata*	Bonkung-esing	Burseraceae	Tree
51	*Glochidion lanceolarium*	-	Phyllanthaceae	Scrub
52	*Gmelina arborea*	Dieng Lophiang	Lamiaceae	Tree
53	*Grevillea robusta*	Kabulia	Proteaceae	Tree
54	*Grewia sapida*	Brbe	Malvaceae	Undershrub
55	*Imperata cylindrical*	Khasi Bon	Poaceae	Herb
56	*Isachne albens*	Batiki Bluegrass	Poaceae	Herb
57	*Kydia calycina*	Anisep	Malvaceae	Tree
58	*Lablab purpureus*	Tohi	Fabaceae	Herb
59	*Lagerstroemia parviflora*	Jarul	Lythraceae	Tree
60	*Lennea coromandelica*	-	Anacardiaceae	Tree
61	*Litchi chinensis*	Deing-soh-manir	Sapindaceae	Tree
62	*Macaranga peltata*	-	Euphorbiaceae	Tree
63	*Mangifera indica*	Am, Chillujak	Anacardiaceae	Tree
64	*Mesua ferrea*	Karai	Calophyllaceae	Tree
65	*Mikania scandens*	German-pula	Asteraceae	Herbaceous

				Climbing Vine
66	*Mimosa pudica*	Touch me not	Fabaceae	Herb
67	*Ocimum basilium*	Basil	Lamiaceae	Herb
68	*Oxalis corniculata*	Chariamilo	Oxalidaceae	Herb
69	*Paedaria foetida*	Skunk Vine	Rubiaceae	Herb
70	*Pennisetum americanum*	Yangpah	Poaceae	Herb
71	*Phoenix sylvestris*	Datepalm	Arecaceae	Tree
72	*Piper nigrum*	Jaluk	Piperaceae	Climber
73	*Ploygonum molle*	Knotweed	Polygonaceae	Herb
74	*Prunus persica*	Chumberi	Rosaceae	Tree
75	*Psidium guajava*	Ambak	Myrtaceae	Tree
76	*Pterospermum acerifolium*	-	Sterculiaceae	Tree
77	*Quercus semiserrata*	Kara	Fagaceae	Tree
78	*Salmalia*	Semulu	Bombacaceae	Tree
79	*Sida acuta*	Common wire weed	Malvaceae	Herb
80	*Sida cordifolia*	Country Mallow	Malvaceae	Herb
81	*Solanum nigrum*	Black nightshade	Solanaceae	Herb
82	*Spondias pinnata*	Dieng-sohpier	Anacardiaceae	Tree
83	*Sterculia villosa*	Chikaungaraung	Malvaceae	Tree
84	*Symplocos*	Kharane	Symplocaceae	Tree
85	*Tectona grandis*	Teak	Lamiaceae	Tree
86	*Terminalia*	Bahera	Combretaceae	Tree
87	*Terminalia arjuna*	Arjuna	Combretaceae	Tree
88	*Themeda villosa*	Silky kangaroo grass	Poaceae	Herb
89	*Thunbergia grandiflora*	Nungnung	Acanthaceae	Climber
90	*Thysanolaena maxima*	Broom Grass	Poaceae	Herb
91	*Tinospora cordifolia*	Amaslota	Menispermaceae	Climbing shrub
92	*Toona ciliate*	Poma	Meliaceae	Tree

93	*Trema orientalis*	Pampak	Cannabaceae	Tree
94	*Trewia nudiflora*	Wangbhop	Euphorbiaceae	Tree
95	*Vanda teosellata*	Akhasi-gos	Orchidaceae	Herb
96	*Ziziphus mauritiana*	Soh-broi	Rhamnaceae	Shrub/ Small tree

B. Fauna

The description is based on the field investigation, reports of Forest Department and queries with local inhabitants. Although the Forest department records the presence of few Schedules I species, no such records could be established during field visit or during interaction with local people.

No significant faunal group was observed during the study period. As reported by local inhabitants, the faunal groups are mostly restricted towards the forested areas. The list of major terrestrial fauna in the study area is given in **Table 3.15**

Table 3.15: List of fauna identified in the study area of Lynti Dkhar Limestone Mine

Group	Scientific name	Common name/ Local name	Family	Schedule as per the Wildlife Protection Act (WPA) 2022	IUCN Status
Lepidoptera	*Papilio polytes*	Common Mormon	Papilionidae	-	Not evaluated (NE)
	Danaus chrysippus	Plain Tiger	Nymphalidae	-	Least Concerned (LC)
	Danaus genutia	Common Tiger	Nymphalidae	-	NE
	Delius acalis	Red-Breasted jezebel	Pieridae	-	NE
	Euploea mulciber	Striped Blue	Nymphalidae	-	NE
	Eurema hecabe	Common Grass	Pieridae	-	LC
	Eurema laeta	Spotless Grass Yellow	Pieridae	-	NE
	Athyma perius	Connon Sergeant	Nymphalidae	-	NE
	Precis atlites	Grey Pansy	Nymphalidae	-	NE
	Barilius bendelisis	Indian hill Trout	Cyprinidae	-	LC
	Laubuka laubuca	Indian Glass Barb	Cyprinidae	-	LC

Pisces	*Brachydanio rerio*	Lauputi	Cyprinidae	-	LC
	Puntius chola	Shalynnai Tungtab	Cyprinidae	-	LC
	Cirrhinus reba	Kha Saw	Cyprinidae	-	LC
	Cirrhinus boga	Mrigal	Cyprinidae	-	LC
Reptiles	*Ahaectulla nasuta*	Common Green Whip Snake	Colubridae	_	LC
	Calotes versicolor	Common garden Lizard	Agamidae	_	LC
	Hemidactylus flaviviridis	House Gecko	Gekkonidae	_	LC
	Mabuya carinata	Common Skink	Scincidae	_	LC
	Macropisthodon plumbicolor	Green Keelback	Colubridae	_	LC
	Calotes jerdoni	Eastern Green Calotes	Agamidae	_	LC
	Merops orientalis	Small Green Bee-eater	Meropidae	Schedule II	LC
	Loriculua vernalis	Lorikeet	Psittaculidae	-	LC
	Psittacula krameri	Roseringed Parakeet	Psittaculidae	Schedule II	LC
	Cuculus micropterus	Hawk Cuckoo	Cuculidae	Schedule II	LC
	Clamator coromandus	Redwinged Crested Cuckoo	Cuculidae	Schedule II	LC
	Eudynamys scolopacea	Koel	Cuculidae	Schedule II	LC
	Columba livia	Blue Rock Pigeon	Columbidae	-	LC
	Centropus sinensis	Koel	Cuculidae	Schedule II	LC
	Hemiprocne longipennis	House Swift	Hemiprocnidae	-	LC
	Dicrurus aeneus	Brown Drongo	Dicruridae	Schedule II	LC
	Caprimulgus asiaticus	Common Indian Nightjar	Caprimulgidae	-	LC
	Cypsiurus parvus	Palm swift	Apodidae	-	LC
	Coracias garrulus	Roller	Coraciidae	Schedule II	LC
	Upupa epops	Hoopoe	Upupidae	Schedule II	LC
	Chyrysocolaptes festivus	Indian Golden backed Woodpecker	Picidae	Schedule II	LC
	Oriolus oriolus	Golden Oriole	Oriolidae	Schedule II	LC

Aves	*Dinopium benghalensis*	Lesser Goldenbacked Woodpeacker	Picidae	Schedule II	LC
	Megalaima asiatica	Blue throated Barpet	Megalaimidae	-	LC
	Pitta nipalensis	Bluenaped Pitta	Pittidae	-	LC
	Galerida cristata	Crested Lark	Alaudidae	Schedule II	LC
	Lanius cristatus	Brown Shrike	Laniidae	Schedule II	LC
	Alcippe poioicephala	Quaker Babbler	Alcippeidae	Schedule II	LC
	Oriolus xanthornus	Lackheaded Oriole	Oriolidae	Schedule II	LC
	Dicrurus macrocercus	Black Drongo	Dicruridae	Schedule II	LC
	Acridotheres ginginianus	Bank Myna	Sturnidae	Schedule II	LC
	Sturnus contra	Pied Myna	Sturnidae	-	LC
	Dendrocitta vagabunda	Tree Pie	Corvidae	Schedule II	LC
	Corvus splendens	House Crow	Corvidae	-	LC
	Cuculus canorus	Cuckoo	Cuculidae	Schedule II	LC
	Hemipus picatus	Pied Flycatcher	Vangidae	Schedule II	LC
	Pericrocotus erythropygius	Whitebellied Minivet	Campephagidae	Schedule II	LC
	Pycnonotus atriceps	Blackheaded Bulbul	Pycnonotidae	-	LC
	Pycnonotus cafer	Redvented Bulbul	Pycnonotidae	Schedule II	LC
	Pellorneum ruficeps	Spotted Babbler	Pellorneidae	Schedule II	LC
	Garrulax maniliger	Necklaced Laughingthrus	Leiothrichidae	Schedule II	
	Muscicapa muttey	Brown-breasted Flycatcher	Muscicapidae	-	-
	Orthotomus sutorius	Tailor Bird	Cisticolidae	-	LC
	Copsychus saularis	Magpie Robin	Turdidae	Schedule II	LC
	Dicaeum erythrorynchos	Thickll's Flowerpecker	Dicaeidae	-	LC
	Dicaeum ignipectus	Firebreasted Flowerpecker	Dicaeidae	-	-
	Aethopyga siparaja	Yellowbacked Sunbird	Nectariniidae	Schedule II	LC
	Nectarinia asiatica	Purple Sunbird	Rosaceae	-	NE
	Passer domesticus	House Sparrow	Passeridae	Schedule II	LC
	Ploceus philippinus	Baya Weaver Bird	Ploceidae	Schedule II	LC
	Lanchura mallacca	Blackheaded Munia	Estrildidae	_	LC
	Scotophilus heathii	Common yellow Bat	Vespertilionidae	-	LC

Mammals	*Dremomys lokriah*	Himalayan Squirrels	Sciuridae	Schedule II	LC
	Cannomys badius	Bamboo Rat	Spalacidae	-	LC
	Cynoptarus sphinx	Shortnosed Fruit Bat	Pteropodidae	-	LC
	Lepus nigricollis	Indian Hare	Leporidae	Schedule II	LC
	Bandicota bengalensis	Indian Mole Rat	Muridae	-	LC
	Mus booduga	Indian Field Rat	Muridae	-	LC
	Bandicota indica	Bandicoot Rat	Muridae	-	LC
	Vulpes bangalensis	Indian Fox	Canidae	-	LC

3.4.10.4. Endangered Species

There are no endangered species of flora and/or fauna within the study area of Lynti Dkhar Limestone Mine.

3.4.11. Socio-Economic Environment

The socio-economic profile of the area offers valuable insights into various aspects such as population growth rate, population density, gender ratio, work participation rate, and a description of the vulnerable population within the study area. This information helps to understand the demographic characteristics, economic activities, and social dynamics of the local population residing in the vicinity of the limestone mine.

3.4.11.1. Demographic Profile

There is no habitation within the project area which has been taken on lease by the project proponent. Hence, there are no R&R issues involved with this project.

The study area comprises 46 villages, with 37 located in the Shella Bholaganj CD Block and the rest situated in the Pynursla CD Block of East Khasi Hills. These villages have 3210 households accumulating 16323 populations. According to the survey, gender ratio of study area was 949.95 in 2011. The details are given in **Table 3.16**.

Table 3.16: Demographic Profile of the study area

Description	Total	% of total population
No. of households	3210	
Total population	16323	100
Male Population	8371	51.28

Female Population	7952	48.72
Females/1000 males	950	-
Family size, persons/family	5.09	-
Schedule Caste	549	3.36
Schedule Tribe	11497	70.43
Others	4277	26.20
Total literates	9595	58.78
Male literate	5034	52.46
Female literate	4561	47.54

3.4.11.2. Occupational Structure

Employment pattern and occupation are the two main indicators of the economic profile. A summary of employment pattern and occupation for the study area is presented in **Table 3.17**.

Table 3.17: Occupational Structure in the study area

Total Workers	Male	Female	Main Workers	Male	Female	Marginal Workers	Male	Female
5779	4265	1514	4481	3425	1056	1298	840	458

Description	Total	% of Population
Break-Up of Main Workers		
Cultivator	377	8.41
Agricultural labour	1400	31.24
Household industries	44	0.98
Other workers	2660	59.36
Total	**4481**	**100.00**
Break-Up of Marginal Workers		
Cultivators	249	19.18
Agricultural labour	229	17.64
Household industries	15	1.16
Other workers	805	62.01

Total	**1298**	**100.00**

3.4.11.3. Infrastructural Facilities

Educational Facilities: Details of educational infrastructure within the study area furnished in **Table 3.18** below.

Table 3.18: Educational Facilities in the Block

Pre-Primary school (Govt. + Private)	Primary school (Govt. + Private)	Middle school (Govt. + Private)	Secondary school (Govt. + Private)	Senior Secondary school (Govt. + Private)	Degree college (UG/PG) (Govt. + Private)
60 (33+27)	52 (29+23)	19 (7+12)	5 (1+4)	1 (0+1)	0

Health Facilities: Nine Primary Health Centres, one Community Health Centre, four Maternity and Child Welfare Centres, four Family Welfare Centres are found within the study area.

Banking and Post-Office Facilities: Five Post-Offices, one Commercial Bank, two Co-operative Banks and 18 Self Help Groups were found within the study area.

Telecommunication Facilities: In that study area, there have 11 landline and 7 PCO options.

Chapter 4 – ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1. DETAILS OF ENVIRONMENTAL IMPACTS

Mining activities cause adverse impacts on the surrounding environment unless proper environmental management plan is adopted.

In this chapter, an attempt is made to quantify or quality the possible environmental impacts on various features such as air quality, water use and quality, land-use, ecological considerations, soil quality and socio-economic factors. The above-mentioned aspects have been studied to identify the impacts of the proposed production from the mine. The magnitude and significance of the environmental pollution caused by mining depends on method of mining, scale and concentration of mining activity. On the basis of the impact analysis, the mitigating action and future monitoring requirement are focused in the Environmental Management Plan for counting or minimizing adverse impacts. The impact identification matrix is given in **Table 4.1**.

4.2. IMPACT OF THE PROJECT

For this project, we have used impact matrices that present the impacts of various activities during the project's operational phase in **Table 4.1**.

Table 4.1: Impact Identification Matrix

ENVIRONMENTAL ATTRIBUTES	PROJECT ACTIVITIES								
	Transport of Raw Materials	Storage of mineral and overburden	Movement of Machinery	Excavation	Blasting	Drilling	Handling of O/B	Operation of DG Sets	Effluent Generation
AMBIENT AIR QUALITY	–		–	–	–	–	–	–	
WATER QUALITY		–					–		–
SOIL				–	–	–	–	–	–
AMBIENT NOISE & VIBRATION	–		–	–	–	–	–		
LAND USE PATTERN				–			–		
SW HYDROLOGY									
GW HYDROLOGY									
GEOLOGY				–					
SHW									
OCCUPATIONAL HEALTH & SAFETY	–	–	–	–	–	–	–	–	
ECOLOGY & BIODIVERSITY	–		–	–	–	–		–	–
SOCIO-ECONOMIC	+		+	+	+	+	+	+	–

–	Anticipated Adverse Impacts
+	Anticipated Beneficial Impacts
	No Impacts

4.3. IMPACT AND MEASURES FOR MINIMIZING/NULLIFYING NEGATIVE EFFECTS

4.3.1. Ambient Air Quality

4.3.1.1. Impacts

Negative impacts on the ambient air quality due to limestone mining depends on the following factors:

i. Intensity of mineral extraction operations
ii. Mode of transportation within and outside the ML area
iii. Emissions load contributed from other industrial and mining activities in the vicinity of the mine

The intensity of mine operations is directly related to the rate of mineral production from mining. Production details are furnished in **Chapter 2**.

Excavators and tippers of different capacities are engaged mainly for extracting and transporting the mineral and overburden from the mining area. Particulate matter (PM_{10}) is the most significant pollutant that is emitted from the surrounding mines. The details of HEMMs are provided in **Chapter 2**.

a. Transportation of the mineral and overburden

The limestone excavated from this mine will be transported through 10-12 T Tippers.

b. Loading of mineral

After sizing, the mineral will be transported by Tippers.

Water sprinkling and fine mist arrangements at the appropriate places will be provided to contain the emissions. The existing baseline concentrations of air pollutants are within the limits prescribed by the CPCB for industrial/mixed areas and for rural/residential areas.

Air pollution sources at Lynti Dkhar Limestone Mine can be classified into three categories, viz., area sources, line sources, and instantaneous point sources. Extraction of limestone by various activities in the mining area is a type of area source; transportation of the mineral and overburden from the mining area to other locations is a type of line source; and blasting, which is usually done during the daytime by deep holes is a type of point source of air

pollution. Even though blasting leads to the generation of NOx, it is instantaneous and intermittent.

4.3.1.2. Mitigation Measures

i. Drilling machines will be equipped with dust collector arrangement and wherever required wet drilling arrangement will be used to prevent generation and spreading of dust,

ii. Optimum blast design parameters will be adopted after study. Optimum stemming in blast holes will be done to minimize generation of dust and fly rocks.

iii. Blasting will be done during favourable atmospheric conditions and will be avoided during high windy periods, night times and temperature inversion periods.

iv. To avoid secondary blasting rock breaker will be used.

v. Optimum bucket size loading equipment will be used which will reduce the number of buckets passes to fill the dumper and thus comparatively less dust will be generated during loading. This will also reduce the chances of spillage from the bucket.

vi. Water sprinkling over blasted pile of ROM will be done which will reduce dust generation during loading.

vii. Water tankers with suitable sprinkling system will be deployed along haul roads and other unworked areas to control fugitive emission. The sprinkling frequency will depend upon the humidity present in the atmosphere.

viii. Overloading of the dumpers and tippers will be avoided.

ix. The vehicles deployed for material transportation shall be spillage proof to avoid or minimize the spillage of the material during transportation.

x. Personnel working on the drills and other mining activities will be provided with dust mask and other necessary Protective Equipment. Health check-ups will be done biannually to monitor the health of the workers.

xi. Plantation of local thriving species will be done in the 7.5 m statutory boundary for arresting dust.

xii. Regular maintenance of vehicles and machinery will be done.

xiii. Vehicles/equipment will be periodically subjected for emission tests and will have valid POLLUTION UNDER CONTROL certificates.

xiv. Excavators and dumpers will have dust proof cabins to minimize dust exposure of workers.

xv. No impacts are expected on micro-climatic conditions of the project due to this small-scale mining activity.

xvi. Monitoring to ensure compliance with emission limits would be carried out during operation.

xvii. Air Pollution Control Equipment (APCEs) shall be proposed to be implemented as part of the EMP. Design details for the same are mentioned below:

Design Details of Air Pollution Control and Monitoring Equipment (APCEs)

Given the inherent dust generation in opencast mining, a multi-pronged approach has been proposed to be implemented to minimize fugitive dust emissions from various mining operations as part of the project's Environmental Management Plan. These strategies will focus on:

i. Avoiding dust generation from drilling operations by adopting and implementing wet-drilling methods,

ii. Use of appropriate explosives (NONELs) for blasting and avoiding overcharging of blast holes in overburden,

iii. Installation of water/mist spraying arrangements at all critical (transfer) points to avoid dust generation due to limestone and OB transportation,

iv. Strategic plantation of indigenous grass species such as *Cymbopogon flexuosus* L. (lemongrass), *Neyraudia* sp., *Saccharum ravennae*, *Imperata cylindrica* (Cogon grass), etc. and other native plants (shrubs) on OB dump slopes, soon after their formation,

v. Haul roads are the major source of fugitive dust in the opencast mines. Hence, water spraying on haul roads and the permanent transport routes shall be done at required frequencies. At least **1 water sprinkler of 10-15 KL standard capacity**, shall be deployed for water spraying on haul roads and in material transfer points,

vi. Black topping/paving of permanent internal roads to reduce dust from being airborne,

vii. The use of a **mobile mist spray/fog cannon machine** for dust suppression, and

viii. Establishing a three-row plantation around the quarry and overburden (OB) dumps, to prevent dust dispersion.

ix. Providing Personal Dust Samplers (PDS) to mine workers working in fugitive dust prone areas.

4.4. IMPACT AND MEASURES FOR MININIMIZING/NULLIFYING THE EFFECTS ON AMBIENT NOISE LEVELS AND GROUND VIBRATIONS

4.4.1. Impacts due to noise generation

During mining operations, various machinery (HEMMs) and transport vehicles are expected to contribute to the generation of noise. As distance from the noise source increases, the noise level naturally decreases due to the spreading of sound waves. Additionally, atmospheric conditions and interactions with surrounding objects further contribute to noise reduction along transmission paths. The machinery and other equipment intended for use in the mine shall serve as sources of noise input. Noise generation is assumed to occur at a height of 1 meter above ground level and spread over flat terrain without any obstacles.

In this mine, factors such as undulating terrain, vegetation, mine structures, and atmospheric conditions like air absorption, wind, temperature, and humidity will act as important noise obstructions. Despite this, the projected noise levels are expected to remain within the national CPCB standards, indicating that the project's impact on ambient noise levels in the study area, if any, shall be minimal. Having said that, the main sources of noise pollution in the mine may be due to the following:

i. Mechanization of the mine

ii. Operation of diesel-powered machines such as DG sets, water withdrawal pumps, drilling machines, dumpers, excavators, etc.

iii. Blasting

iv. Truck movements

4.4.1.1. Physiological impacts due to noise exposure

Noise pollution presents a significant health hazard to individuals employed in mining operations. The detrimental effects of noise pollution depend not only on the intensity and frequency of the sound but also on the duration of exposure and the individual's age. Thus, prolonged exposure to high noise levels can significantly impact the health of workers. Those working for more than 4-4.5 hours per shift at active working faces in the mine are at risk unless appropriate mitigation measures are implemented. The adverse effects of prolonged exposure to high noise levels may include annoyance, hypertension, fatigue, permanent hearing loss, high blood cholesterol, and other related health issues.

Table 4.2: Permissible limits of noise levels (in dB(A) Leq)

Area Code	Category of Area/Zone	Limits in dB (A) Leq	
		Day Time	Night Time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

Note:

1. Day time shall mean from 6.00 am to 10.00 pm
2. Night time shall mean from 10.00 pm to 6.00 am

*(**Source:** Schedule, The Noise Pollution (Regulation & Control) Rules, 2000)*

4.4.2. Noise levels in and around proposed project site

The baseline noise data indicates that the values in core zone as well as in buffer zone are well within the CPCB prescribed limits for respective zones. Most of the mining machineries will work only in the quarry which is below ground level. Hence, the noise generated inside the quarry will not propagate to the surface. Moreover, the proposed overburden dumps will act as a barrier for noise propagation to the nearby village areas. There may be minimal increase in the background noise levels due to the proposed mine due to plying of HEMM and other associated mining operations.

4.4.3. Impacts due to the generation of ground vibrations

Ground vibration, fly rock, air blast, noise, dust and fumes are some of the negative effects of blasting on environment. The explosive energy sets up a seismic wave in the ground, which may cause significant damage to structures and disturbance to human occupants. It can cause major damages to the pit configuration too. When an explosive charge is fired inside the blast hole, it is instantly converted into hot gases, which exert intense pressure on the blast hole walls. High intensity shock waves propagate radially in all the directions and cause the rock particles to oscillate. This oscillation is felt as ground vibration. The existing mining operations using deep hole drilling and blasting using delay detonators produce ground vibrations. 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 oscillation of rock particles is called Particle Velocity and its maximum value is called Peak Particle Velocity (PPV), which is measured in mm/s. As the distance from blast site increases, the PPV value is likely to reduce. The ground vibration generated by blasting during the mining operations will be within the standards prescribed by DGMS by adopting controlled blasting technique including suitable blast design.

Anticipated ground vibration resulting from mining operations in the region may stem from the operation of various machinery such as excavators, drilling and blasting equipment, as well as heavy transportation vehicles. However, blasting shall emerge as the primary source of ground vibrations from this mine. The most noticeable effects of these vibrations may be observed on residential houses in the villages surrounding the mining lease area, in this case, the villages and vicinity of Lynti Dkhar and Bholaganj. Hutments are particularly susceptible to cracking and damage caused by the ground vibrations induced by blasting, whereas reinforced concrete framed structures exhibit greater resilience. Consequently, ground vibrations may instill a sense of discomfort among residents of the nearby village communities. Another environmental impact of blasting activities may be the potential occurrence of fly rocks. These rocks pose risks of injury to individuals or animals, as well as infrastructural damage. Moreover, blast induced ground vibration may create socio-economic problems for the mine workers as well as the people

residing in vicinity of these mines. As only 20-30% of energy of commercial explosives used in the mines is utilized for fragmenting the rock, the rest of energy is transmitted through the earth in the form of ground vibrations resulting in damage to the surrounding structures (Directorate General of Mines Safety, Circular No. 7, 1997, pg. 1).

The maximum explosive charge per delay that can be used for blasting, without causing any significant ground vibration in the nearby villages in the proposed mine are calculated using the following empirical equation.

The empirical equation used for assessment of peak particle velocity (PPV) is:

$$V = 417.8 \{D/ (Q^{0.5})\}^{-1.265}$$

Where

V = Peak particle velocity in mm/s

D = Distance between location of blast and gauge point

Q = Quantity of explosive per blasting

Table 4.3: Permissible Peak Particle Velocity (PPV) at the foundation level of structures in mining areas in mm/s

Type of Structure	Dominant Excitation Frequency, Hz		
	<8 Hz	**8-25 Hz**	**>25 Hz**
A. Buildings / Structures not belonging to owner Domestic houses / structures (Kuchha brick and cement)	5	10	15
Industrial buildings (RCC and framed structures)	10	20	25
Objects of historical importance and sensitive structures.	2	5	10
B. Building belonging to owner with limited span of life			
Domestic houses / structures (Kuchha brick and cement)	10	15	25
Industrial buildings (RCC and framed structures)	15	25	50

*(**Source:** Director General of Mines Safety (DGMS) circular 7 of 1997)*

4.4.4. Measures against Noise Pollution and Ground Vibrations

4.4.4.1. Measures against Noise Pollution

The noise within the mine shall be maintained at levels that adhere to the occupational noise exposure limit set by the CPCB. To achieve this, implementation of the following approaches for noise reduction have been proposed:

i. Prevention at source
ii. Isolation of source

The following noise control measures are proposed to be taken to mitigate unwanted noise pollution that may generate from various mining operations:

i. In this project, it has been proposed to implement controlled blasting methods employing millisecond delay detonators and relay systems to reduce both noise levels and blast vibrations.
ii. Any adverse effects that may arise due to secondary blasting can be mitigated through careful consideration of blast design, spacing, and burden management.
iii. Careful planning of blast timings keeping factors such as favourable atmospheric conditions, and mine working timings in mind.
iv. Greenbelt development in three rows in and around the mine lease area.
v. Avenue plantation along the mine transport roads.
vi. Engines of HEMM and other mine machinery and transport vehicles shall be properly maintained to reduce noise generation. Provision of incorporating silencers into the dumpers and other vehicles shall be suggested to control noise propagation.
vii. Shift timings shall be stringently supervised by the Site Manager/Engineer to prevent overexposure of the workers to high noise levels. A separate budget shall be kept for quarterly health check-ups of all the workers which shall also include audiometric tests.
viii. All workers operating HEMM in environments with noise levels exceeding 90 dB(A) shall be equipped with protective gear such as earplugs, and earmuffs. Additionally, soundproof and dustproof cabins shall be installed in machinery such as dozers,

shovels, dumpers, feeder breakers, etc.

4.4.4.2. Measures against Ground Vibrations

The following precautions are proposed to be implemented to control and mitigate ground vibrations/noise as a result of blasting activities, movement of Heavy Earth Moving Machinery (HEMMs), etc.

Blasting Techniques:

i. **Optimized Blast Design:** The pattern of initiation and firing affects the fragmentation and muck profile of the blast. Blasting patterns shall be optimally designed with minimal explosive use, proper burden and spacing of holes, and precise detonation sequencing. This reduces the energy transmitted to the ground.

ii. **Pre-splitting:** Shallow holes may be drilled along the perimeter of the blast zone and detonate them before the main blast. This creates a clean fracture, reducing the vibration transmitted to surrounding areas.

iii. **Controlled Blasting Techniques:** Use of techniques like cushioned/muffled blasting, air decking, and half second/millisecond delays to minimize the peak particle velocity (PPV), the primary measure of ground vibration intensity.

iv. **Nonel Initiation Systems:** Employing Nonel (Non-electronic) detonators instead of detonating cord for improved control over the detonation sequence, leading to reduced vibration and noise.

v. **Proper detonation and initiation of charge:** In order to ensure uniform fragmentation thus, resulting in better vibration-controlled vibrations, the proper distribution of explosive charge in the borehole shall be ensured. Normally the major portion of the explosive charge is placed in the bottom of the hole, where the confinement of the explosive is greatest and it has to do maximum work. A combination of high density and medium density explosives help to distribute the explosive energy.

vi. **Decking** is also practised for spacing of the explosive charge more uniformly in the hole. After the bottom charge (usually 1.3 times the burden), the balance quantity of explosives is distributed as decks separated by stemming material. Decking is also required where the strata has alternating hard and soft bands. A Cordtex detonating fuse shall be normally used for initiating the explosive charge.

vii. **Secondary Blasting:** Secondary blasting may be carried out to break any oversized boulders, produced during the primary blast to a size suitable for transportation/as per need. Pop Shooting/Plaster shooting shall be employed in this regard. However, the breaker will be a better alternative if available as no further explosives are required and generation of lesser noise.

viii. **Stemming:** Improper confinement of explosive leads to wastage of explosive energy and unregulated vibrations. As such the importance of stemming (packing) cannot be over emphasised. By normal practise, the drill gumming shall be used for stemming as they are readily available at the hole collars. A stemming length of about 0.7-1.1 times the burden is usually optimum. However, stemming length would depend on the nature of strata and the point of initiation of the charge.

ix. **Inclined Holes:** Inclined drilling, with the angle of inclination varying between 10° - 40° with the vertical, produces lesser vibrations due to blasting and an increased blasting efficiency. Difficulties caused due to back break in vertical holes are eliminated due to increased burden and spacing and the bench height can be increased while reducing the haulage levels.

Machinery and Operations

i. **Selection of Equipment:** Machinery to be chosen suited to the task size. Larger machines that may lead to more ground disturbance may not always be necessary.

ii. **Proper Maintenance:** Machinery to be regularly maintained to minimize noise generation and ensure smooth operation, reducing ground vibrations.

iii. **Haul Road Management:** Haul roads to be maintained properly to minimize bumps and vibrations caused by uneven surfaces.

iv. **Speed Limits:** Speed limits to be ensured for haul trucks and other heavy machinery to reduce ground impacts.

Monitoring and Mitigation

i. **Vibration Monitoring:** Ground vibrations to be continuously monitored during blasting to ensure they stay within permissible limits set by regulatory bodies.

ii. **Noise Monitoring:** Noise levels to be regularly monitored complying with regulations and minimize noise pollution.

iii. **Buffer Zones:** Buffer zones to be established around blasting areas to limit the impact on nearby structures and communities.

iv. **Community Communication:** To keep the neighbouring communities informed about blasting schedules and take steps to minimize disruption.

Additional Considerations

i. **Worker Training:** Workers may be trained on proper blasting procedures and safe operation of machinery to minimize environmental impacts.

By implementing these mechanisms, the proposed Lynti Dkhar Limestone Mine can significantly reduce ground vibrations and noise from blasting and machinery operations, creating a safer and more sustainable work environment for miners and minimizing the impact on surrounding communities.

4.4.4.3. Measures to control Fly rocks

Although there are a large number of factors that can influence fly rocks such as an irregular shape of the working face, presence of loose gravel and/or rocks on the face, long water columns in holes, etc. Thus, to minimise and mitigate the risks associated with the generation

of fly rocks, the following preventive measures have been proposed:

i. Muffled blasting
ii. Dozing of loose boulders
iii. The region within a 200-500-meter radius of the blasting zone will be designated as a hazardous area/danger zone, demarcated by red flags or other suitable signage. Unauthorized access to this zone will be strictly prohibited during blasting activities.
iv. To safeguard the mine workers involved, blasting shelters will be made available near the blasting sites to offer protection during the process.
v. A warning sound will be sounded fifteen minutes prior to the actual blast, allowing individuals to evacuate the danger zone.

4.5. IMPACT ON WATER QUALITY

4.5.1. Impact of the proposed project on surface and ground water regime of the area due to mining

4.5.1.1. Topography and drainage

The area around the block represents a gently rolling topography. Karst Topography is prevalent with spiky surfaces with lots of sink holes and solution cavities. In the proposed block, elevation difference is noted from 145 meters to 133 meters. In a Regional Scale the area forms a part of the Meghalaya Plateau exposing geological milieu representing Precambrian to Tertiary sequence in this part of East Khasi Hills District of Meghalaya. The Wah Tharia River is about 1.1 Km SE from the Mine Lease area and flowing N-S.

4.5.1.2. Impact on surface water regime

The study area is not crossed by any large surface water channel/nallah. Some important surface water quality parameters that were examined in the baseline data were pH, DO, BOD, and total coliforms, in accordance with the CPCB water quality requirements. The surface water samples were found to have DO values ranging from 7.4 mg/L to 7.6 mg/L, whereas BOD was consistently determined to be equal to or greater that 1.6 mg/L.

Problems of high suspended solids in mine water have been found as a matter of concern, which need to be treated through physical and chemical processes. Suspended solids can be removed by sedimentation.

It is expected that a greater concentration of suspended materials is probably what will have an effect on the surface water quality. The overburden dump area shall be designed, contoured, capped, and graded appropriately to avoid any runoff and soil erosion.

Moreover, in order to manage the influx of water in the rainy season (generally from June – October in Meghalaya), provisions of garland drains shall be made as follows:

i. **Near overburden dumps and stackyard:** Garland drains shall be constructed in and around the overburden dump and stackyard so that the wash-off is re-coursed into the settling tanks. The overflow shall be further discharged for adequate treatment in the proposed ETP.

ii. **Near the working face/active area:** At any time, the method of extraction of mineral will be carried out in a dip-rise manner. During heavy rainfalls, the mine will remain closed and water accumulated at the dip end of the quarry shall be pumped out, as necessary to prevent rain water percolation and will be directed through the garland drains towards the settling tanks.

iii. **In non-working areas:** During periods of heavy rainfall in such areas, the natural topographical drainage pattern of the area shall remain untouched unless leading to the working areas of the mine. In such cases, garland drains shall be made to intercept and recourse any wash-off that may otherwise, flow into a nearby surface water channel/nallah/catchment area.

4.5.1.3. Impact on ground water regime

Information on ground water hydrogeology available with the *Department of Water Resources, Government of Meghalaya and Central Ground Water Board, State Unit Office, Shillong* are summarized in **Table 4.4** below.

Table 4.4: Hydrogeology of Meghalaya

Age	Group	Formation	Lithology	Hydrogeological Conditions	Yield (m^3/hr)
Pleistocene to Holocone	Newer (Recent) and Older Alluvium		Unconsolidated Sediments Sand, silt and clay	Thick, continuous aquifer in the western, northern and southern fringes of the State. Ground water occurs under unconfined to semiconfined conditions; Depth to water level rests at 3 to 5 m BGL (metres below ground level)	30-100
Mio-Pliocene		Duptila	Mottled clay, sandstone, shale and conglomerate	Thick, discontinuous aquifer encountered down to 250 m BGL in the West Garo Hills area. Groundwater occurs under semi-confined to confined conditions; Depth to water level rests at 4 to 9 m bgl	25-150
Oligo-Miocene	Garo group	Chengapara	Coarse sandstone, siltstone, clay and marl		
		Baghmara	Coarse sandstone, conglomerate, silty clay and fossiliferous limestone		
		Simsang	Fine sandstone and alternation of siltstone-mudstone		
Eocene-Oligocene	Barail group	----------	Coarse sandstone, shale, minor coal lenses carbonaceous shale		
Palaeocene-Eocene	Jaintia group	Kopili	Shale, sandstone, marls and coal	Discontinuous aquifer in the cavernous limestones and sandstones area. Groundwater occurs under unconfined to semi-confined conditions; Depth to water level rests at 2 to 4 m BGL	5-15
		Shella	Alternation of sandstone, limestone		
		Langer	Calcareous shale, sandstone, limestone		
Upper Cretaceous	Khasi Group	Mahadek	Arkosic sandstone (Glauconitic)		
			Conglomerate		
		Jadukata	Conglomerate/sandstone		
Paleo-Meso Proterozoic	Shillong Group		Quarzite, phyllite, quartzsericite schist, conglomerate	Aquifer formed by weathered and fractured zones extending down to 150 m BGL. Groundwater occurs under unconfined to	2-10
Archaean - Proterozoic	Meghalaya Archaean Gneissic Complex		Granite gneiss, Biotite gneiss, mica schist,		

		silliminite-quartz schist, pyroxene granulite, gabbro & diorite, acidic and basic intrusives	semi-confined conditions; Depth to water level rests at 7 to 17 m	

*(**Source:** Department of Water Resources, Government of Meghalaya & Central Ground Water Board, State Unit Office, Shillong, 2023)*

Ground Water Resources Estimation Methodology (2015)

Ground Water Resource Estimation based on latest methodology as recommended by Ground Water Resource Estimation Committee Report (GEC – 2015) is the current approach utilised for groundwater resource evaluation for the district of East Khasi Hills in Meghalaya which covers an area of 2748 km2 (East Khasi Hills District | Govt. of Meghalaya | District Administration | India). These computations are taken from CGWB's Report titled "Dynamic Ground Water Resources, Meghalaya (As on March, 2023)" that have been calculated for the year 2022-2023 (1st April, 2022 to 31st March, 2023).

Table 4.5 – Status of GW Recharge, Annual Extraction & Allocation and Net Availability in East Khasi Hills, 2023

DYNAMIC GROUND WATER RESOURCES OF EAST KHASI HILLS, MEGHALAYA, 2023 (in Hectare Metre – Ham)														
MEGHALAYA)														
District	Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for Domestic use as on 2025	Net GW Availability for future use	Stage of Ground Water Extraction (%)
	Monsoon Season		Non-Monsoon Season		Total Annual Ground Water Recharge			Irrigation	Industrial	Domestic	Total			
	Recharge from rainfall	Recharge from other Sources	Recharge from rainfall	Recharge from other Sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
EAST KHASI HILLS	17237.26	386.76	5108.86	380.83	23113.71	2311.38	20802.33	0	2.1	589.56	591.64	673.59	20126.66	2.84

(***Source:*** *Department of Water Resources, Government of Meghalaya & Central Ground Water Board, State Unit Office, Shillong, 2023)*

Table 4.6 – Categorization of GW Quality in East Khasi Hills, 2023

DYNAMIC GROUND WATER RESOURCES OF EAST KHASI HILLS, 2023											
MEGHALAYA											
District	Total No. of Assessed Units	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
		No.	%	No.	%	No.	%	No.	%	No.	%
EAST KHASI HILLS	8	8	100.0	–	–	–	–	–	–	–	–

As of 2023, the stage of groundwater extraction in the project district, i.e., East Khasi Hills was 2.84% ≈ SAFE Category as per the quantity-based categorization of the GEC – 2015 Report.

Thus, the impact of mining on the local groundwater regime depends upon such features of the mine as the depth and rate of expansion, rate of groundwater recharge and level of groundwater extraction from the mine lease area, and other hydraulic attributes of the aquifers below the project area. It is important to mention here that there will be no groundwater extraction from within the project area of 1.36 Ha. to meet any of the daily water demand of the project. It is so proposed that from the average quantity of water that shall be pumped out from this mine due to rainwater seepage and wash-off, a significant portion shall be utilised and recirculated to meet the daily mine water requirements. Potable drinking water shall be sourced from nearby rivers and delivered to the mine by water tankers.

After the end of mining operations, rainwater percolation/infiltration will increase and the water levels quickly get recharged in a short time. Upon completion of the mine, the empty space in the dip-side area will progressively fill with surface run-off and rainfall, forming a useful reservoir that will continuously replenish the groundwater regime and raise the water levels within the radius of influence (ROI) surrounding the mine.

4.5.2. Measures against Water Pollution and Depletion

Water from the stratum leaks into the quarry area during quarry operations and is pumped out as mine discharge. A portion of the mine's discharge water will be used to meet project water requirements, such as those for plantation irrigation, dust control, and cleaning HEMM. Other sources of water pollution are surface run-off during heavy rains, mine effluent, and sewage. Some control measures against water pollution are as follows:

i. Garland drains of appropriate sizes and lengths shall be made and maintained till the end of LoM (10 years) along the overburden dump and quarry area to keep any surface run-off away from the nearby areas of Lynti Dkhar and Bholaganj, and surface water bodies/vegetated areas, etc.,

ii. A Rainwater harvesting tank of appropriate size is in place to store excess rainwater during the rainy seasons, which shall ensure ground water sustainability in and around the mine lease area,

iii. The Rainwater Harvesting structure shall be designed and implemented based on the recommendations suggested by the Central Ground Water Board's State Unit Office in Meghalaya. Details of the proposed Rainwater Harvesting scheme in the mine are given as **Annexure 7** of this report,

iv. In order to control soil erosion and siltation into natural water bodies, various measures such as settling tanks, gabion walls, check dams, and sufficient size and length of garland drains are suggested. These measures are proposed based on the rainfall patterns in the area, the general ground profile, the proposed profile of internal dumps, the quarry surface, and other parameters.

v. The overburden dump shall be designed in such a manner so as to avoid surface run-off water along its slopes. This shall be achieved by developing overburden bench terraces that slope inward and have deck drains to check the run-off at pre-determined slope intervals,

vi. Grass cover shall be developed along the backward slopes to minimise any surface run-off and consequent soil loss (*Widomski & Marcin, 2011*),

vii. Water accumulated in the dip-side of the active quarry area due to rain as well as seepage shall be regularly pumped out and directed to the Effluent Treatment Plant (ETP),

viii. The water collected from washing HEMMs shall first be collected and then treated in the ETP. The treated water shall then be re-used for cleaning and washing of HEMMs, dust control, and plantation – maintaining the principal of Zero Liquid Discharge (ZLD),

ix. The sewage generated in the mine shall be in small quantities and treated in septic tanks followed by soak pits as detailed in the Govt. of India's *Central Public Health and Environmental Engineering Organisation's (CPHEEO) Advisory Manual on On-Site and Off-Site Sewage Management Practices, 2020*.

x. Surface and ground water qualities shall be monitored regularly.

4.5.2.1. Details of mitigation measures against surface run-off

Surface run-off is one of the major sources of water pollution that can contribute to siltation in the natural water bodies, increase in values of Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Turbidity, pH, etc. Precipitation in the area either recharges into the ground, evaporates or forms run-off. The run-off factor can be taken as 0.2 in the open land.

Based on the rainfall intensity, frequency, and patterns in the area, profile of the ground, proposed profile of external dumps, quarry surface, other parameters, sufficient size & length of garland drains along with toe walls/earthen embankments, settling ponds, greens in between, gabion walls, rock flow dynamics, and check dams are proposed to control the soil erosion and siltation into the natural water bodies.

The external dumps are designed in such a way so to avoid the run-off along the slopes of the external dumps by backward sloping of the terraces (at 27°-28° to the horizontal), deck drains and safe disposable drains at predetermined intervals. The schematic diagram of the disposal of run-off along the overburden dump is given in **Figure 4.4** below.

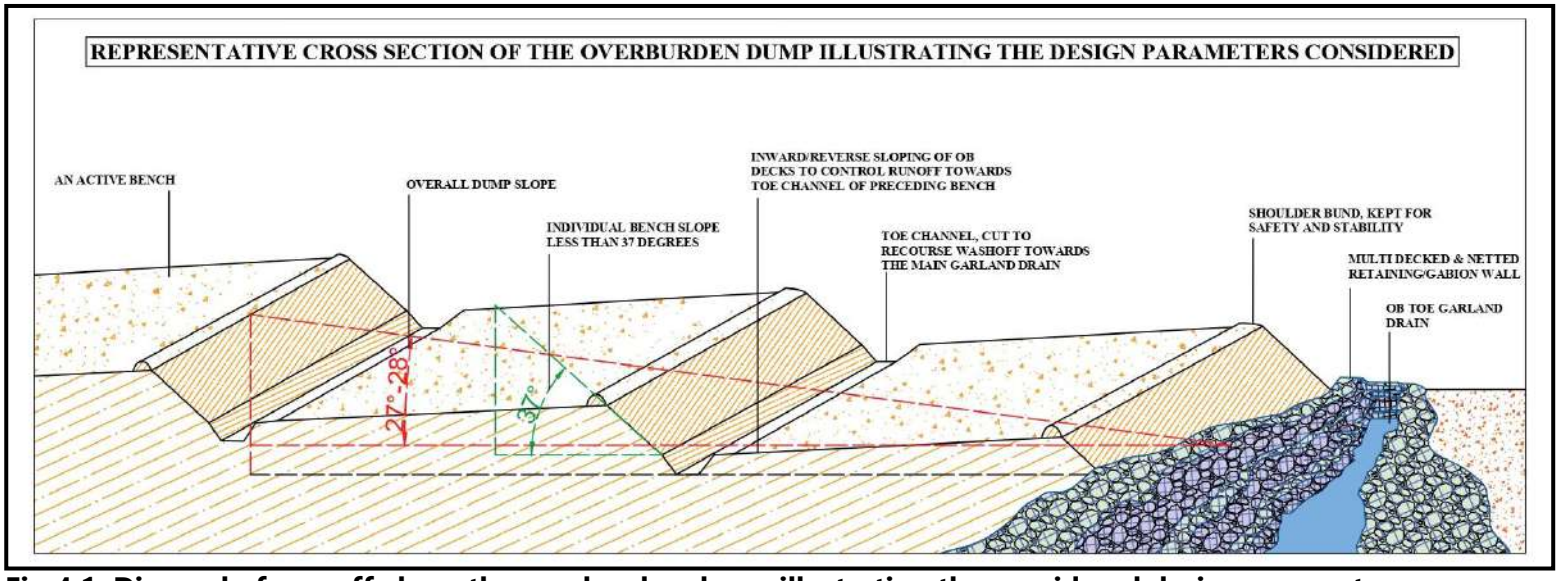


Fig 4.1: Disposal of run-off along the overburden dump illustrating the considered design parameters

4.5.2.2. Scheme for Rainwater Harvesting for Groundwater Recharge

A detailed proposal for Rainwater Harvesting and Artificial Recharge to Groundwater is given as **Annexure 7** to this report.

Development and Conceptual plans in the approved Mining Plan include the design and schematic diagram of the proposed garland drain surrounding the external dump, the retaining wall, border planting, etc. for controlling siltation and arresting the eroded material, if any. Thus, taking into consideration the above points and their **stringent implementation**, it may be concluded that the surface and ground water regimes in this area will not have any adverse negative impacts. In the unlikely event of any adverse impact on the water regimes of the surrounding areas, the project proponent will take strict and immediate action to address the issue.

4.6. IMPACT ON LAND ENVIRONMENT

4.6.1. Impact of the proposed project on land environment of the area

The total land requirement for the project is 1.36 Ha. During opencast mining, some amounts of overburden (gritty soil) will have to be rehandled and removed to facilitate extraction of the mineral. As a result, the landscape and terrain of the project area will change during operation-stage activities such as excavation, dumping of overburden, infrastructural developments of temporary structures and offices, approach roads and service facilities, etc. Initially, some natural vegetation of the area was damaged during the initial period of 5 years of mining operations which have been eventually be restored by stage-wise plantation activities in a progressive manner. Details of existing land-use, during mining land-use (next 5 years), and end of LoM land-use (end of 10 years) are furnished in the **Table 4.7**.

Table 4.7: Present Land-Use of the project

Existing Land Use Pattern		
S. No.	**Category**	**Area in Ha.**
1	Excavated Land	0.16
2	Road	0.01
3	Balance unused area	1.19
Total		**1.36**
Land Use Pattern after 5 Years Plan Period		
S. No.	**Category**	**Area in Ha.**
1	Excavated Land including road	1.01
2	Green belt in safety Barrier	0.26
3	Dump with parapet wall and Garland drain	0.09
4	Balance unused area	0.00
Total		**1.36**
Land Use Pattern after Life of Mine		
S. No.	**Category**	**Area in Ha.**
1	Excavation Land including reclamation	1.01
2	Green belt	0.35
3	Balance unused land	0.00
Total		**1.36**

4.6.2. Measures against Land Degradation

The Land Use pattern in the lease area may change as a result of different phases of mining operations. Land reclamation shall be done along with ongoing mining operations in order to minimise the negative consequences. After the end of mining operations, approx. 0.35 Ha. of land of the mine lease area shall be developed into a dense greenbelt, and the remaining backfilled areas and OB benches will be revegetated by plantation activities which will be taken up by the project proponent, any remaining void of land shall be converted to a water body – which may act as a potential source of surface water and recharge for ground water in the future for the neighbouring communities (*Sengupta, 2015*).

The following measures are proposed to be undertaken in the project:

i. Plantation of approximately 0.35 Ha. of the project area (within the safety barrier) and additional plantation over the backfilled area of the mine with native, high APTI species that are resistant and self-sustaining,

ii. Topsoil excavated from the site shall not be mixed with the overburden and shall be dumped separately at predetermined locations apropos to the greenbelt development/plantation activities, and

iii. Simultaneous back-filling of the mine voids during the ongoing mining operations.

iv. Overburden (OB) will be managed as per the approved Mining and Mine Closure Plan of Lynti Dkhar Limestone Mine and has been indicated in **Section 2.7** of **Chapter 2**.

4.7. IMPACT ON ECOLOGY AND BIODIVERSITY

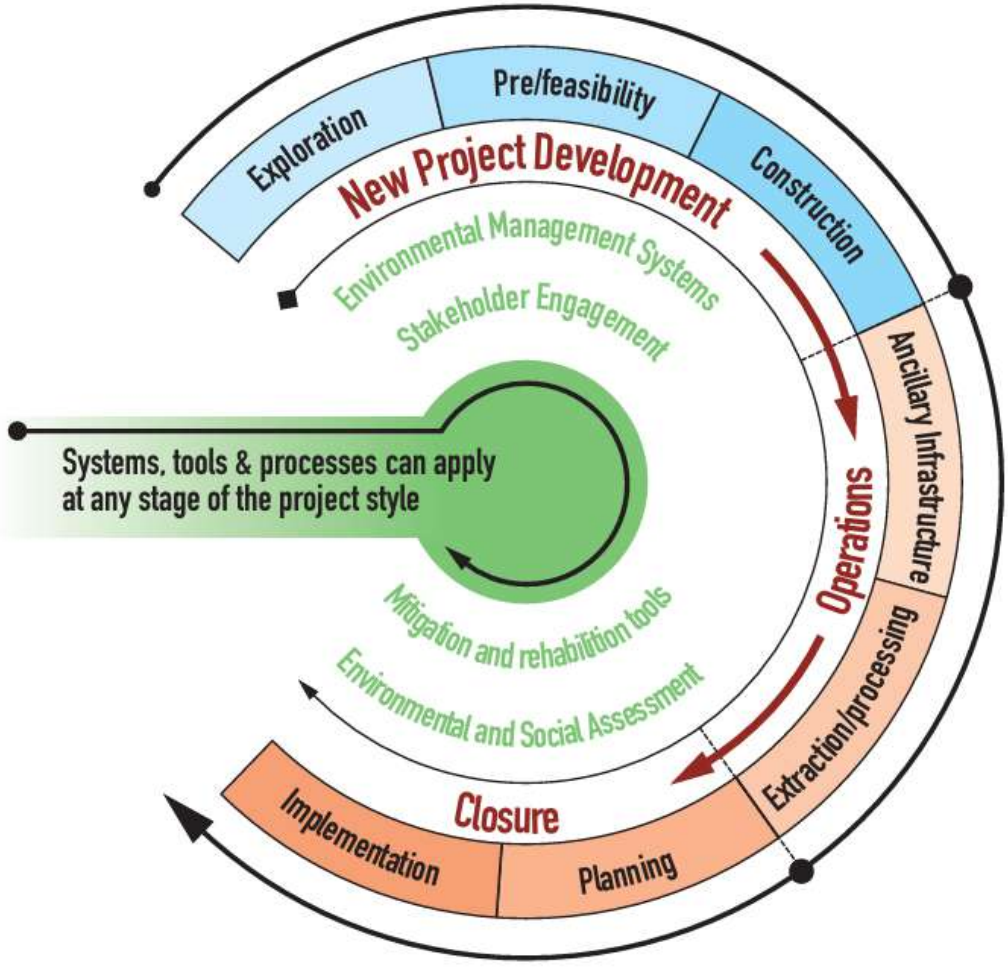
4.7.1. Impact of the proposed project on ecology and biodiversity within the core and buffer areas

This section examines the challenges posed by mining to the ecology and biodiversity in the surrounding environment. All mining activities including limestone mining are site-specific. Ores and minerals cannot be moved to another location and thus, have to be quarried from wherever the mineral deposits occur. From the point of view of the mining industry, its activities are economically and environmentally risky. They are dependent on the fluctuations and flows of the global economy. The site-specific and regional impacts vary significantly depending on the local characteristics of the environment, on the mining activity type, on the geology, and on the ore that is mined (*Mononen et al., 2022*).

To minimize harm to biodiversity and surrounding communities, the mitigation strategies prescribed in this section involve implementing protective measures. These measures aim to prevent negative impacts from mining activities altogether. However, if complete prevention is not achievable, such mitigation measures have been suggested that focus on decreasing the severity of these impacts to an acceptable level.

Fig 4.2

Integrating biodiversity into the mining project cycle



Note. From Good Practice Guidance for Mining and Biodiversity, by Sally Johnson, 2006, London, UK: International Council on Mining and Metals (ICMM). Copyright 2006 by www.icmm.com.

4.7.1.1. Core Area:

There is no forest area and/or wildlife inside the core area of this project.

4.7.1.2. Buffer Area:

As per the Land-Use Land Cover Map of the 10 km radius study area around the mine lease boundary, there is 17338.38 Ha. of vegetation area around the project classified mainly under tropical evergreen vegetation (https://megbiodiversity.nic.in/floral-diversity). Also, there is no Protected Area and/or Ecologically Sensitive Zone (ESZ) in the buffer zone of the project.

Thus, taking into consideration the above points and the fact that the mining lease area is comparatively small, it may be concluded that the ecology and biodiversity in the study area will not have any significant negative impact as a result of this mining project.

4.7.2. Measures to nullify any impact on the vegetation within the core and buffer areas

Although the mine lease area does not have any forests, portions of the study area may have tropical evergreen vegetation (https://megbiodiversity.nic.in/floral-diversity).

Hence, the following safeguards shall be undertaken to protect any such vegetation:

i. Avenue Plantation: Avenue plantation is proposed to be taken up in the non-forest areas falling within a 5 km radius from the mine lease area with native plant species such as *Ficus sp., Clerodendrum colebrookeanum, Acacia auriculiformis, etc.*

ii. Plantation of angiosperms (flower and fruit bearing plants) shall be taken up to attract different types of fauna such as arthropods, reptiles, aves, and mammals.

iii. Muffled blasting techniques along with other noise and ground vibration mitigation measures shall be used to ensure negligible impact on the surrounding ecology and biodiversity,

iv. Regular water spraying on dust generating areas such as transport points, approach and haul roads, overburden and topsoil dumps, stackyards, etc. to avoid the accumulation of fugitive dust and other pollutants on trees in the nearby areas,

v. In order to preserve the hydrological equilibrium in this area, mine water shall be effectively utilized for a variety of purposes, such as dust suppression, plantation, washing

of HEMMs, etc. The excess water shall be reused for groundwater recharge after channelling through settling ponds.

vi. Detailed studies on the biological environment jointly conducted by the QCI-NABET Accredited Ecology and Biodiversity team of the Environmental Consultancy Company that has prepared this report with support from the Meghalaya Forest Department indicated that there are no endangered, threatened, vulnerable, and/or endemic species in the core and buffer areas of the proposed project.

vii. A site and project-specific Greenbelt Development Plan has been prepared with support from the Meghalaya Forest Department. The same has been explained in detail in **Section 4.7.2.1.** of this chapter.

4.7.2.1. Greenbelt Development Plan

A progressive biological reclamation exercise will be undertaken to ensure restoration by means of revegetation in all areas impacted by mining operations during the backfilling of mine voids, road preparation, and rehandling of OB. A Greenbelt over 0.35 Ha. will be developed within the safety barrier of 7.5 meters (*indicated in **Table 4.7***)

Additionally, the reclaimed area of 1.01 Ha, will also be developed as a green cover, to restore and enhance the site's natural condition.

Therefore, nearly **100.0%**, of the 1.36 Ha within the block will be targeted for ecological reclamation at the end of the life of mine (LoM) and post closure period.

The proponent will also take steps towards the development of a nursery within the mine lease area to substantiate the availability of saplings as and when required; however, to develop the area of 1.36 Ha, native species will be acquired from the nearest available State Forest Nursery/Horticulture Department as well.

A list of species recommended in the afforestation / plantation programme of the Lynti Dkhar Limestone Mine is furnished in **Table No. 4.8**.

Table 4.8: Species recommended for plantation (will be dependent on sapling/seed availability with the nearest available Forest Range Office Nursery)

S. No.	Local Name	Scientific Name	Habit
1	Synsar	*Thysanolaena maxima*	Grass
2	Siej	*Bambusa tulda*	Grass
3	Soh-ngang	*Solanum indicum*	Shrub
4	Soh-pyrnou	*Leea asiatica*	Shrub
5	—	*Murraya koenigii*	Shrub
6	—	*Melastoma malabathricum*	Shrub
7	—	*Mussaenda roxburghii*	Shrub
8	—	*Clerodendrum sp.*	Shrub
9	—	*Croton caudatus*	Shrub
10	—	*Jatropha curcas*	Shrub
11	—	*Coffea bengalensis*	Shrub
12	Syntiew-dohmahi	*Clerodendron colebrookianum*	Shrub
13	Makor	*Zizyphus oenoplia*	Climber
14	Tyllen-dkhar	*Hibiscus macrophyllus*	Shrub
15	—	*Mucuna bracteata*	Climber
16	Banatulsi	*Ocimum gratissimum*	Shrub
17	Bti	*Toona cilliata*	Tree
18	Dieng jalong	*Sapium baccatum*	Tree
19	Dieng ngan	*Schima wallichii*	Tree
20	Dieng rai	*Michelia champaca*	Tree
21	Dieng laphiang	*Gmelina arberea*	Tree
22	Dieng song	*Erithrina indica*	Tree
23	Bai	*Duabanga grandiflora*	Tree
24	Soh-phan	*Artocarpus heterophyllus*	Tree
25	Soh-um	*Syzygium cumini*	Tree
26	Dieng lakhoit	*Callicarpa arborea*	Tree
27	Saphai	*Myrica esculenta*	Tree

4.8. SOCIO-ECONOMIC MEASURES

This project is anticipated to generate only positive socio-economic impacts on the people of the neighbouring communities. It shall harbour economic development to the project area including

infrastructural and community developments.

The project proponent shall ensure that continuous efforts are made towards the enhancement and upliftment of living conditions of the mine workers, their families, and community people from the surrounding village areas. Similarly, the proposed mining operations will bring in additional indirect employment opportunities and will also bring in the medical and communication facilities within their reach.

Chapter 5 – ANALYSIS OF ALTERNATIVES

5.1. GENERAL

Analysis of alternatives seeks to ensure that Lynti Dkhar Limestone Mine has considered other feasible approaches, including alternative project locations, scales, technologies and processes, operating conditions, etc.

5.2. ANALYSIS OF ALTERNATIVES

5.2.1. Technology Alternatives

As per the existing mining operations, the proposed production enhancement of limestone mine shall be carried out through a semi-mechanized method in a systematic and scientific manner in line with the approved Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine. It is based on the Meghalaya Minor Minerals Concession Rules of 2016 (MMMCR, 2016) and approved by the Directorate of Mineral Resources (DMR) under the administrative control of the Department of Mining and Geology, Shillong:

- The proposed method of mining is semi-mechanized mining by forming benches of requisite bench height within 6 m x 6 m. The mining operations will consist of 4 basic stages namely, removal of topsoil, drilling and blasting for fragmentation of mineral and overburden, excavation and loading by excavators, and reclamation of mined-out voids,
- The excavation will be carried out through a combination of air compressor-jackhammer drills, excavators, and blasting. Blasting will be carried out using ANFO and slurry explosives, and NONEL detonators,
- Deployment of HEMM at the project site shall be in line with applicable permit conditions from the concerned authority and the Disaster Management Plan as described in Chapter 7 of this report for disaster preparedness and fire safety,
- Progressive reclamation plan proposes the continued development of the greenbelt by systematic utilization of the excavated topsoil during the mining phases; the greenbelt shall occupy an area of 0.35 Ha. by the end of LoM and additional plantation areas shall also be developed along the haul roads and dump sites. The mined-out voids shall be used as a water reservoir and rainwater harvesting,

5.2.2. Site Alternatives

This involves an evaluation of alternative sites with respect to environmental and project attributes such as proximity to raw materials, infrastructural facilities, markets, etc. The project is mineral specific and there is an abundance of the mineral in the area.

5.2.2.1. Site Selection

The existing project site has the following advantages:

i. The ML area is a non-forest land, has no agricultural land in its vicinity or any RF/PF areas,

ii. No sensitive or protected areas are found within the study area of 10 km radius from the ML boundary,

iii. There are several villages outside the ML area but within the study area of the project, which will be economically benefitted by the project's continued operations.

Chapter 6 – ENVIRONMENTAL MONITORING PROGRAMME

6.1. SCOPE OF ENVIRONMENTAL MONITORING

An Environmental Monitoring Programme is an essential component of an EIA report for opencast mining projects in India. It serves as a roadmap for continuously assessing the environmental impacts of the project throughout its lifecycle, from pre-construction to operation and post-closure. This proactive approach ensures compliance with environmental regulations and minimizes potential environmental damage.

The monitoring programme for Lynti Dkhar Limestone Mine, shall entail a five-step process:

i. **Designing a data collection strategy:** This involves planning surveys and sampling protocols to systematically gather relevant environmental information for assessment of environmental status in relation to the project activities and subsequent implementation of approved environmental management plan.

ii. **Sampling and the data collection plan:** This stage shall focus on conducting the planned surveys and collecting samples according to the established protocols. Further, samples shall be processed and analysed for generating data on various aspects of environment.

iii. **Data analysis and interpretation:** Collected samples and environmental data shall be analysed to understand their significance. This analysis will help interpret the collected information and its implications for the local environment.

iv. **Environmental management reporting:** The final step involves preparing reports that summarize the collected data, analysis of results, and its interpretations. These reports are crucial for supporting informed decision-making related to environmental management practices throughout the project lifecycle.

v. **Corrective measures:** Based on obtained data, necessary corrective measures shall be taken, if needed to minimize the impacts.

Considering the environmental implications of various actions involved in the proposed opencast project, a comprehensive environmental monitoring plan has been developed incorporating various mitigation measures for prevention/control of pollution. The following details the monitoring procedures designed to evaluate the success of these mitigation measures in the EMP:

6.2. STRUCTURE OF THE ENVIRONMENT MANAGEMENT CELL (EMC)

For effective monitoring of the EMP and other environmental protection measures, a committee will be formed at the project level. This committee shall constitute of the following members:

i. Project Proponent
ii. Environmental Engineer
iii. Mine Manager/Engineer
iv. Mine Safety Officer
v. Medical Officer
vi. Allied personnel assisting the above

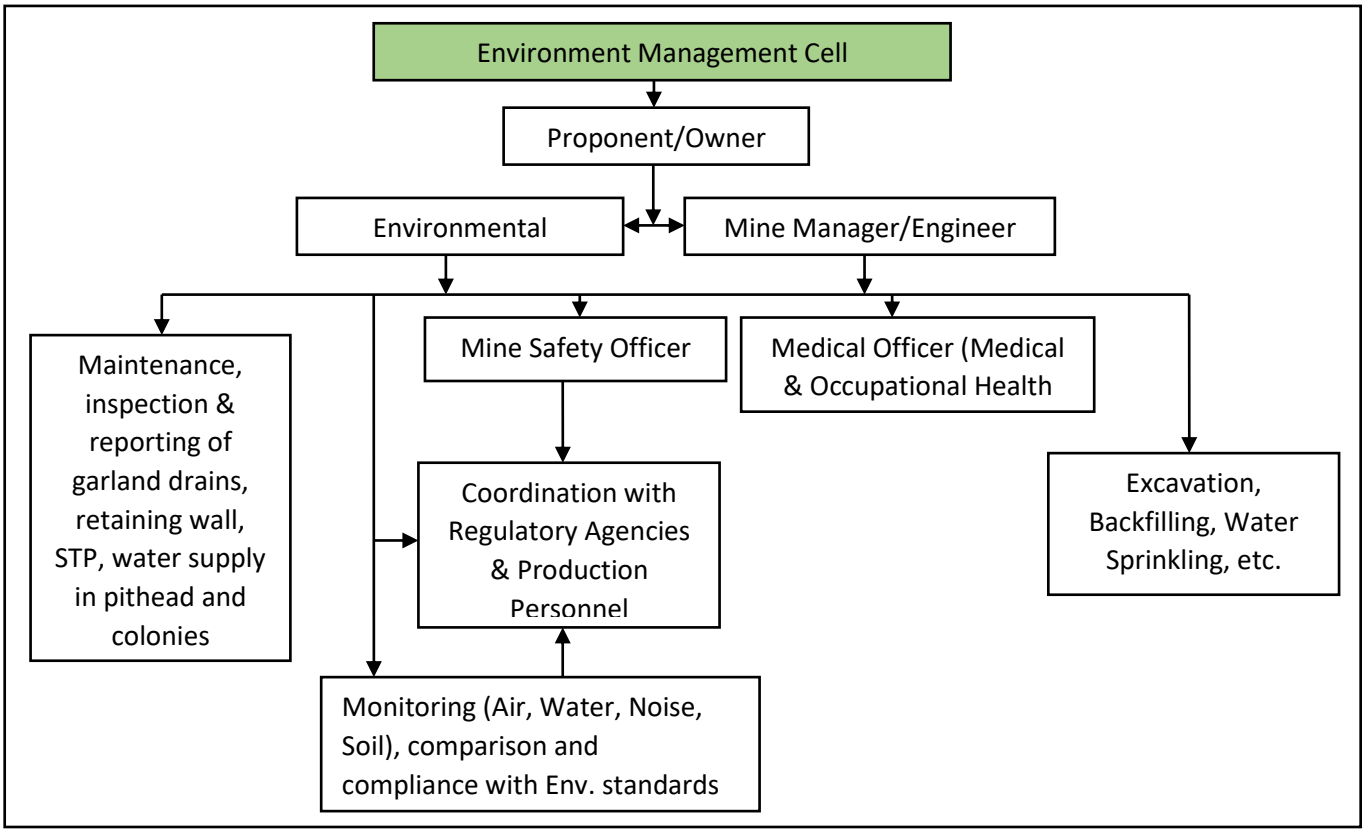


Fig: 6.1: Organizational Set-Up and basic functions of the Environment Management Cell (EMC)

6.3. METHODOLOGY OF THE MONITORING MECHANISM

6.3.1. Environmental Management and Monitoring

A two-tiered environmental monitoring system shall be established for Lynti Dkhar Limestone Mine project and its associated facilities. This system will track both project-level and area-level environmental impacts.

i. **Project Level:** Project authorities will monitor the effectiveness of various environmental protection measures such as dust suppression, effluent treatment and reuse, noise and vibration control, equipment maintenance, mine site cleanliness, greenbelt development and plantation activities, and compliance with the Environmental Management Plan (EMP) and Environmental Clearance conditions.

ii. **Area Level:** Dedicated authorised personnel as described in **Figure 6.1**, will oversee area-level protection measures, including planting and maintaining green belts on vacant land, proper functioning and maintenance of the oil/grease traps and settling tanks, and monitoring the overall environmental quality at the project site.

Coordination and Oversight: A senior executive such as the Mine Manager, Mine Safety Officer or the Environmental Engineer reporting directly to the Project Proponent/Management shall be responsible for ensuring collaboration between various departments working within the project and conducting regular monitoring of all environmental protection efforts. This executive shall be supported by an Environmental Engineer with expertise in pollution prevention and control specific to opencast mining operations in India.

6.4. POST-PROJECT MONITORING & EVALUATION PROGRAMME

6.4.1. Monitoring of Mining Parameters

Slope failure: Regular inspection (frequency and mechanism) will be carried out to examine slope stability, mine face and active working areas, etc. A team constituting of the Mine Manager will undertake monthly inspection.

Ground water drainage: The effectiveness of drainage system depends upon proper cleaning of all drains and sumps. Regular checking will be carried out to find any blockage due to silting or accumulation of loose material. The drains will also be checked for any damage in lining / stone

pitching, etc. The assigned Environmental Management Cell will inspect for such indications and submit such a report to the owner.

Blasting effect: Blasting is one of the most critical activities of mining operations. Because of presence of loose rock mass, rarely drilling and blasting is to be performed for loosening of the rock mass. Therefore, optimum drilling and blasting parameters will be developed to optimize the efficiency of blasting - keeping the associated hazards at a minimum.

6.4.2. Monitoring of Environmental Parameters

Air, water, soil, and noise monitoring will be conducted at the same locations where the samples were originally collected during the Environmental Impact Assessment (EIA) study.

To ensure the effectiveness of the environmental mitigation program, regular monitoring of crucial environmental parameters will be conducted. The specific location, schedule, duration, and parameters to be monitored are detailed in **Table 6.1**.

Table 6.1: Location, Monitoring Schedule and Parameters

Sl. No.	Description of Parameters	Location	Schedule and Duration of Monitoring
A	**Air Quality (PM_{10}, $PM_{2.5}$, SO_2, NO_2) monitoring**		
A-1	Five monitoring stations	One within and four outside the project area covering upwind and downwind directions.	Monthly basis
B	**Quality of surface and ground water monitoring**		
B-1	At least two surface water samples from the nearby water bodies will be regularly monitored as part of the project's environmental monitoring programme in consultation with the MSPCB.	Up-stream (One location)	Quarterly basis
		Down-stream (One location)	
B-2	Five groundwater samples will be regularly monitored as part of the project's environmental monitoring programme in consultation with the MSPCB.	One will be taken from near the active working area and four more from outside the project's core area	
C	**Ambient Noise Level monitoring**		
C-1	Five monitoring stations	One is on-site and, four within the study area covering the approach	Monthly basis

		road connected with the main road.	
D	**Soil Quality monitoring**		
D-1	Soil samples will be collected from four locations.	Within the study area	Half-yearly basis

6.4.3. Monitoring of Phase-Wise Reclamation Programme

A dedicated Environmental Management Cell (EMC) (as depicted in **Figure 6.1**) will conduct regular inspections to assess the progress of reclamation activities alongside mining operations. The Mine Manager will hold primary responsibility for ensuring the implementation of the approved reclamation program as outlined in the Environmental Management Plan (EMP).

6.4.4. Monitoring of Proactive Emergency Preparedness

The Mine Manager will lead efforts to identify and prepare for potential emergencies arising during opencast mining operations. An emergency response plan will be developed to address various scenarios, including:

i. **Inundation of the quarry:** Flooding due to unexpected water inflows.
ii. **Seismic Events:** Earthquakes and resulting landslides that could trigger slope instability or equipment damage.
iii. **Slope failures:** Landslides or collapses in pit walls.

By proactively identifying and planning for these potential emergencies, the Mine Manager shall ensure a swift and effective response to safeguard personnel, property, and the environment.

6.4.5. Occupational Health and Safety Monitoring

Full body health check-ups, complete with chest radiographs as per International Labour Standards guidelines on Occupational Health & Safety (ILO), shall be organised once in six-months through qualified medical officers for all work personnel in the mine.

Moreover, health camps shall also be organised in the neighbouring villages and others that fall within 10 km radius area from the project boundary to monitor the health of the nearby inhabitants after the start of mining operations.

6.4.6. Reporting Schedules of Monitored Data

Project-Level Environmental Committee: Monitoring Activities

To ensure successful implementation of the EMP and achieve the environmental goals of Lynti Dkhar Limestone Mine, the Environmental Management Cell (EMC) will focus on monitoring the following activities:

i. **Slope Stability:** Regular check for slope stability of mine working faces and dumps for taking necessary corrective steps.

ii. **Soil Erosion:** Regular monitoring of soil erosion will be done at dumps and other areas. Garland drains, check dams, plantation along dump slopes will be provided and maintained.

iii. **Garland Drains and Mine Sumps:** All drains including garland drains will be de-silted periodically during pre-monsoon season. Effectiveness of the drainage system will be regularly monitored.

iv. **Effects of Blasting Activities:** Blasting operations will be continuously monitored to minimize environmental impacts such as fly rock generation, ground vibrations, and dust production.

To summarize, the Environmental Monitoring Cell (EMC) will serve as the central hub for all environmental monitoring programs and data. This data will be compiled and submitted regularly to the relevant Meghalaya state regulatory agencies. Reports will be formatted for clarity and submitted on a bi-annual (six-monthly) basis.

Chapter 7 – ADDITIONAL STUDIES

7.1. INTRODUCTION

Additional Studies required for the proposed Lynti Dkhar Limestone Mine such as Risk Assessment (RA), Disaster Management Plan (DMP), Social Impact Assessment (SIA) in connection with opencast mining and related operations, dangers/ risks/ explosions/ accidents, etc. likely to arise, including onsite and offsite emergency plans to meet any potential disastrous situation are included in this chapter.

7.2. PUBLIC CONSULTATION

To ascertain the concern of affected persons who have a plausible stake in environmental impacts due to the project activity, public consultation will be done after submission of this draft EIA report to the concerned authority. In the Public Hearing process, the responses/opinions of the public, affected directly or indirectly shall be received by way of written correspondence & through verbal modes of communication. A datasheet format similar to the one given below will be used for questions asked/ comments/ suggestions from the public and the compliances against them. A copy of the final proceedings of the public consultation, the points raised by the public and commitments made in tabular form will also be incorporated as an **Annexure** in the Final EIA/EMP.

S. No.	Name & Address	Public Queries/ Comments/Suggestions	Response and Commitment/ Action Plan along with budgetary provision made by Project Proponent

7.3. RISK ASSESSMENT AND MANAGEMENT

Assessment of risks and their management is essential to guard against and mitigate the consequences of major accidents. The term, "major accident" means an unexpected and sudden occurrence of event from abnormal developments in course of one's industrial activity leading to a serious danger to personnel/public or the environment, whether immediate or delayed, inside or

outside the installation involving one or more hazards.

Risk Assessment Process

The Risk Assessment Process shall involve measurement of risks to determine, prioritise and enable identification of the appropriate level of risk treatment.

Keeping in view the three basic principles i.e., **prevention, preparedness (both proactive and reactive) and mitigation** of effects through rescue, recovery, relief and rehabilitation; a comprehensive blue print of Risk Assessment and Management Plan will be prepared for the proposed Lynti Dkhar Limestone Mine incorporating the following:

i. Identification and assessment of risks
ii. Recommendation of measures to prevent damage to life and property against such risks

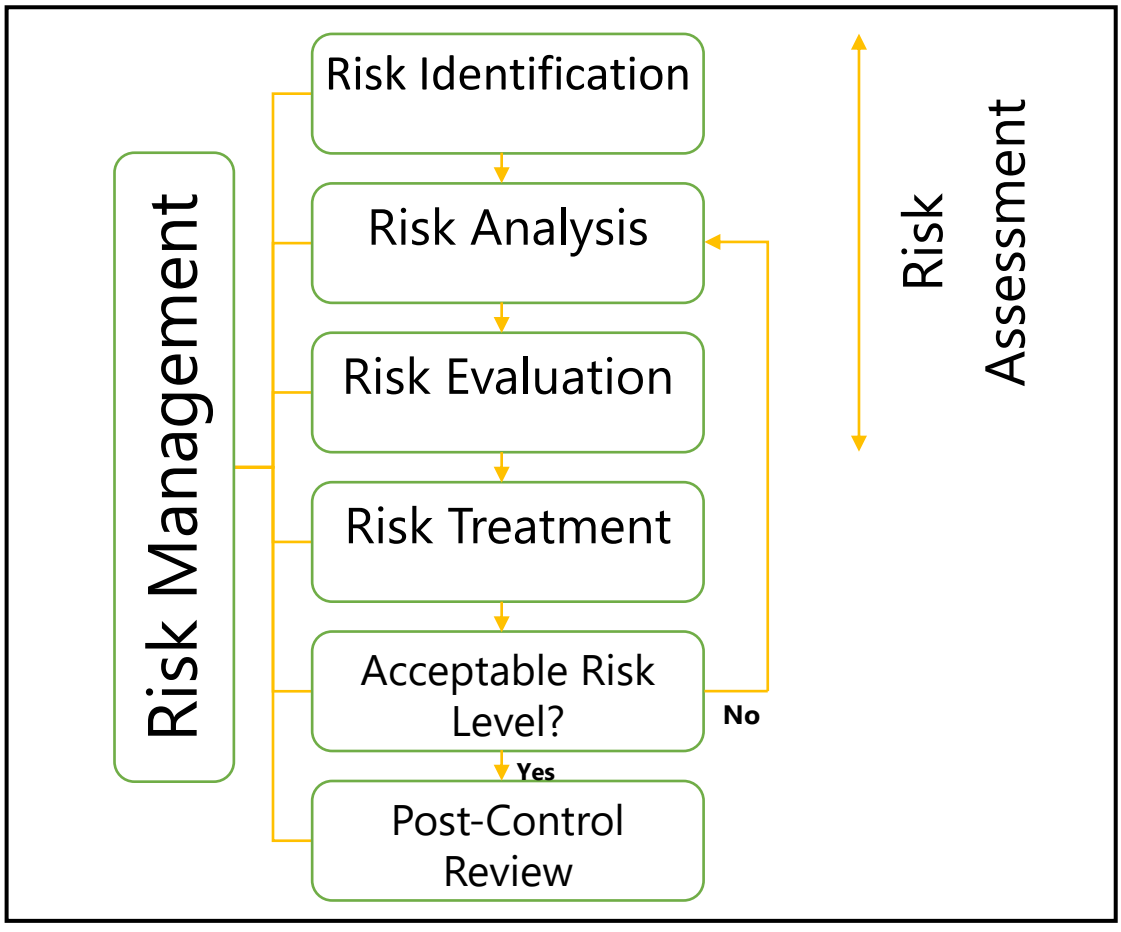


Fig 7.1: Brief summary of the Risk Management process to be implemented in the proposed Lynti Dkhar Limestone Mine

All statutory rules, regulations, applicable laws, etc. and statutory requirements related to govt. licenses, workers compensation, insurance, etc., including the Minimum Wage Acts for workers employed shall have to be adhered to. Rules, if any, imposed by local/State/Central authorities should also be complied by the lessor of HEMM/equipment, and the proponent will also have to supply various protective equipment such as safety helmets, shoes, etc. to the workmen.

Assessment of risks involved during mining operations and against them, the safety aspects and mitigation measures to combat such risks have been indicated below:

7.3.1. Safety Aspects for Operation of HEMMs/Equipment

Special precautions shall be taken while deploying workers in the mine. Before employing any personnel to the mine, proper vocational training shall be imparted and statutory provisions shall be implemented. For deployment of labourers, applicant/management shall fix terms and conditions. Some of the major aspects are as follows: -

7.3.1.1. For persons

i. No person shall be deployed unless he is trained at Mine Rescue and Mines Vocational Training (VT) Rules.
ii. Records in relevant forms shall be maintained.
iii. Records of Vocational Training Certificate and driving license of operators shall be kept by HEMM outsourcing agency/proponent and shall be made readily available for inspection by management.
iv. No person shall be employed unless person holds VTC certificate and the Mine Manager is informed. A record of it shall be maintained.
v. Adequate supervision shall be maintained by qualified competent persons.

7.3.1.2. For Machineries as recommended by the DGMS Circular (Tech.)

i. All the machineries to be deployed in mines should be checked before deployment by competent authority.
ii. Regular checking of machines deployed shall be carried out. No unfit machine shall be deployed before the defect is rectified.
iii. A proper record of repair and maintenance along with inspection done by management and defect pointed out shall be maintained and signed by authorized person.

iv. The trucks deployed shall be provided with audio-visual alarms, proper light for use at night and period when natural light is not sufficient. In addition, audio-visual alarms for reversing on trucks shall be provided.

7.3.1.3. Other Precautions for machines

i. RTO certificate along with photo copies of all vehicles shall be submitted to the Mine Manager.

ii. Daily welding, monitoring, inspection shall be done by the mechanic as directed by the management.

iii. Machine manufacturers should be asked to give risk analysis details in respect to machines deployed by outside agencies.

iv. Suitable type of the fire extinguishers shall be provided in every machine.

7.3.1.4. General

i. No person/vehicle shall be deployed at any place other than the authorized place.

ii. All workers should obey lawful instructions of the EMC.

iii. Risk Management Plan of tipper/payloader shall be made and implemented.

iv. All drivers shall obey systematic traffics rules as devised by the management.

v. Before deploying workers, they must be trained and briefed about safety aspects in opencast mines. However, during course of execution of the work, if any accident occurs whether major or minor, the matter shall have to be immediately informed to the EMC and the project proponent so that notices of accidents (**Section 23 of Mines Act 1952)** may be given and other necessary steps may be taken in accordance with the Mines Act 1952.

vi. The external agency shall operate transport system in such a way to minimize pollution in the mine.

7.3.2. Slope failure

During quarrying operations, it is necessary to adopt required mining parameters as per the approved Mining Plan to ensure the stability of benches, quarry walls and spoil dumps. It is also mandatory to examine systematically the fencing of mine workings, landslides and cracks between the benches. It is required to maintain well-graded and wide roads on benches,

keeping the width of working areas sufficient for spreading of blasted rock and movement of the mining and transport equipment. Statutory provisions, applicable for opencast working, should be strictly complied.

Slope failure in Mine Pit

The exposed ends of the OB/limestone will be left with a safe slope to avoid slope failure and collapse of benches. Similarly, at the end of mining operations, a safe terminal pit slope shall be provided to avoid failure.

All the working benches will be under the direct supervision of project level officials and all the necessary precautions – some of which are mentioned below, will be taken to make the workings safe.

i. Height & width of the benches, will depend upon the size of the equipment. In the mine pit and working area, the width and height of working benches shall be (6 x 6) meters.
ii. Bench Slope (working benches/active areas): = 45°.
iii. Overall final pit slope: 37° - 45°

Slope failure in the OB Dump

Total volume of waste which primarily consists of gritty soil, will be removed and will be temporary stored the northern and north eastern side of the applied area with suitable precautions to maintain its fertility and after exhaustion of the mineable reserve, the overburden dump soil will be used for progressively backfilling the exhausted quarry. Some quantities of the generated gritty soil would also be used for road maintenance and plantation activities. After exhaustion of the mineable reserve, the quarry will be reclaimed to the maximum extent possible.

It is suggested to level the dump, grade it properly and reverse slope to avoid water accumulation.

The following design criteria have been considered for waste dumps as per the approved Mining Plan:

i. OB in external dumps will be stacked in 3 m high and 3 m wide benches.
ii. OB in internal dumps will also be stacked in benches of height not exceeding 3 meters.

Width will vary between 3 m -5 m.

iii. A berm width of appropriate width will be provided for transport, etc.

iv. Dump slope for each deck to be at natural repose i.e., 37°.

v. Track dozers to be deployed for shaping and maintaining the dump's overall slope not exceeding 27° at any point with the horizontal.

vi. Height of the external dump will be variable at different spot levels and merged with the original profile of the undulating hilly terrain.

7.3.3. Mine Inundation due to heavy rains during the rainy season

The mine pit will receive water from three sources namely:

i. direct precipitation over the excavated area,

ii. surface run-off from the surrounding area and

iii. seepage from the strata.

A careful assessment will be made against dangers from mine flooding from surface water sources before the onset of the monsoon season in the region. During heavy rainstorms, there may be a situation when the mine may get flooded due to ingress of water from the higher ground through natural drainage which may cause serious loss of human life, equipment, etc. To guard against this eventuality, the following steps should be clearly laid down and implemented:

i. Garland drains need to be provided to drain away the surface rain water from coming into the mine.

ii. Where any mine or part thereof is so situated such that there may be danger of inrush of surface water into the mine, adequate protection against such inrush shall be provided and implemented.

iii. Provision and regular maintenance of garland drains around the mine to prevent ingress of precipitation, surface run-off.

iv. Provision of sufficient number of submersible pumps to pump out mine water during the critical rainfall period.

v. Every entrance into the mine shall be so designed, constructed and maintained that its lowest point (which means the point at which a body of rising water on surface can

enter the mine), shall not be less than 1.5 m above the highest flood level (HFL) at that point.

vi. During heavy rains, inspection of vulnerable points shall be carried out on a daily basis. In case of any danger, persons will be withdrawn to higher and safer places.

vii. Artificial nallahs or water inlet channels may be diverted or isolated by embankments, if so required.

Prevention of Flooding of Equipment Deployed at Bottom Horizons

During the monsoon season, mining activities in the lower-most bench may have to be stopped. The lowermost bench shall be kept intact and protruding around the seam to prevent direct contact with rainwater and prevent exposure of Limestone. This is to ensure that any possibility of chemical reaction with rainwater is avoided. The quarry shall then be dewatered before resumption of mining activities.

For ensuring safety of the mining equipment while working at the bottom horizons with no access to the surface profile, the following measures should be taken:

i. Drivage of initial trenches and mineral extraction on the bottom benches shall be done during the dry period of the year.

ii. Ramps should be made for quick shifting of mining equipment from the bottom to the top horizons, as the bottom horizons are more likely to be flooded during heavy rain spells in the monsoon season.

7.3.4. Electric Shocks

During ongoing mining operations, all statutory provisions of **the Indian Electricity Rules of 1956**, and **Indian Standards (IS) for installation and maintenance of electrical equipment**, etc. should be observed.

i. For protection from electric shocks to persons, from electrical equipment with voltage up to 1000 V, Earth Leakage Relays (ELR) should be provided which will automatically disconnect electrical circuits.

ii. Closed mobile substations and switchgears should be mechanically interlocked which exclude the possibility of opening the door when oil switch and air circuit breakers are in operation.

iii. All metal parts of electrical equipment should be properly earthed to avoid failure of insulation.

iv. All High-Tension (HT) lines and cables if located within the blasting zones should be disconnected before the start of blasting operations.

7.3.5. Fire

In addition to statutory provisions, the measures for firefighting and prevention of fires are as follows:

i. Organization of a designated cell for systematic observations to examine and prevent fire.

ii. Storage of lubricants and cotton waste in enclosed fireproof containers at the working places.

iii. Fire alarm and firefighting systems should be provided at the proposed project site.

iv. Adequate number of fire extinguishers shall be provided at all the crucial points in the proposed project site.

7.3.6. Dust Suppression & Dilution of Exhaust Fumes

The necessary precautions, as per statutes should be implemented to suppress dust generation during mining operations. In general, the following measures should be adopted for dust suppression at all quarry working places, dumps, haul roads, and near other auxiliary operations:

i. Spraying with water on all the working faces & haul roads, by special spraying machines or water-sprinklers.

ii. While drilling holes, it is necessary to use dust extraction devices.

iii. Installation of local dust suppression and air conditioning devices in cabins of excavators and drilling rigs may be considered.

iv. Levelling of spoil dump surface.

To prevent the accumulation of harmful gases in the atmosphere from the different sections of quarry workings, it is recommended that:

i. Drilling & blasting operations should be timed while keeping in mind periods of minimum wind activity during the day.

ii. Dumpers may be provided with purifiers for exhaust gases.

7.3.7. Drilling & Blasting

Drilling and blasting in the quarry shall be done in compliance with the provisions of the **Mines Act of 1952**, and statutory provisions applicable for opencast working.

For proper blasting and minimising the adverse side effects due to blasting such as noise, ground vibration, back breaks, air blasts, fly rocks, etc. the following precautions have been suggested to avoid dangerous situations:

i. Optimal blast design parameters shall be implemented.

ii. A safety zone of 100 m beyond the quarry limit is envisaged and controlled blasting shall be done keeping this aspect in mind.

iii. Blasting shall always be done at a fixed time as governed by the local authorities such as the Village Headman/Sirdar.

iv. All necessary precautions should be taken while blasting.

v. Regular monitoring of vibration will be carried out and necessary precautions will be taken while blasting.

vi. Before blasting is done, 3 warning sirens shall be issued so that people can move over to safe places.

vii. Arrangements will be made to alert the people working for sudden inrush of water by accidental development of fractures connecting the working place to the water bodies/ ground aquifer.

7.3.8. Handling of Explosives

Adherence to relevant statutory safety provisions as stipulated by the DGMS, Chief Controller of Explosives and others shall be made.

7.3.9. Road Accidents

Sufficient arrangements for adequate light illumination of the mine roads including haul roads shall be undertaken. Properly planned and designed road crossings should be implemented to prevent vehicular accidents.

Further, haul roads have been planned in such a way that the HEMM traffic will be away from the passenger traffic. These are likely to prevent road accidents. All the dumpers would be

fitted with audio visual alarms and arrangement of such automatic warning alarms while reversing should be made for preventing accidents.

7.3.10. Medical Preparedness

For guarding against accidental medical hazards, the following measures will be undertaken:

i. Emergency Ambulance service shall be kept ready on a 24x7 basis.
ii. First-Aid medical facilities will be ensured at the mine.
iii. Rotation of workers on shift basis, if necessary, exposed to noise and dust to reduce exposure time.

The district HQ of East Khasi Hills, i.e., Shillong, already has existing medical facilities and community health centres (CHCs). They shall meet the medical emergencies arising out of any accident.

7.4. DISASTER MANAGEMENT PLAN

The disaster management plan, or DMP, is an action plan that should be followed in the event of an emergency or any perilous event, such as earthquake, flooding, fire, high wall failure, or dump failure. The DMP for the proposed Lynti Dkhar Limestone Mine will have 3 broad stages:

i. Information Stage
ii. Assessment Stage
iii. Action Stage

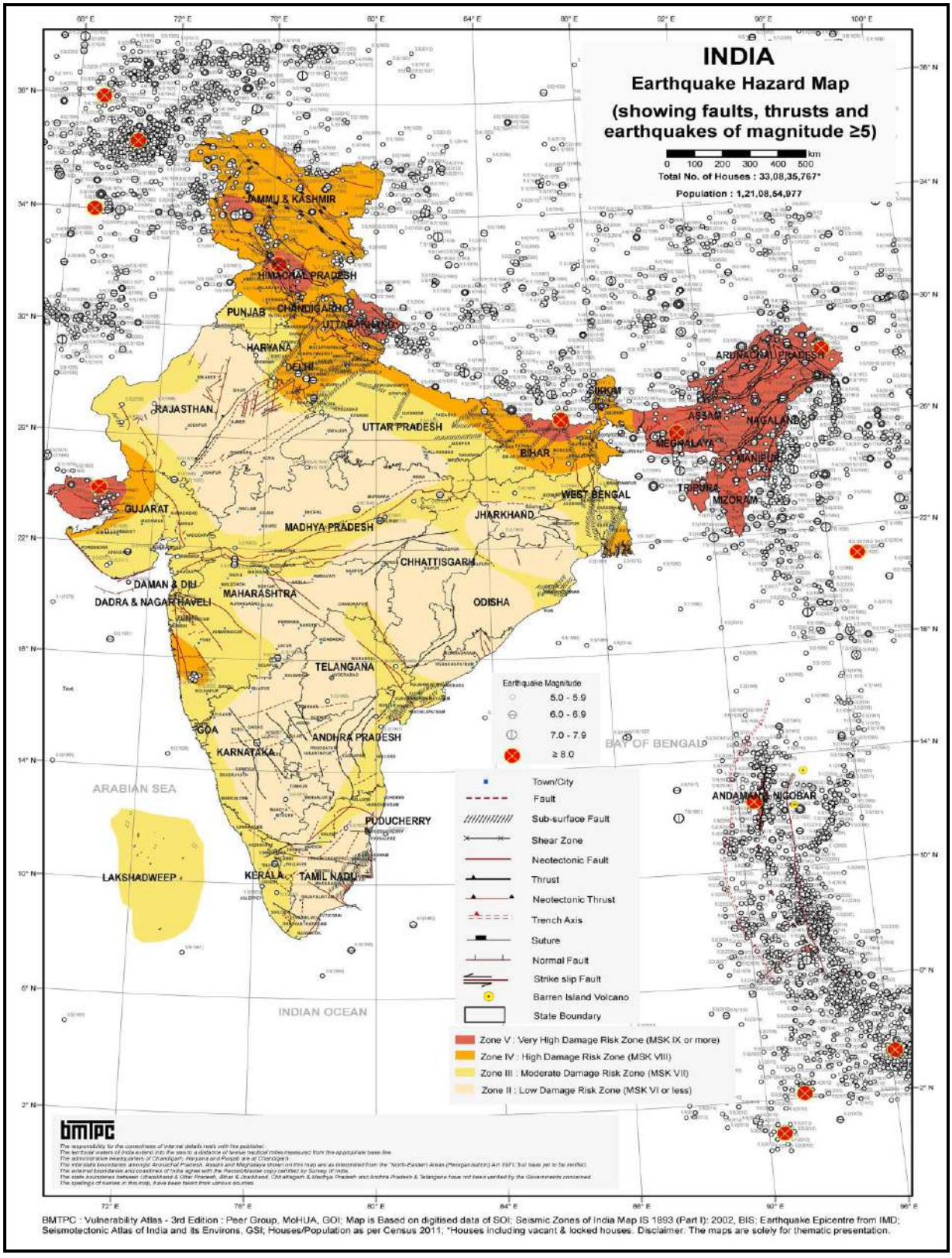


Fig 7.2: Earthquake Hazard Map of India *(Source: Building Materials & Technology Promotion Council (BMTPC). https://bmtpc.org/)*

7.4.1. Awareness, Evaluation and Execution

i. **Information Stage:** Information should be made available to all interested parties and stakeholders in a speedy, clear and concise manner. If a mine worker witnesses or learns of any dangerous situation, they have an obligation to notify the Manway Clerk (Attendance Clerk) or the closest authority, who will then notify the Manager or the senior most official in his absence.

ii. **Assessment Stage:** The Manway Clerk shall then promptly notify the Manager or the senior most mine official in his absence, notifying the rescue station, and gathering crucial information on the following 3 subjects:

a. Location of the incident,
b. Number of people involved, and
c. Nature of assistance needed.
d. Identity of the informant, and
e. Precise time

He should note the aforementioned details, including the identity of the informant and the precise time, and forward them to the management. He shouldn't leave the project site at any cost.

iii. **Action Stage:** The Manager is responsible for notifying the Proponent, or Highest Authority on the property to initiate the DMP. If the Manager is away from the project premises, he must also hurry to the location or mine and determine the seriousness of the matter by getting in touch with any possible witnesses or frontline supervisors via wireless sets. The project proponent and safety officer must be immediately notified. They should then notify the DGMS authorities, the local dispensary, the chief medical officer, the superintendent of police, acknowledged union delegates, local department heads, state disaster management authorities, etc. as necessary.

It is suggested that an emergency response team be formed, and that important staff members coordinate with one another. Three teams—a firefighting squad, a rescue team, and a support team—will make up the group. The Group will be led by the Mine Manager, who will also serve as the Exigency Coordinator. In his absence, the senior most individual at the mine who is

available will serve as the Exigency Coordinator.

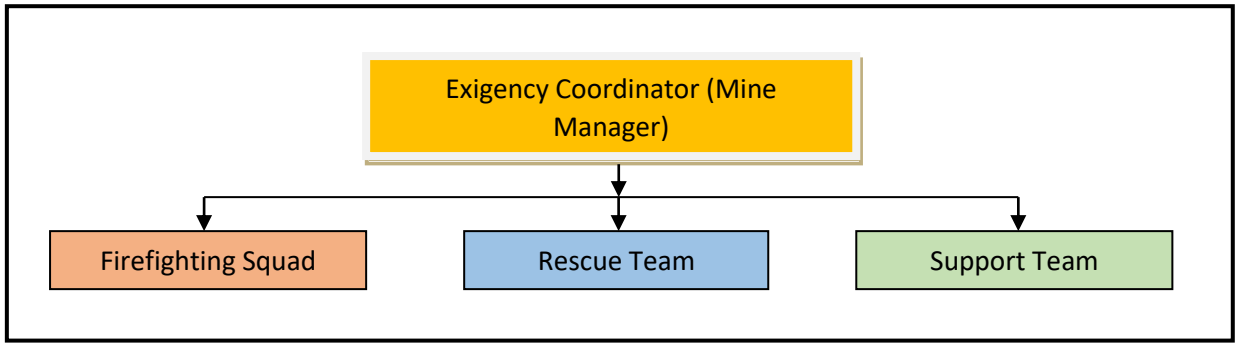


Figure 7.3: Organizational set-up of the Disaster Management Cell (DMC) for the proposed Lynti Dkhar Limestone Mine

Using the combined resources of the mines and outside services, the DMP seeks to accomplish the following goals:

i. Rescue and medical treatment of injured.
ii. Safeguard other people within the study area.
iii. Minimize damage to mine infrastructure, equipment, and the surrounding environment.
iv. Initially contain and ultimately bring the incidence under control.
v. Identify casualties, if any.
vi. Secure the safe rehabilitation of affected persons.

7.4.2. Training

Regular training programs, workshops and annual safety weeks shall be arranged for the workers and personnel regarding safety education & awareness in line with the Mine Rescue Rules, VT Rules, Mines Act of 1952 and other regulations.

7.4.3. Communication

The telephone numbers and addresses of adjoining mines, rescue stations, police stations, fire service stations, local hospitals/public and community health centres, electricity supply agencies and standing consultative committee members shall also be maintained for any emergency requirement. Supervisors will be provided with wireless/mobile phones to communicate in case of any emergencies.

7.5. SOCIAL IMPACT ASSESSMENT

There will be spontaneous economic stimulus in the area with commencement of the opencast mine. Traders and private enterprises will grow in the area with this economic growth. Besides, the State Exchequer will derive financial revenues through levy of royalty, sales tax, etc. as applicable.

The following measures shall be additionally undertaken to drive the social growth in the mining area:

i. The project will provide skill-based training to the locals.

ii. Reducing project risks and providing greater certainty to the society by doing regular environmental monitoring, prediction of risks, hazards and their mitigation.

iii. Planning for social and physical infrastructure with the help of local authorities such as, driving education in nearby schools, organizing health awareness camps and medical camps, emphasis sanitation and personal well-being, plantation of trees etc.

iv. Proposed project will improve the quality of life of its employees and retention of skilled workers.

v. The project shall enhance competitive advantage and reputation, by implementing innovative approaches, setting high standards for other businesses and leaving a positive legacy beyond the life of the project.

vi. The proposed project shall comply with existing principles and standards, thus setting the benchmark for other projects to follow as well.

7.6. REHABILITATION & RESETTLEMENT ACTION PLAN

The lease area comprises of 1.36 ha which is privately owned. There is no habitation within the mine lease area. Hence, no R&R is applicable for this project.

7.7. OCCUPATIONAL HEALTH STUDY

Mining activities may lead to respiratory disorders due to generation of dust, skin allergies, etc. in the mine workers and people living in the nearby areas. Additionally, elevated sound levels due to various activities may lead to partial hearing loss, vision impairment over the period of the mine's life.

A well-organized plan for routine medical examinations shall be carried out and an authorized organization, appointed by the project proponent shall carry out a comprehensive Occupational Health Study on a yearly basis. For all future purposes, all the collected data shall be biometrically identified and documented for each personnel.

A First-Aid/Occupational Health unit with basic medical facilities to monitor, control, prevent, and treat occupational health hazards as well as handle emergencies will be built close to the leasing area. **Table 7.1** lists the safety equipment (PPE) that should be made available to all workers within the mine.

Table7.1: List of Safety Equipment (PPE)

S. No.	Category	Equipment
1.	Face protection	Face Shield
2.	Eye protection	Different types of safety goggles used for different purposes.
3.	Ear protection	Ear plugs and ear muffs
4.	Feet and Leg Protection	Protective footwear such as safety rubber canvas boots, miner's safety boots with leather soles, rubber knee boots
5.	Working at height	Safety belts
6.	Head Protection	Safety helmets/hats
7.	Protection from Dust	Dust Masks and Respirators

The following measures should be carefully followed:

i. Workers will be informed and trained about occupational health hazards.
ii. Any worker's health related problems will be properly addressed.
iii. The personnel working in dust prone areas will be examined every year as per the **DGMS Circular No. 01** dated **21st January 2010**.
iv. Quick-Fix designed by the Occupational Safety and Health Administration's (OSHA)

ergonomic standards should be followed to reduce work-related musculoskeletal disorders (MSDs).

v. Lyophilized Polyvalent anti-snake venom serum should be always available at the mine site for potential snake bites.

To proactively reduce occupational hazards, the following measures should be implemented:

i. **Regular Air Quality Monitoring:** Every six months, high-risk workers from all mine activities should be monitored for exposure to Total Suspended Particulate Matter (TSPM). If necessary, an annual analysis of the dust's chemical composition should be conducted to assess levels of sulphates, lead, nickel, arsenic, and silicates.

ii. **Comprehensive Health Screenings:** All workers should undergo health check-ups every six months. These check-ups should include chest X-rays, lung function tests, ear, nose, and throat (ENT) examinations, eye exams, hearing tests, liver and kidney function tests, electrocardiograms (ECGs), and other relevant assessments.

iii. **Safe Drinking Water Monitoring:** The source of drinking water for both mine workers and nearby residents should be tested every six months to ensure it meets the safety standards outlined in **IS 10500: 2012**.

Chapter 8 – PROJECT BENEFITS

8.1. IMPROVEMENT IN PHYSICAL INFRASTRUCTURE

The project is proposed in the district of East Khasi Hills, with the district headquarter as well as the state capital – Shillong, lying at a distance of approximately 80 km by road from the mine lease area, where communications and other facilities are well established. The following physical infrastructure facilities shall be developed due to the proposed project:

i. Metalled Road Transport facilities
ii. Communication facilities
iii. Vehicles for public transportation
iv. Solar Power supply
v. Rain Water Harvesting facilities

8.2. IMPROVEMENT IN SOCIAL INFRASTRUCTURE

Carrying out of mining activities in Lynti Dkhar Limestone Mine with safety rules, improved occupational health, and safety standards, the project will contribute greatly towards the socio-economic development of the state, both directly and indirectly by creating an economic flow which will significantly boost the state's GDP.

As per the Census of 2011, agriculture and small-scale business is the primary sector of employment for the local communities in this area. By commencing this project, direct employment will be generated for various operations in the mine. The total manpower that will be deployed during the operational phase shall be ≈ 25 people *(as described in the Approved Mining Plan and Mine Closure Plan of Lynti Dkhar Limestone Mine)*.

Apart from the direct employment, indirect employment shall also be generated in the form of material/mineral transportation, general conveyance of persons to the mine from their location by means of hired vehicles, small business establishments such as vehicle repair shops, eateries, garages and/or workshops, plantation areas, other recreational facilities, etc.

8.3. OTHER TANGIBLE BENEFITS

The proposed Lynti Dkhar Limestone Mine is likely to have other tangible benefits such as:

i. Indirect employment opportunities to the people from the nearby communities in the form of various contractual works like temporary mine infrastructure development, transportation, sanitation, and supply of goods and services to the project and other community services.
ii. Market and small-medium business establishment facilities are projected to increase.
iii. Post-closure of the mine, cultural, recreational and aesthetic facilities shall improve.
iv. Improvement in public communication, transport, education, sustainable development and medical facilities.
v. Overall change in employment and income opportunities.
vi. Lastly, the State Government will benefit directly from the proposed project, through increased revenue from royalties, excise duties, and other taxes.

Chapter 9 – ENVIRONMENTAL COST BENEFIT ANALYSIS

The current proposal is for appraisal of Lynti Dkhar Limestone Mine by the SEAC/SEIAA of Meghalaya and for obtaining the Environmental Clearance for 50544 TPA (Peak Limestone production) via opencast semi-mechanised method of mining over a mine lease area of 1.36 Ha located in Ri-U Siar, Lynti Dkhar Area, Sohbar Sirdarship, East Khasi Hills District in the state of Meghalaya. The scope of this EIA/EMP report has been specified via the Terms of Reference issued by SEIAA vide **File No. ML/SEAC/SEIAA/PP/EKH/83/2024** dated **6.12.2024** which does not require Environmental Cost Benefit Analysis.

Chapter 10 – ENVIRONMENTAL MANAGEMENT PLAN

10.1. OBJECTIVE

The efficacy of an Environment Management Plan (EMP) is contingent upon the effectiveness of the organizational structure tasked with executing the program. It is imperative that environmental management be incorporated into the mine design process in order to preserve the area's ecological balance and prevent negative impacts.

The following objectives have been incorporated into the design of the EMP in order to mitigate the adverse environmental effects which will be caused due to mining:

i. Biological reclamation and rejuvenation of the mined-out areas and active points of the mine lease area to the maximum possible extent possible, in line with the economy of mining operations, the drainage pattern, geological stability, vegetation, etc.;
ii. Minimal disturbance to the water environment and existing ecological status of the area and conservation of the same;
iii. Efforts towards improvement of the air quality, water quality and the land during and post mining activities; and
iv. Establishment of an environment which is conducive to improve the socio-economic situation in the area.

10.2. ANTICIPATED POTENTIAL IMPACTS AND SUGGESTED MITIGATION MEASURES

Regular monitoring of environmental parameters is of immense importance to assess the status of the environment during project operation. With the knowledge of baseline conditions, the monitoring programme will serve as an indicator for any deterioration in environmental conditions due to operation of the project. Accordingly, suitable mitigative measures will be taken in time to safeguard the environment. Monitoring is important to determine the efficiency of control measures implemented.

The design of EMP for operational phase has been aimed to achieve

i. Adoption of practical environmental control measures and implementing them effectively;

ii. Implementation of monitoring program of the surrounding environment;

iii. Institutional arrangements to monitor effectively and take suitable corrective steps; and

iv. Implementation of schedule and reporting procedures.

10.2.1. Environment Management Measures

A summarised table for the anticipated impacts and details of suggested mitigation measures are furnished in **Table 10.1**.

Table 10.1: Probable Source and Mitigation Measures

Sources/Activities	Anticipated Impacts	Mitigation Measures
1. Soil Compaction and Settlement	The frequent movement of trucks on unpaved roads can result in soil compaction, reducing the infiltration rate and impeding the growth of deep-rooted plants.	• The project will utilize paved roads for vehicle movement. In areas where roads are partially paved, measures shall be taken to strengthen them, thereby minimizing the impact on soil quality. • The vehicles moving to and from the site will be regularly checked to prevent oil leakage. • There is no pollutant present in the mineral which may contaminate the site and/or surrounding soil and/or nearby water resources. • Within the mine lease area, haul roads will be aligned and developed in a stage-wise and progressive manner alignments shall be followed and developed, so as to use only these haul roads for the movement of HEMMs.
2. Air Pollution Control		
Drilling	Fugitive dust generation, particulate matter and gaseous pollutants such as SO_2, NOx, etc. due to these activities, effective photosynthesis of plants may be hampered due to a thin layer of dust settled on the leaves	• Wet drilling methods shall be implemented • Drilling operations shall be suspended during unfavourable environmental conditions (such as high velocity winds), which may lead to dissipation of dust • Emission from exhaust of compressors will be checked periodically to ascertain the engine efficiency. • Periodical monitoring through Respirable dust samplers shall be done to take corrective action

Blasting and fragmentation		• Blasting will be carried out using NONELs (non-electric detonators)-delay detonator relays and DGMS approved P1/P3/P5 type explosives as required. • Proper blast intervals shall be maintained and executed for proper free face creation during fragmentation • Proper blasthole designs shall be executed (burden and spacing shall be optimally decided by field trials based on the strength of the rocks) to achieve the best fragmentation within the desired Powder Factor • Blast faces and respective areas shall be water sprinkled before and after blasting
Movement of HEMMs (Heavy Earth Moving Machineries) on haul roads		• All haul roads & service roads shall be graded at regular intervals to maintain proper gradient as per statutes • Such roads shall be regularly sprayed with water at least thrice a day (or more) before the beginning of each shift • Plantation of wide leaved trees & tall grasses shall be done along all such roads
Overburden removal, storage and movement		• Completed areas and stable non-working areas of the dump shall be biologically reclaimed • Plantation will be carried out towards the outer periphery of the decks (of OB benches) to prevent dust dissipation • Water shall be regularly sprayed on all active areas, plantation areas, etc.
Mineral Handling and Transportation		• Provisions of mist spraying/water sprinkling arrangements shall be in place at all loading, transfer and receiving points of material in the mine. • The perimeters of commonly used haul roads and transportation routes to and from the working face/temporary stackyard shall be developed with plants to arrest fugitive dust. • A greenbelt will be developed in and around

		the temporary stackyard (if any) to arrest fugitive dust. • The width of linkage roads will be designed in a way that no truck shall intersect an unpaved road. • Limestone transport trucks will be optimally loaded and covered with tarpaulin sheets for preventing spillage and fugitive dust emissions. • Periodic air quality monitoring will be carried out to monitor the changes consequent upon mining activities as per the norms of the State Pollution Control Board. • To control emissions, regular preventive maintenance of vehicles will be carried out, and all transportation vehicles shall be required to carry a valid and periodically updated Pollution Under Control (PUC) certificate.
3. Noise Pollution/Vibrations Control		
Drilling and Blasting	Noise levels/vibrations will be high due to heavy earth moving machinery, vehicles and drilling & blasting. These adverse impacts may result in hearing loss and other related problems if mitigation through protective measures is not undertaken	• To protect the nearby areas from noise, a provision of a 7.5 meters wide safety barrier has been proposed as per regulations. This safety zone is proposed to be vegetated which will act as a buffer to absorb noise and dust. • Ambient noise monitoring will be conducted regularly at the designated noise monitoring stations that will monitor noise and vibrations created within the mine due to various mining operations. • Controlled blasting with muffling will be carried out along with proper stemming to keep vibrations and noise within the recommended CPCB levels. • Blastholes will be charged with explosives in a judicious manner as per requirement. During blasting, the Assistant Mine Manager will be supervising the whole operation. • To check vibration, values of peak particle

		velocity (PPV) will be maintained within the prescribed limit by DGMS.
Due to HEMMs		• The operators engaged in stripping and Limestone winning equipment will be accommodated in cabins which are acoustically designed. Such a design shall also be present on all HEMMs that produce high noise levels such as dozers, hydraulic shovels, dumpers, etc. • Fitting of special silencers, and proper lubrication shall be ensured. Regular maintenance of noise generating machinery and transportation vehicles will be carried out. • Reducing the exposure time of workers to higher noise levels shall be practised. • Efforts shall be carried out to confine noise by isolation at source. • Provisions of protective devices like ear muffs/ear plugs will be kept for those workers that cannot be isolated from the source of noise.
4. Water Pollution Control		
Surface, and Excess Mine Water	Discharge of wash-off during rains away from the mine lease area, runoff from waste dumps	• Garland drains will be made around the quarry and OB dumps to intersect and collect run-off water into centralized siltation ponds and settling tanks of sufficient size. • Contour drains will be constructed along the slopes of the OB dumps, benches will be reverse sloped to arrest any wash-off along the slopes. • Retaining walls/toe walls shall be provided along the dip side of all benches, wherever necessary. • OB/Limestone benches will be kept free of any obstructions, sloped inbye and a proper gradient will be maintained to enable controlled flow of water thereby preventing slope failures, erosion, etc. • Mine water at the dip side sump at any

		point of operation shall be regularly pumped out and coursed through the garland drains into the siltation tanks, settling tanks and filtrations beds to be reutilised for different activities.
Washing of HEMMs and Mine Office	Contamination due to discharge of waste water from the mine office, oil spillage from washing of HEMMs and impact on surface water bodies through indiscrete disposal of liquid waste and suspended solids carried by rainwater.	• Effluent discharged by washing of HEMMs shall be constrained at a designated spot within the mine lease area and will be treated in a designated spot containing an oil/grease trap and sedimentation tank. The treated water is to be stored and reutilised for washing of vehicles. • Conventional toilets will be provided for the workers. Sewage generated within the mining lease area will be treated by a combination of septic tank and soak pit arrangements.
Groundwater regime	Probability of Intersection with the local ground water table.	• Mining will be restricted above the local water table. • Mining activities will induce an increase in the infiltration rate within the excavated area thereby aiding ground water recharge during rainfall. • Since the mine lease area is over a small hillock-like terrain, it may be inferred that the ground water shall not be breached in any place over the excavation area. In any case, groundwater levels and groundwater quality shall be regularly monitored in existing open wells and borewells to study the ground water regime of the site.
5. Land Management		
Gritty Soil	Change in Land-Use pattern due to various aspects of mining, gritty soil removal and rehandling	• Gritty soil will be stacked at an earmarked place and completely utilised by the end of LoM for blanketing purposes and development of green cover.
Reclamation		• The mined-out void will be progressively backfilled with gritty soil to the extent possible, and reclaimed biologically by plantation and development of a pit lake. • Indigenous plant species that are resistant

		to tough environmental conditions and have a high APTI (Air Pollution Tolerance Index) – depending upon the availability of such seeds and/or saplings with the nearby Range Forest Offices/State Forest Department nurseries shall be utilized for reclamation purposes.
Greenbelt Development		• 0.35 Ha. (25.80%) of the mine lease area of 1.36 Ha. will be revegetated and ecologically reclaimed at the end of the Life of Mine.
6. Flora and Fauna	There are no endangered species in the study area.	• Although there are no endangered and/or vulnerable species within the mine lease area's vicinity, all attempts shall be made to conserve the natural ecology of the area. • The greenbelt around the periphery of the mine office, along roads will result in small sized fauna such as squirrels, reptiles and birds in finding a favourable habitat. • The roads leading to and from the mine shall have caution boards warning drivers to slow down for animal crossings, if any develop in the future. • The drivers shall be sensitized not to hit stray animals during transportation operations. • People from the neighbouring areas shall be sensitised about the variety of faunal species, their status of endangerment and behaviour through posters/seminars/workshops and discussions during social welfare activities.
7. Occupational Health and Safety (OHS)	Health hazards related to respiratory and hearing issues and other health hazards during working	• Dust masks, ear muffs and safety goggles shall be provided to all personnel as a primary protection measure against fugitive dust emissions due to various activities and noise generation. • Regular trainings shall be implemented by a competent authority/authorised mine personnel appointed by the proponent on various safe practices and working conduct as per existing rules and legislations.

		• Half-yearly health check-ups (lung function tests and audiometric/hearing tests) shall be held. • A mobile dispensary shall be set-up for the mine personnel and a site ready ambulance vehicle in cooperation with the nearest Public/Community Health Centre and/or hospital shall be kept ready within the mine premises.
8. Socio-economic conditions	Currently, people in the nearby villages are only engaged in small scale businesses, agriculture, etc. After appraisal, Lynti Dkhar Limestone Mine will necessitate various jobs, thereby positively impacting the socio-economic condition of the area.	• People living in the nearby areas will be made aware about the project and will be informed about the project details prior to its implementation. Initially, this shall be achieved during the process of Public Consultation. The mine would lead to various direct and indirect sources of income for the area's indigenous population.
9. Increased volume of vehicular traffic from the mine	Impact on air quality and noise due to increased vehicular movement resulting into impacts on habitation including flora and fauna falling along the mineral transportation route	• Improvement/development of metalled roads by strengthening and maintenance outside the ML area which shall be used for transportation of mineral and other raw materials. • Optimum weight shall be carried by the truck and overloading shall be prohibited so as to nullify any potential damage to roads due to spillage. • It shall be ensured that the transportation vehicles will undergo regular "Pollution Under Control (PUC)" check-ups and obtain and update valid PUC certificates. Moreover, periodic maintenance of the dumpers/trucks as per manufacturers' specifications for best fuel efficiency shall be ensured. • Depending on environmental and meteorological conditions, water spraying will be carried out at least 3-4 times a day – at loading and unloading points as well as on the haul roads; and covering of trucks with tarpaulin sheets will be ensured. • Efficient traffic management shall be

		ensured by facilitating the installation and usage of proper traffic signages throughout the mine and by regulating the speeds of the dumpers/trucks. Drivers will be trained to minimize the use of horns. • Width of the roads shall be so developed to tackle the increased traffic load from the mine. They shall be graded and maximum stretches of such roads shall be extensively landscaped with a variety of plants and trees.
10. Solid Waste Generation (Top soil and Overburden (OB))	Air pollution due to handling of OB and rejects, water pollution due to suspended solids in run-off and possible improper disposal of wastes.	**Top Soil Management:** • The total gritty soil generated during the life of the mine will at a designated place and progressively reused in reclamation process. • During the Plan Period and subsequently the LoM, some quantity of gritty soil will be removed and will be temporary stored the southern side of the applied area with suitable precautions to maintain its fertility and after exhaustion of the mineable reserve, the overburden dump soil will be used for progressively backfilling the exhausted quarry. Some quantities of the generated gritty soil would also be used for road maintenance and plantation activities. After exhaustion of the mineable reserve, the quarry will be reclaimed to the maximum extent possible. • Garland drains will be provided around the soil dump to arrest any soil from the dump from being carried away by the rain water. • The soil dump will be stabilised on non-working faces through plantation or geo-textiles to minimise gully formation. While the dumps exist, the following mitigation measures will be required to minimise erosion: • Retaining walls will be provided, wherever required, to support the benches or any loose material and also to arrest sliding of loose debris.

		• Garland drains along the retaining walls or along bench contours (leading to the settling/siltation tanks and filter beds) will be provided around the OB dump to arrest any particles from the dump area from being carried away by rains. • The silt and soil sludge from the settling tanks will be periodically removed and disposed in the OB dump area. • Any other generation of inorganic or non-biodegradable waste shall be minimised through the practise of the 3Rs of waste management. They shall be collected and handed over to local authorised bodies for disposal.
11. Environmental Monitoring	-	Statutory norms will be followed for the monitoring of significant environmental parameters such as ambient air quality, ground and surface water quality, soil quality, effluent discharge quality, noise and blast vibrations, phreatic surface and piezometric surface, and HEMM exhaust emissions. Corrective actions will be taken to mitigate environmental pollution.
12. Environmental Awareness	-	Environmental awareness programmes shall be carried out to improve awareness regarding various environmental and conservation policies and laws as a measure to safeguard the environment with the implementation of best practices.

10.2.2. EMP – Implementation Framework

The responsibility for mitigating the different environmental impacts due to various activities as discussed in **Table 10.1** and implementation of the different corrective mechanisms shall be carried out by the mine personnel and owner as detailed in **Table 10.2**.

Table 10.2: Impact Management and Implementation Framework

S. No.	Particulars of Impact Areas	Responsibility	Frequency of Monitoring
1	Soil Compaction and Settlement	Mines Manager	As required

2	Air Pollution Control	Mines Manager	Twice a week
3	Noise Pollution/Vibrations Control	Safety Officer	Once a month
4	Water Pollution Control	Environmental Engineer	Quarterly
5	Land Management	Mine Manager and Environmental Engineer	–
6	Flora and Fauna	Environmental Engineer	Half-Yearly
7	Occupational Health and Safety (OHS)	Medical/Occupational Health Officer	Half-Yearly
8	Socio-economic Condition	Project Proponent	Yearly
9	Increased volume of vehicular traffic	Mines Manager	As required
10	Solid waste generation	Safety Officer	Half-Yearly
11	Environmental Monitoring	Safety Officer	Half-Yearly
12	Environmental Awareness	Project Proponent	Yearly

The Environment Management Cell (EMC) will be constituted by the PP, shall be structured with a core group dedicated to environmental management, comprising of expert members. The supporting group shall include members from allied disciplines and areas of activities, including top management personnel. This organisational set-up of the EMC has been shown as **Figure 10.1** below.

The Project Proponent of this opencast project shall be responsible for implementation of the approved EMP and various conditions of EC, FC and CTE/CTO. An Environmental Engineer shall assist the Project Proponent in ensuring the compliance of conditions. The Environment Department of the project shall monitor the compliance of environmental norms in all the areas of Lynti Dkhar Limestone Mine.

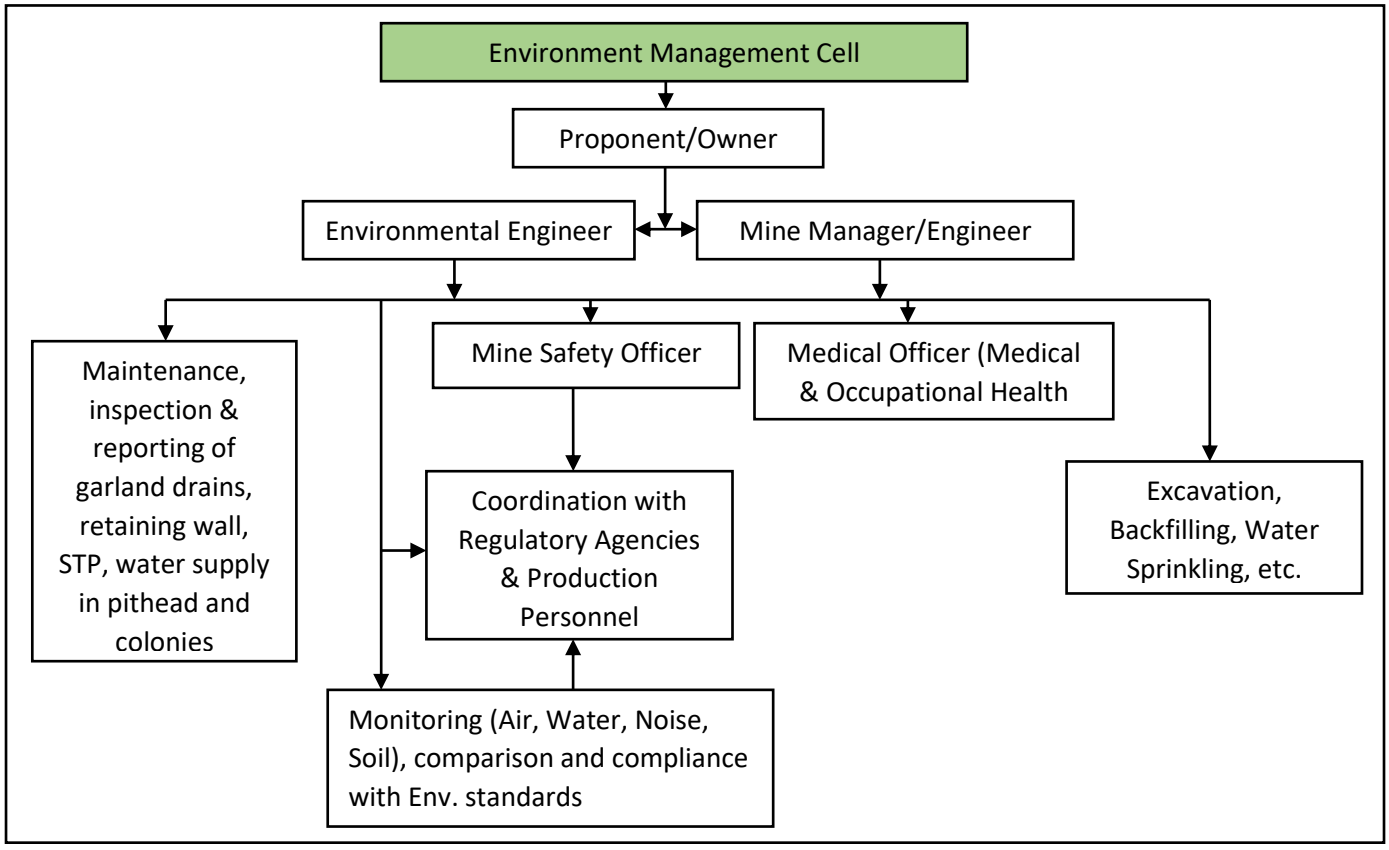


Fig 10.1: Organizational Set-up and basic functions of the Environment Management Cell (EMC)

10.2.3. System of reporting non-compliances/violations of environmental norms

The EMC shall monitor the implementation of environmental norms/conditions and inform about any deviations to the Owner. The Project owner will then take suitable corrective measures in co-ordination with the state environment departments, forest department, State Pollution Control Board of Meghalaya and the Integrated Regional Office (IRO) of the MOEF&CC.

10.2.4. Estimation of Capital and Recurring Expenditure towards Environmental Protection

Capital and ongoing expenses will be incurred in the process of putting the recommended environmental protection measures into practice. Since the execution of protective measures would be ongoing throughout the mine's life, capital investment shall not be necessary all at once. It would be executed in a phased manner. Every year, there would be a regular requirement for the

recurring expenditure, which has been furnished in **Table 10.3**.

The total funds earmarked for the environmental protection and monitoring measures as described in this Environment Management Plan (recurring for LoM) with the proposed production capacity for this mine is **₹4.65 L/year** and, with an allocated Capital Cost of **₹15.00 L**. The cost has been calculated *as per the Govt. of Meghalaya's unified norms for creation of plantations outside Reserve Forests and Protected Forests – Annexure C & Rate of Wages fixed by the Labour Department (Govt. of Meghalaya) vide No. LE&SD.9/2023/101 dated 31st March, 2023.*

Table 10.3: Estimated EMP Cost

S. No.	Particulars	Capital Cost (₹L)	Annual Recurring Cost (₹L)
1	Pollution monitoring – Air, Water, Noise and Soil	1.50	1.50
2	Green Belt development (Tree guards, plantation and its maintenance, etc.)	3.00	0.25
3	Construction and maintenance of approach roads, settling tanks, garland drains, and a retaining wall	5.00	0.50
4	PPE and First-Aid facilities	0.50	0.20
5	Water requirements (Drinking and domestic, plantation, and dust suppression, etc.)	-	1.50
6	Construction and maintenance of three-chamber septic tank	3.00	0.50
7	Implementation of rainwater storage and harvesting structures and its maintenance	2.00	0.20
Total		**15.0**	**4.65**

10.3. CORPORATE ENVIRONMENTAL RESPONSIBILITY (CER)

The proposed Lynti Dkhar Limestone Mine over an area of 1.36 Ha. is privately owned by the applicant Smt. Idalis Ryngnga. The estimated project cost is around ₹23 Lakhs. The project

proponent will keep 5% of the total estimated Project Cost as mentioned in the Pre-Feasibility report, which comes to ₹1.15 L as the project's Corporate Environmental Responsibility (CER) budget. However, particulars of the CER activities will be prescribed by the project proponent in the Final EIA/EMP, based on the commitments made by him to address the concerns raised during the Public Consultation. This is in line with the MoEF&CC's **OM No. 22-65/2017-IA.III** dated 25th February, 2021 regarding Corporate Environmental Responsibility.

10.4. PLAN OF COMPLIANCES OF REGULATORY REQUIREMENTS

It is inadequate to merely implement and oversee the approved and suggested EMP. Part and parcel of the procedure also includes keeping accurate records and informing the relevant regulatory authorities regarding various compliances.

Details of the monitored data and half-yearly compliance reports will be submitted to the Regional Office of the MoEF&CC and the State Environment Impact Assessment Authority of Meghalaya (SEIAA Meghalaya) on a bi-annual basis. All concerned departments shall be informed about the commencement of mining operations at the proposed project location after the grant of Consent to Operate (CTO) and shall be regularly consulted during the mine's operational stage.

Chapter 11 – SUMMARY AND CONCLUSION

11.1. INTRODUCTION

The applicant for Lynti Dkhar Limestone Mine – Smt. Idalis Ryngnga, has obtained the Letter of Intent vide No. **KH/8/ML/Limestone/68/6085**, dated **26/03/2024** over an area of **1.36 ha** at Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, East Khasi Hills, Meghalaya **(Refer Annexure 3)**.

The Divisional Forest Officer, East Khasi Hills & Ribhoi (T) Division, Shillong issued letter vide No. **KH/8/NOC/Limestone/41/Pt.IV/2720** dated **02/09/2022** stating that the proposed project falls under a non-forest land category **(Refer Annexure 4)**.

The Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine was approved by the Mining Engineer, Directorate of Mineral Resources, Meghalaya, Shillong vide letter **No. DMR/MM/199/2024/04** dated **06/07/2024** **(Refer Annexure 5)**.

The project proponent has also obtained a cluster certificate from the Mining Engineer, Directorate of Mineral Resources, Shillong vide letter No. **DMR/MM/199/2024/09** dated **23/07/2024** **(Refer Annexure 6)**. As per the cluster certificate, two limestone projects or mines with a total area of 3.64 ha are lying within 500 m from the periphery of this mining lease area.

State Environment Impact Assessment Authority (SEIAA) of Meghalaya recommended the Terms of Reference ToR for the preparation of the EIA/EMP report and subsequently issued ToR vide File No. **ML/SEAC/SEIAA/PP/EKH/83/2024** dated **6th December 2024** to Lynti Dkhar Limestone Mine **(Refer Appendix 1)**.

The bounding latitudes of the project area are 25°10'43.83"N to 25°10'49.27"N and bounding longitudes are 91°44'29.03"E to 91°44'33.20"E with a maximum elevation of 145 mRL and minimum elevation of 133 mRL. The area falls in the Survey of India Topo Sheet No. 783O/12 (Restricted). The lease area forms a part of the individual owned land taken on lease.

The estimated total mineable reserve within the leasehold area is approximately 505197 Tonnes. Targeted peak production would be 50544 TPA. A few important details of the approved Mining Plan with Progressive Mine Closure Plan are depicted in the **Table 11.1** below:

Table 11.1: Brief details of the project as per the approved Modified Mining Plan with Progressive Mine Closure Plan of Lynti Dkhar Limestone Mine

Aspect	Value	Aspect	Value
Allotted Mine Lease Area (Ha.)	1.36	**Plan Period (Years)**	5
Total Mineral Reserve (Tonnes)	505197	**Total Production during plan period (T)**	252570
Life of Mine (Years)	10	**Total Working Days/Year**	300
Manpower	25	**Mining Method**	Opencast, Semi-mechanised

11.1.1. Mining Method

- Opencast semi-mechanized mining will be carried out in the area as the deposit is massive and compact in nature.
- Jack hammer drill machine will be deployed for drilling of shot holes ranging from 35 mm to 32 mm diameter. Breaking of limestone at the required site will be done manually.
- For blasting of holes with burden and spacing of 0.8m x 1.0m in a staggered grid pattern would be adopted.
- Muffle blasting will be adopted as a precautionary measure to control fly rocks. Excavation and handling of gritty soil will be done by excavator, if necessary.
- The benching system 6m x 6m will be practiced in the area in order to comply with the provisions of Metalliferous Mines Regulations, 1961. Bench slope angle for stabilization of the benches will be maintained at 45°.

11.1.2. Raw Materials Required

Inputs	Approx. quantity required (KLD)
High Speed Diesel Water Requirement	
Diesel	~0.1
Water Requirement	
Water for Drinking and Domestic Purposes	~1.25 Water requirement for drinking & domestic per person is 50 L/day. Therefore, requirement is 25x50 = 1250 L/day (~1.25 KLD)
Dust Suppression	2.0
Greenbelt Development/Plantation	2.0
Cleaning of HEMMs, and other machinery	2.0
Total	**7.25 KLD (~7.5 KLD)**

11.2. DESCRIPTION OF ENVIRONMENT

The baseline data has been collected from March 2024 to May 2024. The details of the area given below:

Micro-Meteorological Parameters

Temperature: Temperature of the area varied from 13.6°C to 35.1°C.

Relative Humidity: Relative Humidity of the area varied from 14.6% to 100%.

Wind Speed: Maximum wind speed was 10.8 m/s with average wind speed of 1.92 m/s. Calm wind was 12.91%.

Ambient Air Quality (AAQ) Results

Samples were collected from 5 sampling locations during the baseline data collection period. The results are given below:

Particulate Matter (PM_{10})

The results of PM_{10} of all the locations are showing variations from 44.5 µg/m^3 in the Ichamati Village to 56.0 µg/m^3 at the project site. Hence, the results are within the limits of the National Ambient Air Quality Standards (NAAQS).

Particulate Matter ($PM_{2.5}$)

The results of $PM_{2.5}$ of all locations are showing variations from 20.9 µg/m^3 in the Ichamati Village to 34.5 µg/m^3 at the project site. However, the results are within the limits of the National Ambient Air Quality Standards (NAAQS).

Gaseous Pollutants

The results of SO_2 concentration at all locations are showing variations from 5.5 µg/m^3 in the Ichamati village to 6.9 µg/m^3 at the project site. However, the results are within the limits of the National Ambient Air Quality Standards (NAAQS).

The results of NOx concentration at all locations are showing variations from 10.6 µg/m^3 in the Ichamati village to 10.0 µg/m^3 in the project site. However, the results are within the limits of the National Ambient Air Quality Standards (NAAQS).

Ambient Noise Level (ANL) Results

Samples were collected from 5 sampling locations during the baseline data collection period. The results are given below:

The ambient noise level at day time varied from 46.3 dB (A) at Ichamati village to 62.8 dB(A) at the project site which is within the standard limits of an Industrial area of 75 dB(A). The night time noise result varied from 39.7 dB(A) at Ichamati village to 52.9 dB(A) at the project site which is within the standard limits of an Industrial area of 70 dB(A).

Water Quality Results

The samples were collected from 5 ground water locations and 3 surface water locations. The results are given below:

Groundwater Results

All results comply with the standard drinking water standards of India, i.e., IS: 10500:2012.

Surface Water Results

The surface water quality results of the upstream and downstream water sampling locations of Um Sohryngkew and a sampling location near Ichamati are within the **IS standard 2296:1992** and prescribed **CPCB Water Quality Criteria Class – B**.

Soil Quality Results

Samples were collected from 4 sampling locations during the baseline data collection period. The results are given below:

pH ranging from 6.5 to 7.2 in the study area. Bulk density of the study area ranges between 1.32 gm/cm^3 S1 (Project Site) to 1.49 gm/cm^3 at S4 (Sohbar). Electrical conductivity of the soil samples is found to be average and ranges from 362.5 µmhos/cm to 387.3 µmhos/cm. Organic carbon of the soil samples varies from 1.35% in S2 (Bholaganj) to 1.46% in S1 (Project Site). Available Nitrogen content in the surface soil of the study area varies between 246.5 Kg/ha at S1 (Project Site) to 286.1 Kg/ha at S4 (Sohbar). Available Phosphorus ranges between 4.4 Kg/ha at S2 (Bholaganj) to 5.7 Kg/ha at S4 (Sohbar). Available Potassium content in the study area ranges between 348.7 Kg/ha at S4 (Sohbar) to 461.8 Kg/ha at S2 (Bholaganj).

Based on the provided data, it can be inferred that the soil in the study area has moderate to good fertility with sufficient levels of nitrogen and Organic Carbon for plant growth and foliage development.

Ecological Studies

Flora: The flora found in the whole of the study area are representative of mainly Deciduous/Semi-Deciduous Forest and Scrub Forest. The complete list of Flora in the Study area has been given in **Chapter 3**.

Fauna: During study, various types of fishes, amphibians, reptiles, avifauna and mammals along with invertebrates were recorded. A list of the faunal diversity of the study area is given in **Chapter 3**.

Demography and Socio-economic Study Results

The study area encompasses 46 villages within the buffer zone. The study was conducted using a combination of primary surveys and secondary data sourced from the Census of India 2011. Summarized details are given below:

Population

The study area has a total population of 16323 residing in 3210 households. On average, each household consists of 5.09 members. The gender ratio in the study area was 950 in 2011.

Social Structure

In the study area, the Scheduled Tribes (ST) population accounts for 70.43% of the total

population, while the Scheduled Caste (SC) make up 3.36% of the total population.

Literacy

Within the study area, the overall literacy rate is 58.78% of the total population. Among the literate population, male literacy stands at 52.46%, while female literacy is recorded at 47.54%.

The project will provide direct employment opportunities for 25 individuals, with a focus on hiring local residents in addition to fulfilling any necessary statutory employment requirements.

11.3. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This section summarizes the pollution potential of the proposed project, possible impacts on the surrounding environment during its operational phases and the environment management plan proposed for prevention and control of pollution.

11.3.1. Impacts due to Air Pollution and their Mitigation Measures

The air borne particulate matter is the main air pollutant contributed by opencast mining with drilling and blasting. Various emission sources are identified from the proposed mining operations. Therefore, water sprinkling and mist spraying via APCEs shall be done and workers will be given protective gears such as Personal Dust Samplers, full PPE which shall include protective goggles, dust masks, gloves, safety helmets, and safety shoes.

11.3.2. Impacts due to Noise Pollution and their Mitigation Measures

Due to mining operations such as machinery, drilling and blasting for mine development, excavation, transportation and sizing of limestone, it is anticipated that noise levels will increase. Proposed mitigation measures include maintenance of blasting parameters such as burden, spacing, charge per delay, sub-grade drilling, etc. Controlled blasting techniques such as pre-split blast, use of NONEL, etc. will be followed to minimize noise and generation.

Further, engines of HEMM and other mine machinery and transport vehicles shall be properly maintained to reduce noise generation. Provision of incorporating silencers into the dumpers and other vehicles shall be suggested to control noise propagation. Acoustic enclosures shall be provided in the DG sets. All the workers will be provided with personal PPE such as ear plugs and ear muffs for noise attenuation.

The greenbelt development around the ML area shall also act as a noise barrier.

11.3.3. Impacts due to Water Pollution and their Mitigation Measures

The main sources of water pollution are mine discharge and surface run-off containing suspended solids. The mine discharge water will be passed through settling ponds for removal of suspended solids.

About **7.5 KLD** water is required for various requirements of the mine like dust suppression (2.0 KLD), HEMMs and other machinery washing (2.00 KLD), greenbelt development & plantation within the mine (2.00 KLD) and drinking and domestic consumption (~1.25 KLD).

As the system involved is a closed circuit, there is no scope for wastewater discharge outside of the proposed ML area. Hence, there will be no wastewater discharge outside the mine premises and no contamination of surface and/or groundwater bodies is anticipated.

11.3.4. Impacts due to Solid Waste Generation and their Mitigation Measures

The entire product of limestone will be used as building materials for construction activities. During the project's life, 4650 Tonnes of gritty soil will be removed which will be stacked in a specific stack yard and will be used for haul road dressing and plantation. Moreover, to prevent erosion during rainy as well as windy season, the stack yard will be planted with small varieties of plantation and grasses to prevent such erosion.

11.3.5. Impacts on Land and their Mitigation Measures

The Land Use pattern in the lease area may change as a result of different phases of mining operations. Land reclamation shall be done along with ongoing mining operations in order to minimise the negative consequences. After the end of mining operations, a total area of 0.35 Ha. of land within the safety barrier of the ML area shall be developed into a dense greenbelt area, and the remaining backfilled areas will be revegetated by plantation activities. Any remaining mine void shall be converted into a water body – which may act as a potential source of surface water and recharge for ground water in the future for the neighbouring communities *(Sengupta, 2015)*.

11.3.6. Impacts on Ecology and Biodiversity

As the mining activity is restricted to the core zone, no significant impact on the surrounding ecology of the area is anticipated. With development of greenbelt around the mine, aesthetics of the area shall be improved.

11.3.7. Impact on the Socio-economic Environment

The project will enhance direct and indirect employment in the area. Therefore, overall economic development is likely to improve after the commencement of the project.

11.4. ENVIRONMENTAL MONITORING PROGRAMME

A systematic environmental monitoring programme will be implemented within the mining lease area and a 10 km radius study area. A comprehensive network for monitoring has been developed, considering factors such as pollution sources from mining operations, wind direction, drainage pattern, topography, and the biological environment. Sampling locations have been identified accordingly to ensure comprehensive coverage and accurate assessment of environmental parameters. The Environment Monitoring Cell (EMC) will be responsible for successful implementation of the monitoring program.

11.5. ADDITIONAL STUDIES

Risk Assessment & Disaster Management Plan: Mining will be carried out by semi-mechanized opencast mining, with mining equipment as Jack Hammers, Hydraulic Excavator, Air Compressor, Rock Breaker, tippers etc involving drilling and blasting. Mining will be done under strict supervision hence the rate of operational risks is minimal.

Rehabilitation and Resettlement: There is no human habitation at the project site. So, there will be no rehabilitation and resettlement issue.

11.6. PROJECT BENEFITS

The mining project has a substantial positive impact on the socio-economic environment, supporting the overall development of the area. It contributes significantly to economic growth by generating direct employment for 25 individuals and creating numerous indirect employment opportunities for the local community.

11.7. ENVIRONMENT MANAGEMENT PLAN

An EMP is a site-specific plan developed to ensure that the project is implemented in an environmentally sustainable manner. An effective EMP should ensure the application of best practice environment management to a project. Hence, to ensure effective environmental protection measures throughout and after the commissioning of the proposed mining project, the preparation of an Environmental Management Plan (EMP) is necessary. The EMP serves as a comprehensive framework for formulating, implementing, and monitoring environmental safeguards.

By the end of the lease period, green belt development programme will be carried out over an area of 0.35 ha. Native species will be considered for the plantation purpose.

The following objectives have been incorporated into the design of the EMP in order to mitigate the adverse environmental effects which will be caused due to mining:

- Biological reclamation and rejuvenation of the mined-out areas and active points of the mine lease area to the maximum possible extent possible, in line with the economy of mining operations, the drainage pattern, geological stability, vegetation, etc.;
- Minimal disturbance to the water environment and existing ecological status of the area and conservation of the same;
- Efforts towards improvement of the air quality, water quality and the land during and post mining activities; and
- Establishment of an environment which is conducive to improve the socio-economic situation in the area.

11.8. ESTIMATED COST OF THE PROJECT

The project cost is **₹23.0 Lakhs** and the EMP's capital cost is **₹3.0 Lakhs** with an annual recurring cost is about **₹5.1 Lakhs**. Budget towards Corporate Environment Responsibility (CER) will be **₹1.15 Lakhs**.

11.9. CONCLUSION

From the detailed analysis of the environmental impacts and the mitigation measures proposed in the EMP, it is anticipated that no significant deterioration in the eco-system is likely to occur due to this limestone mine. On the other hand, the project is likely to have several benefits like improvement in indirect employment generation and economic growth of the area, by way of improvements in the infrastructure facilities and better socio-economic conditions.

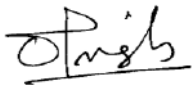
Chapter 12 – DISCLOSURE OF CONSULTANTS ENGAGED

12.1. DECLARATION BY EXPERTS CONTRIBUTING TO THE PREPARATION OF EIA-EMP OF LYNTI DKHAR LIMESTONE MINE

12.1.1. Declaration by the EIA Co-Ordinator

I, hereby declare that I was involved in the capacity of an EIA Coordinator for developing and preparing the EIA-EMP Report of Lynti Dkhar Limestone Mine for a Mine Lease area of 1.36 Ha. located in Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, East Khasi Hills District of Meghalaya.

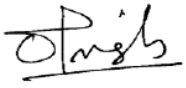
***Name*: Dr. Om Prakash Singh** (NABET Approved Category-A EIA Coordinator)

***Signature*:** 

***Period of Involvement*:** March 2024 – Ongoing

***Contact Information*:** N6/2, 150 S, Indira Nagar Colony, Chitaipur, Varanasi- 221005, Uttar Pradesh

12.1.2. Declaration by the Functional Area Experts (FAEs)

S. No.	Name of the Expert	Functional Areas	Involvement	Period	Signature
1	Dr. Om Prakash Singh	AP Category A	Involved in identifying monitoring locations, interpretation of results, identifying impacts and suggesting mitigation measures.	March 2024 – Ongoing	
		WP Category A	Involved in identifying monitoring locations, interpretation of results, identifying impacts and suggesting mitigation measures.		
		AQ Category A	Involved in meteorological studies, identifying air pollution		

			sources, Suggesting mitigation measures.		
2	Jadab Chandra Dutta	GEO Category A	Involved in interpreting the geology of the project area and identifying impacts. Suggesting mitigation measures.	March 2024 – Ongoing	
3	Rajnarayan Biswas	HW Category A	Involved in quantifying hazardous waste, identifying impacts and suggesting mitigation measures.	March 2024 – Ongoing	
		NV Category A	Involved in identifying monitoring locations, interpretation of results, identifying impacts and suggesting mitigation measures for adverse impacts due to noise.		
		RH Category A	Risk assessment, preparation of risk and disaster management plan.		
4	Amlanjyoti Kar	HG Category A	Involved in identifying the drainage pattern and potential impacts to the surface/groundwater regime of the area. Suggesting mitigation measures.	March 2024 – Ongoing	
5	Asok Kanti Sanyal	EB Category A	Involved in flora & fauna studies by species identification. Identifying impacts and suggesting mitigation measures.	March 2024 – Ongoing	
6	Mita Chakrabarty	SE Category A	Involved in socio-economic studies, data analysis and interpretation, identifying impacts and potential socio-economic change due to the project.	March 2024 – Ongoing	
7	Saumendra Narayan Halder	LU Category A	Processing satellite imageries for land use classification. Identifying impacts and suggesting	March 2024 – Ongoing	

			mitigation measures.		
		SC Category A	Characterisation of soil, assessment of pollutant impacts on soil and suggesting mitigation measures		
8	Rajendra Kumar Kalita	HG Category A	Involved in identifying the drainage pattern and potential impacts to the surface/groundwater regime of the area. Suggesting mitigation measures.	March 2024 – Ongoing	R. Kalita

12.1.3. Declaration by the Head of the Accredited Consultant Organisation

I hereby confirm that the EIA/EMP for Lynti Dkhar Limestone Mine was prepared by the aforementioned experts. The EIA Coordinator (EC) has reviewed the report. The consultant organization assumes full responsibility for any misleading information. It is certified that no unethical practices or plagiarism were involved in carrying out this work. External data or text has not been used without proper acknowledgment.

Signature: Soumi Chakraborty

***Name (authorized signatory)*: Soumi Chakraborty**

***Designation*:** Director

***Date*:** 20/03/2025

12.2. EIA-CONSULTANT ORGANISATION NABET ACCREDITATION CERTIFICATE

QUALITY COUNCIL® OF INDIA
Creating an Ecosystem for Quality

NABET

National Accreditation Board for Education and Training

Certificate of Accreditation

Novomine India Private Limited
4th Floor, Building No. 65, Opp- The Children's Hospital,
Pohkseh, Shillong, East Khasi Hills, Meghalaya- 793006

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sectors (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast/underground mining	1	1 (a) (i)	A

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in IA AC minutes dated September 22, 2023, posted on the QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance with the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/23/3025 dated November 10, 2023. The accreditation needs to be renewed before the expiry date by Novomine India Private Limited, Meghalaya following the due process of assessment.

Sr. Director, NABET
Date: November 10, 2023

Certificate No.
NABET/EIA/2326/IA 0124

Valid up to
August 3, 2026

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

12.3. NABL CERTIFICATE OF EXTERNAL LABORATORY

National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

N. D. INTERNATIONAL

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

17, JNAN GOSWAMI SARANI, 107B, BLOCK-F, NEW ALIPORE, KOLKATA, WEST BENGAL, INDIA

in the field of

TESTING

Certificate Number: TC-5910

Issue Date: 07/06/2024 Valid Until: 06/06/2026

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

Name of Legal Entity: N. D. INTERNATIONAL

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

Annexure 1

Office of the
SOHBAR SIRDARSHIP

P.O. Sohbar, East Khasi Hills District, Meghalaya - 793108

Under Rule 5(5) of the Khasi Hills Autonomous District(Appointment and Succession of Chiefs and Headman)Rules 2015 of the United Khasi - Jaintia Hills Autonomous District (Appointment and succession of Chiefs and Headman Act 1959.

Ref No. SSS/Adm/A-48/2022-24/39

Date ....26/04/2024....

No Objection Certificate

This is to Certify that the Elaka Sohbar has no objection to **Smti Idalis Ryngnga,** daughter of (L) Smti **Skotish Ryngnga**, an inhabitant of **Sohbar, Sohbar Sirdarship**, East Khasi Hills to apply the Mining Lease from the Concern Authority, to extract the Limestone from her own grove name **"Ri-U-Siar"** Lynti Dkhar Area" situated at Sohbar Sirdarship, East Khasi Hills. The Total Area of the land about 1**2,274. Square Meter**.

Wish her every success

Date: Sohbar
The 26/04/2024.

(K. S. Lyngskor)
Sirdar
Sohbar Sirdarship

Sirdar
Sohbar Sirdarship

Annexure 2

88/2021

APPROVED

GOVERNMENT OF MEGHALAYA

1

मेघालय MEGHALAYA 00AA 614048

Sub Registrar,
Sohra

DEED OF DECLARATION

THIS DEED OF DECLARATION is made on this the 28th day of October, 2021, by me **SMTI IDALIS RYNGNGA**, aged about 53 years, daughter of SMTI SKOTISH RYNGNGA, Category – Tribal (Khasi Scheduled Tribe) ,Block – Shella, by profession House wife and a resident of Sohbar Area, Sohbar Sirdarship, East Khasi Hills District, Meghalaya, hereinafter call the **DECLARANT/EXECUTANT**.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Fees Paid
R-12f.
F-36f.
Dt. 29/10/21

WHEREAS, I am the sole absolute owner of a plot of land lying and situated at Lynti Dkhar Area, Sohbar Sirdarship, known as **"Ri-U-Siar"**, measuring an area of about **12,274 Sq. mts** more or less herein after referred to as the said "LANDED PROPERTY", which is morefully and specifically described in the Scheduled herein below

(contd....Page 2)

APPROVED

GOVERNMENT OF MEGHALAYA

2

मेघालया MEGHALAYA 00AA 614047

(Photo Copy of the EPIC,NOC, from acting Sirdar, Sohbar Sirdarship, confirmation, clarification and justification along with sketch map dated 16.12.2013, 16.07.2017 are annexed herewith for ready reference)

AND WHEREAS , I being the absolute owner of the said landed property and am in continous, legal occupation and physical possession of the said landed property which has also been registered before the office of the Sohbar Sirdarship, by which the Acting Sirdar Sohbar issued a **public notification** vide ref no. SSS/Adm/A-39/2012-13/55 dated 25th.10. 2013 and which is more specifically described in the schedule below.

WHEREAS THE said landed property as per the scheduled below/herein after is free from all sorts of encumbrances, mortgages,charges,linens,etc.whatsoever.

WHEREAS I am executing this Deed for declaring my right, title, interest and possession and for all future intents and purposes and for all future reference, use and record.

Certified to be true copy

Sub Registrar,
Sohra

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

(contd....Page 3)

3

मेघालया MEGHALAYA ODAA 614046

WHEREAS, by this DEED OF DECLARATION, I do hereby solemnly affirm and declare that I am the sole and absolute owner in occupation and continuous physical possession of the landed property (specifically described in the Schedule) which is still lying unregistered till date and as such I do hereby made this deed of declaration for the purpose of personal records, future reference and for any other mode of future transferred or alienation, etc.

SCHEDULED OF THE SAID LANDED PROPERTY

ALL THAT PART AND PARCEL of the said landed property known as "Ri U Siar", lying and situated at **Sohbar Area**, **Sohbar Sirdarship**, East Khasi Hills District, Meghalaya, measuring an areas of **12,274 Sq. Mts** more or less which is bounded and butted as under :-

Certified to be true copy
Sub Registrar,
Sohra.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

(contd....Page 3)

4

मेघालय MEGHALAYA 00AA 614045

EAST :	(L) Smti Sidis Tymmeniang	181 m
WEST :	Smti Saribon Iawim	181 m
NORTH:	Smti Bhir (Ria Shabong)	36 m
WEST:	Road of Elaka Sohbar	100 m

Total Area : 12,274 Sq. Mts more or less

(contd....Page 4)

Certified to be true copy
Sub Registrar,
Sohra.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

(contd....Page 3)

APPROVED

भारतीय गैर न्यायिक

दो रुपये TWO RUPEES

रु.2 Rs.2

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

GOVERNMENT OF MEGHALAYA

5

मेघालय MEGHALAYA OOAA 314004

IN TESTIMONY WHEREOF I said and subscribe my signature in presence of the following witnesses, who have put their signatures herein below on the day month and year, first above mentioned.

WITNESSES:-

DECLARANT

Name: KEIMAPHISHISHA RYNGNGA
D/S/o SAWBORLANG KHONGNGNI
Tribal/Non Tribal : Tribal (Scheduled Tribe)
District: East Khasi Hills
State: Meghalaya
Occupation: HOUSEWIFE
Address: SOHRA

2. Name: LAWANHUN SYNRON
D/S/o: IARABHUN SYNRON
Tribal/Non Tribal : Tribal (Scheduled Tribe)
Block: C&RD Block Shella Bholaganj
District: East Khasi Hills
State: Meghalaya
Occupation TEACHER
Address: SOHRA

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Certified to be true copy
Sub Registrar,
Sohra.

(contd....Page 3)

Annexure 3

GOVERNMENT OF MEGHALAYA
DEPARTMENT OF FORESTS & ENVIRONMENT
OFFICE OF THE DIVISIONAL FOREST OFFICER: EAST KHASI HILLS & RIBHOI TERRITORIAL DIVISION: SHILLONG

No.KH/8/ML/Limestone/68/ 6085 Dated Shillong, the 26th /March/2024.

To,

Smti. Idalis Ryngnga,
Sohbar Area,
Sohbar Sirdarship,
East Khasi Hills District.

APPROVED

Subj: Renewal of Letter of Intent (LOI).

Ref: No.KH/8/ML/Limestone/68/3790 dated 17.11.2022.

Sir,

With reference to the subject cited above and also on perusal of your application no nil dated 19.03.2024. Letter of Intent (LOI) issued to you vide this office letter cited under reference is hereby renewed for a period of 3 (three) months from the date of issue of this letter.

Yours faithfully,

Divisional Forest Officer
East Khasi Hills & Ri-bhoi (T) Division
Shillong.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Forest Management Building, 1st Floor
Lower Lachumiere, Shillong - 793001

Phone No: 0364-2226375
Email Id :dfotkhasihills@gmail.com

Annexure 4

GOVERNMENT OF MEGHALAYA
THE DEPARTMENT OF FORESTS AND ENVIRONMENT
OFFICE OF
THE DIVISIONAL FOREST OFFICER:: EAST KHASI HILLS & RI-BHOI (T) DIVISION::
SHILLONG

NO.KH/8/NOC/Limestone/41/Pt.IV/ 2720 Dated Shillong, the 2 / 9 /2022.

APPROVED

To,
Smti. Idalis Ryngnga,
Sohbar area,
Sohbar Sirdarship,
East Khasi Hills District.

Subj: Non Forest Land Certificate (NFC) : Limestone Quarry.

Ref: Your letter No. Nil dated, 20.01.2022.

Sir,

With reference to the subject cited above and also on perusal of your application and tree enumeration data conducted by the Range Forest Officer i/c Southern Range Shillong, I have been directed to issue Non Forest Land Certificate (NFC) for the applied area i.e 1.36 ha located at Ri-U-Siar, Lynti Dkhar area, Sohbar Sirdarship, East Khasi Hills District and subject to the following conditions :

1. You shall obtain Mining Lease / Quarry Permit under Meghalaya Minor Mineral Concession Rules, 2016.
2. The applied area is subject to inspection by the officials/ staff of this Division/ District Council.
3. This Non Forest Land Certificate (NFC) issued shall stand cancel on violation of any extant Acts and Rules of both the State Government and District Council.
4. The certificate shall be applicable only to the applied area (as indicated below) and as per map submitted to this Division.

Sl.no	GPS Co-ordinates	
1.	N – 25° 10' 43.83"	E – 91° 44' 29.65"
2.	N – 25° 10' 43.95"	E – 91° 44' 32.36"
3.	N – 25° 10' 47.91"	E – 91° 44' 33.20"
4.	N – 25° 10' 48.29"	E – 91° 44' 31.71"
5.	N – 25° 10' 49.27"	E – 91° 44' 31.65"
6.	N – 25° 10' 49.03"	E – 91° 44' 30.08"
7.	N – 25° 10' 48.19"	E – 91° 44' 29.03"
8.	N – 25° 10' 48.19"	E – 91° 44' 29.48"

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

[illegible] of trees from the applied area shall be carried out only on prior permission from this Division.

Yours Faithfully,

Divisional Forest Officer
East Khasi Hills & Ri Bhoi (T) Division
Shillong.
Dated Shillong, the ___/___/2022.

Memo NO.KH/8/NOC/Limestone/41/Pt. IV/

Copy to

1. The Principal Chief Conservator of Forests & HoFF Meghalaya, Shillong along with copy of Inspection Report, Tree Enumeration List and other relevant documents for favour of your information. This has a reference to his letter No.MFG.68/20/Vol-II/Pt/3768-76 dated 02nd July 2020.
2. The Conservator of Forests (T), Khasi and Jaintia Hills, Shillong, Meghalaya, along with copy of inspection report, Tree Enumeration List and other relevant documents for favour of your information.
3. The Member Secretary, State Environmental Impact Assessment Authority, Meghalaya for favour of information.
4. The Member Secretary, Meghalaya State Pollution Control Board for favour of information.
5. The Range Forest Officer i/c Southern Range, Shillong for favour of his information and necessary action. He is also instructed to monitor/inspect the applied area for any violation under the extant Acts & Rules of both the State Government and District Council.

Divisional Forest Officer,
East Khasi Hills & Ri Bhoi (T) Division,
Shillong

Forest Management Building, Lower Lachumiere, Shillong-793001
Phone No. 0364-2226[illegible] Email- dfokhasihills@gmail.com

Annexure 5

GOVERNMENT OF MEGHALAYA
DIRECTORATE OF MINERAL RESOURCES
SHILLONG.

No.DMR/MM/199/2024/04 Dated Shillong, the 06/09/ 2024.

To,

Smt. Idalis Ryngnga,
Sohbar Area, Sohbar Sirdarship,
East Khasi Hills District.

Sub: Approval of Mining Plan in respect of Limestone of Smt. Idalis Ryngnga, over an area of 1.36 ha. at Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, East Khasi Hills submitted under Rule 19 (1) of Meghalaya Minor Mineral Concession Rules, 2016.

Sir,

In exercise of the power conferred under Rule 10 (a) & 19 (1) of Amended Meghalaya Minor Mineral Concession Rules, 2016 along with Govt. Notification No.MG.49/2011/Pt-I/58 dt. 01.03.2019, I hereby approve the above said Mining Plan with following conditions.

(i) The Mining Plan is approved without prejudice to any other law applicable to the mine area from time to time made by the Central Government, State Government or any other authority and without prejudice to any order or direction from any court of competent jurisdiction.

(ii) The proposals shown on the plates and/or given in the document is based on the lease map/sketch submitted by the applicant/lease and is applicable from the date of approval.

(iii) It is clarified that the approval of Mining Plan does not in any way imply the approval of the State Government in terms of any other provision of the Meghalaya Minor Mineral Concession Rules, 2016 or Acts and Rules relating to Mines and Minerals framed by Central Government and any other laws including Forest and Labour Laws.

(iv) The Approving authority does not undertake verification of the mining lease boundary on the ground and does not undertake any responsibility regarding the correctness of the boundaries of the precise area as furnished by the applicant/lessee.

(v) At any stage, if it is observed/found that the information furnished data incorporated in the document are incorrect or misrepresent facts, the approval of the document shall be revoked with immediate effect.

(vi) If this approval conflicts with any other law or court order/direction under any statute, it shall be revoked immediately.

(vii) The granting authority may verify the Mining Lease boundary of the applied area.

(viii) The granting authority may ensure that the Limestone raised from the above proposed Mining Lease is used only for the purpose indicated in the end use incorporated in the approved Mining Plan.

Enclo: As above
2 (two copies of approved Mining Plan)

Yours faithfully,

(P.Ch.Marak)
Mining Engineer
Directorate of Mineral Resources
Meghalaya:::Shillong.

Annexure 6

GOVERNMENT OF MEGHALAYA
DIRECTORATE OF MINERAL RESOURCES
SHILLONG

No. DMR/MM/199/2024/09 Dated Shillong, the 23rd july 2024

TO WHOM IT MAY CONCERN

It is hereby certified that as on date, the approved mining plans indicated below are located within a distance of 500 meters from the periphery of the approved mining plan on Lime stone over an area 1.36 hectare located at Ka Ri U Syiar, Lynti Dkhar Area, Sohbar Sirdarship, District- East Khasi Hills, Meghalaya, of Smt Idalis Ryngnga r/o Sohbar Area, Sohbar Sirdarship, District- East Khasi Hills, State- Meghalaya:

S. No.	Approved mining plan	Area (hectares)	Mineral	Distance from the approved mining plan of Smt. Idalis Ryngnga (metres)
1	Smt Ailadmon Japang	2.40	Limestone	10
2	Shri Nebarson Tymmenniang	1.24	Limestone	487

Yours faithfully,

(P. Ch. Marak)
Mining Engineer,
Directorate of Mineral Resources
Meghalaya:::Shillong

Annexure 7

MINING PLAN WITH PROGRESSIVE MINE CLOSURE PLAN OF LYNTI DKHAR LIMESTONE MINE

LOCATED AT – RI-U-SIAR, LYNTI DKHAR AREA, SOHBAR SIRDARSHIP EAST KHASI HILLS DISTRICT, MEGHALAYA.

PREPARED AS PER MMMCR 2016

APPLIED LEASE AREA: (1.36 HA)

GOVERNMENT OF MEGHALAYA

APPROVED

APPLICANT

SMT. IDALIS RYNGNGA

SOHBAR AREA, SOHBAR SIRDARSHIP, EAST KHASI HILLS DISTRICT, MEGHALAYA

Prepared By RQP

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

NOVOMINE INDIA PVT. LTD.

ASHOK KUMAR SARKAR

RQP NO.-: RQP/KOL/377/2013/A

Airport Enclave Co-Operative Housing Society, Jessore Road, Kolkata - 700051, West Bengal.

Office:- 4th Floor, HouseNo.65, Opposite Children Hospital, Pohkseh Central,Shillong

LYNTI DKHAR LIMESTONE MINE

APPLIED AREA: 1.36 HA

LESSEE – SMT. IDALIS RYNGNGA

APPROVED

CONSENT LETTER

The Mining Plan along with Progressive Mine Closure Plan in respect of Lynti Dkhar Limestone Mine over an area of 1.36 Ha located at Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya has been prepared by M/s Novomine India Private Limited, RQP- Shri. Ashok Kumar Sarkar, RQP No.:RQP/KOL/377/2013/A.

I request the Concerned Authority, Government of West Bengal, to make further correspondence regarding modification etc. in Mining Plan alongwith Progressive Mine Closure Plan with the said recognized person on the following address:

Novomine India Private Limited

Unit No 7WS5d, 7th Floor West Block Mani Casadona plot No. II F/4,

Action area II "F" New Town, Rajarhat,

Kolkata – 700160, West Bengal

Ashok Kumar Sarkar

Registration No: RQP/KOL/377/2013/A

I hereby undertake that all the modification so made in the Mining Plan alongwith Progressive Mine Closure Plan by the recognized person be deemed to have been made with my knowledge and consent and shall be acceptable to me and binding on me in all respect.

For Lynti Dkhar Limestone Mine

Smt. Idalis Ryngnga

(Applicant)

Place: - Sohbar Area

Date: - 04/05/2024

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

LYNTI DKHAR LIMESTONE MINE

APPLIED AREA: 1.36 HA

LESSEE – SMT. IDALIS RYNGNGA

APPROVED

CERTIFICATE

The provision of Mines Act, Rules and Regulations made there under have been observed in the Mining Plan alongwith Progressive Mine Closure Plan in respect of Lynti Dkhar Limestone Mine over an area of 1.36 Ha located at Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya belonging to Smt. Idalis Ryngnga and wherever specific permission is required; the applicant will approach the DGMS.

Further, standards prescribed by DGMS in respect of Miners Health will be strictly implemented.

For Lynti Dkhar Limestone Mine

Smt. Idalis Ryngnga

(Applicant)

Place: - Sohbar Area

Date: - 04/05/2024

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

NOVOMINE INDIA PVT. LTD.

LYNTI DKHAR LIMESTONE MINE

APPLIED AREA: 1.36 HA

LESSEE – SMT. IDALIS RYNGNGA

APPROVED

GOVERNMENT OF MEGHALAYA

CERTIFICATE

The progressive Mine closure plan of Lynti Dkhar Limestone Mine over an area of 1.36 Ha located at Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya belonging to Smt. Idalis Ryngnga complies all statutory rules, regulations, order made by the Central or State Govt. statutory organizations, court etc. has been taken into consideration and wherever specific permission is required the concerned authorities will be approached.

I also undertake to the effect that all measures proposed in this closure plan will be implemented in a time bound manner.

For Lynti Dkhar Limestone Mine

I. Ryngnga

Smt. Idalis Ryngnga

(Applicant)

Place: - Sohbar Area

Date: - 04/05/2024

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

NOVOMINE INDIA PVT. LTD.

LYNTI DKHAR LIMESTONE MINE

APPLIED AREA: 1.36 HA

LESSEE – SMT. IDALIS RYNGNGA

APPROVED

UNDERTAKING

I, Smt. Idalis Ryngnga, Applicant of Lynti Dkhar Limestone Mine over an area of 1.36 Ha located at Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya does hereby undertake that the boundary pillars of the proposed grant area will be maintained properly.

For Lynti Dkhar Limestone Mine

I Ryn

Smt. Idalis Ryngnga

(Applicant)

Place: - Sohbar Area

Date: - 04/05/2024

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

NOVOMINE INDIA PVT. LTD.

LYNTI DKHAR LIMESTONE MINE

APPLIED AREA: 1.36 HA

LESSEE – SMT. IDALIS RYNGNGA

APPROVED

GOVERNMENT OF MEGHALAYA

CERTIFICATE

Certified that all provisions of MMMCR, 2016 has been observed in the in Mining Plan and wherever specific permissions are required, the Applicant Smt. Idalis Ryngnga will approach the concerned authorities of D.G.M.S. for granting permission.

The information furnished in this Mining Plan is true and correct to the best of my knowledge.

Place: Shillong

Date : 04/05/2024

Ashok Kumar Sarkar

REG. No.- : RQP/KOL/377/2013/A

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

LYNTI DKHAR LIMESTONE MINE

APPLIED AREA: 1.36 HA

LESSEE – SMT. IDALIS RYNGNGA

APPROVED

GOVERNMENT OF MEGHALAYA

CERTIFICATE

Certified that the provisions of Mines Act, Rules and Regulations made there under have been observed in this Mining Plan and wherever specific permissions are required, the Applicant, Smt. Idalis Ryngnga will approach the concerned authorities of D.G.M.S. for granting permission.

The information furnished in this Mining Plan is true and correct to the best of my knowledge.

Place: - Shillong
Date: - 04/05/2024

Ashok Kumar Sarkar
REG. No.-: RQP/KOL/377/2013/A
NOVOMINE INDIA PVT LTD

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

NOVOMINE INDIA PVT. LTD.

INTRODUCTION

1. Smt. Idalis Ryngnga has applied for a mining lease for minor mineral (Limestone) mining over an area of 1.36 Ha located at Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya.
2. Study revealed that the limestone of East Khasi Hills District, Meghalaya will be used in kilns for manufacturing of lime used as building materials.
3. The applicant has obtained Renewed Letter of Intent for mining lease for limestone (minor mineral) mining from the Government of Meghalaya on dated **Shillong 26th March 2024** with letter. No. **KH/8/ML/Limestone/68/6085**. Mining lease will be granted only after obtaining EC from the concerned authority.(Photocopy of Letter of Intent is enclosed as an **Annexure**).
4. Mining Plan has been prepared based on the coordinates given by DFO, East Khasi Hills and Ri-Bhoi (T) Division, Shillong, Govt. of Maghalaya.
5. Mining plan including Progressive Mine Closure Plan in respect of Lynti Dkhar Limestone Mine is prepared under Rule 19(1) of MMMCR 2016.
6. While preparing the mining plan proper attention has been paid to ensure that the relevant provisions under MMDR Act,1957, MMR,1961, and Mines Act,1952, MMMCR, 2016 are followed. All safety measures provided in the statutes will be complied with.
7. Required numbers of competent and qualified persons will be appointed for exercising control, direction and supervision of safe working.
8. For baseline data assistance has been taken from local authorities.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

APPROVED

GOVERNMENT OF MEGHALAYA

CHAPTER – I
GENERAL

1.1 Name & Address of the Lessee:

Smt. Idalis Ryngnga

Address – At-Sohbar Area, Sohbar Sirdarship, East Khasi Hills District, Meghalaya.

1.2 Status of the Applicant:

The Lessee is a Private Individual.

1.3 Mineral occurring in the area which the Lessee intends to mine:

Limestone

1.4 Name of the RQP preparing the Mining Plan:

Ashok Kumar Sarkar

Flat no-304, Block B-12,

Airport Enclave Co-operative Housing Society

Jessore Road, Kolkata, Pin- 700051

Registration No:RQP/KOL/377/2013/A

1.5 Name of the Prospecting Agency: Novomine India Pvt Ltd

A qualified surveyor has surveyed the area accompanied by a Geologist, assigned by the the Company. During the process, surface and scarp faces were studied to delineate the Limestone exposures & excavation by GPS within the lease hold area, followed by contouring by Total Station.

1.6 Details of the Area

Applied Area –1.36 Ha

Non- Forest Private Land.

1.7 Period of Mining Lease - 10 years

1.8 Period of Mining Plan - 5 years

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

NOVOMINE

APPROVED

GOVERNMENT OF MEGHALAYA

CHAPTER – II
LOCATION & ACCESSIBILITY

2.1 Location & Accessibility:

Lynti Dkhar Limestone Mine is situated near about 80 km away from Shillong.The nearest Railway Station, Mirza is about 166km away and the nearest Airport Lokpriya Gopinath Bordoloi International Airport is about 190 km away & the nearest Road is MDR 27 about 527m away from the area in south direction.

2.2 Co-ordinates of the area

Boundary Pillar no.	Location (co-ordinates)	
	Latitude	Longitude
1	25°10'43.83"N	91°44'29.65"E
2	25°10'43.95"N	91°44'32.36"E
3	25°10'47.91"N	91°44'33.20"E
4	25°10'48.29"N	91°44'31.71"E
5	25°10'49.27"N	91°44'31.65"E
6	25°10'49.03"N	91°44'30.08"E
7	25°10'48.19"N	91°44'29.03"E
8	25°10'48.19"N	91°44'29.48"E

2.3 Availability of Water, Medical & Educational facilities:

Tharia River is situated at about 1.1 km south-east of the project area. Primary health care facilities and Primary educational facilities are available at Bholaganj which is about 500m away from the mine site.

2.4 Google Map – The area has been marked on the image generated from Google Earth showing the vicinity of the area within a radius of 500m (Plate No.1).

2.5 Co-ordinate Plan: - A Co-ordinate plan has been prepared on the basis of the co-ordinates of project boundary pillars as mentioned in the Forest NOC given by DFO, East Khasi Hills & Ri Bhoi Division to demarcate its location in the concerned area of 1.36 Ha located at Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, East Khasi Hills District, Meghalaya on a scale of 1:1500 (Plate no 2).

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CHAPTER – III
GEOLOGY AND EXPLORATION & RESERVE

3.1 Physiography

The area around the block represents a rolling topography with gorges/scarp faces and with numerous streams. The elevation range within the lease area is 145mRL highest contours to 133mRL lowest contour. Karst topography is prevalent with spiky surface with lots of sink-holes and solution cavities. Streams are semi-dendritic and flow towards east before taking southern turn towards Bangladesh. The mineral is exposed in the whole lease area.

3.2 Regional Geology:

In a regional scale it is obvious that the topographic expression is very rugged with the high hills and the following stratigraphic sequence is noted in this part of South-West Khasi Hills District of Meghalaya.

Summarized Regional Geological set-up around the block.

Age	Group	Formation	Rock types
Oligocene to Miocene	Garo	Chengapara Baghmara Simsang	Sandstone, claystone marl Feldspathic S. St. conglomerate, clay Shale, Sandstone and marl
Palaeocene to Eocene	Jaintia	Kopili Sylhet Therria	Argillaceous sediments Dominantly Limestone with S.St Dominantly S.St. with coal partings
Cretaceous to Jurassic	Khasi Sylhet trap	Mahadek	Coarse, gluconitic, feldspathic, arkosic S.St. and purple shale with uranium ore Volcanic trap with vesicles
Lr Palaeozoic	Granites (Exposed towards east)	Different granites plutons	Coarse porphyritic granite, pegmatite aplote with epidiorite dolerite enclaves
Proterozoic	Khasi Greenstone Shillong Group		Epidiorite, meta dolerite, diorite dykes Thick pile of quarzite
Proterozoic & Archaean	Assam-Meghalaya Gneissic Complex (AMGC)		Para and ortho-gneis, migmatite, mica schist and other metasedimentary bands

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3.3 Local Geology:

The proposed mining area is small and exposes only the limestone of the Sylhet limestone formation. Table provides a glimpse of the Geology that is seen in the area.

Geological age	Group	Formation	Summarized rock types
Recent	Newer Alluvium	Unclassified	Unconsolidated soil and scree material
Eocene	Jaintia	Shylhet (=Shella)	Top part with grey/white limestone Bottom part with dark/steel grey limestone

3.4 Method of Estimation of Reserves:

Standard Cross Sectional Area method.

a) Sections have been drawn from boundary to boundary across the applied area considering the litho units in the area. The sectional area has been estimated on the basis of the cross sections.

b) Length of influence has been measured by taking half of the section interval distance on both side of each section.

c) Bulk density has been taken as 2.7.

3.5 Resource & Reserve:

Resources have been divided into two categories, such as Proved Reserve & Probable Reserve.

Up to an average depth of 29 meters from average ground level has been taken as **Proved Reserve Category** on the basis of Limestone exposed in the quarry face of the nearby mines & also from the exposure on hill top and slope as well as from the nala cutting section around the applied area and further up to a depth of 5 meters has been taken as **Probable Reserve Category**.

Mineable reserve is based on the mineable part of the reserve. Mineable mineral (Limestone) reserve has been calculated from the geological reserve in the area considering the stone which is to be left out and maintained as Safety Barrier of 7.5 meters within ML boundary and in consideration of ultimate pit limit as calculated from the Geological Plan &Section and approved.

Measured Mineral Resources

SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	LIMESTONE (TONNES)
A-A'	2356	45	106020	2.7	286254
B-B'	2603	45	117135	2.7	316265
C-C'	2107	66	139062	2.7	375467
TOTAL			**362217**		**977986**

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Indicated Mineral Resources

SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	LIMESTONE (TONNES)
A-A'	377	45	16965	2.7	45806
B-B'	479	45	21555	2.7	58199
C-C'	425	66	28050	2.7	75735
TOTAL			**66570**		**179739**

Blocked Measured Mineral Resources in Safety Barrier & UPL

SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	LIMESTONE (TONNES)
A-A'	1631	45	73395	2.7	198167
B-B'	1039	45	46755	2.7	126239
C-C'	999	66	65934	2.7	178022
TOTAL			**186084**		**502427**

Blocked Indicated Mineral Resources in Safety Barrier & UPL

SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	LIMESTONE (TONNES)
A-A'	377	45	16965	2.7	45806
B-B'	348	45	15660	2.7	42282
C-C'	348	66	22968	2.7	62014
TOTAL			**55593**		**150101**

Category of Resource	Mineable Reserves in Tonnes	Non Mineable in Tonnes	
Proved	475559	Pre-Feasibility Mineral Resources	502427
Probable	29638	Pre-Feasibility Mineral Resources	150101
TOTAL	**505197**		**652528**

Summary of Total Mineable Reserve:

Category of Reserve	Total Reserve in tonnes
Mineable Proved Reserve	475559
Mineable Probable Reserve	29638
Total	**505197**

Anticipated life of the mine:

The mineable reserve would be **505197** Tonnes with an average annual production of **50519.7(505197/10 = 50519.7)** Tonnes. Note that the average annual production of stone may be different from the yearwise annual production of 5 years. During plan period of 5 years, total **252570** Tonnes of stones has been proposed to be achieved and the remaining (505197-252570)= **252627** Tonnes would be exhausted in next 5 years @ 50525 Tonnes per annum.Thus the life of the mine will be 10 years.

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CHAPTER – IV
MINING

4.1 The entire area is highly potential area and working will be started from northern part of the applied area and gradually extended attaining further depth. The benching system 6mx6m will be practiced in the area, in order to comply with the provisions of Metalliferous Mines Regulations, 1961. Details of advancement and formation of benches are shown in Development Plan & Section (Plate - 5) on a scale **1:1500.**

4.2 Mining Strategy:

The deposit in this area is massive and compact in nature. It is proposed to carry out Open Cast Semi-Mechanized mining in this area during the plan period i.e. five years. Jack hammer drill machine will be deployed for drilling of shot holes ranging from 35 to 32mm diameter and breaking of limestone at the required size will also be done manually & by rock breaker. For blasting of holes with burden and spacing of 0.8m x 1.0m in a staggered grid pattern would be adopted. Muffle blasting will be adopted as precautionary measure to control fly rocks. Excavation and handling of gritty soil will be done by excavator.

4.3 Production Targets:

Year wise Production of Limestone from the area has been calculated by cross sectional method. The cross sectional area has been multiplied by the advancement to be worked in each bench as length of influence to get the bulk volume. Thus the value obtained has been multiplied by tonnage factor (T.F.) to get the actual production of stone in each bench. Year wise calculation has been made separately and the details of year wise development of the Mine is given below:

Production :

Year	Production of Stone in Tonnes	Removal of Gritty Soil in Tonnes
1st	50504	3402
2nd	50528	1248
3rd	50463	0
4th	50531	0
5th	50544	0
6th	50525	0
7th	50525	0
8th	50525	0
9th	50526	0
10th	50526	0
Total	**505197**	**4650**

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4.4 Bench Design and Formation:

Since the mine will be worked in semi-mechanized method during this proposed plan period of 5 years, bench height will be restricted to the statutory 6mx6m due to compactness of the hard stone and as per the DGMS norms. Bench slope angle for stabilization of the benches will be maintained at 45°.

4.5 Bench Development over the plan period:

Working of the first 5 years will be started from the northern part of the area and advanced towards southern direction, attaining further depth. Details of advancement and formation of benches are shown in Development Plans & Sections (**Plates: 5**) in the scale of 1:1500.

1st year: Working will be started from top hilly portion of the area with one bench of 6mX6m in dimension with RL up to 137m. During mining some gritty soil will be removed and would be dumped in the northern side with suitable precautions. For haulage of the stone ramp will be maintained at the working face. Details of calculations are given below:

LIMESTONE PRODUCTION 1ST YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	LIMESTONE (TONNES)
143-137	A-A'	291	45	13095	2.7	35357
143-137	B-B'	170	33	5610	2.7	15147
TOTAL				**18705**		**50504**

SOIL REMOVAL 1ST YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	SOIL (TONNES)
143-137	A-A'	24	45	1080	1.5	1620
143-137	B-B'	36	33	1188	1.5	1782
TOTAL				**2268**		**3402**

2nd year: - During 2nd year working will be advanced towards southern part in the same working face with two benches having 6mX6m with up to the RL 131m RL. In this year too, during mining some gritty soil will be removed and would be dumped in the north-eastern part with suitable precautions. For haulage of the stone ramp will be maintained at the working face. Details of calculations are given below:

LIMESTONE PRODUCTION 2ND YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	LIMESTONE (TONNES)
143-137	C-C'	47	22	1034	2.7	2792
137-131	C-C'	340	52	17680	2.7	47736
TOTAL				**18714**		**50528**

SOIL REMOVAL 2ND YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	SOIL (TONNES)
137-131	C-C'	16	52	832	1.5	1248
TOTAL				**832**		**1248**

3rd year: - During this year working will be continued in the central part in the same working face and further depth with one bench of 6mX6m in dimension up to the RL 131m. In this year, during mining no gritty soil will be removed. For haulage of the stone ramp will be maintained at the working face. Details of calculations are given below:

LIMESTONE PRODUCTION 3RD YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	LIMESTONE (TONNES)
137-131	B-B'	445	42	18690	2.7	50463
TOTAL				**18690**		**50463**

4th year: - During this year working will be continued towards northern direction in the same working face with two benches of 6mX6m in dimension up to the RL 125m.No gritty soil will be generated during the this year of mining. For haulage of the stone ramp will be maintained at the working face. Details of calculations are given below:

LIMESTONE PRODUCTION 4TH YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	LIMESTONE (TONNES)
137-131	A-A'	250	54	13500	2.7	36450
131-125	A-A'	149	35	5215	2.7	14081
TOTAL				**18715**		**50531**

5th year: - During this year working will be continued in the same working face and further depth with one bench of 6mX6m in dimension up to the RL 125m. For haulage of the stone ramp will be maintained at the working face. Details of calculations are given below:

LIMESTONE PRODUCTION 5TH YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	LIMESTONE (TONNES)
131-125	B-B'	390	48	18720	2.7	50544
TOTAL				**18720**		**50544**

4.6 Notes on Conceptual Plan for the Lease Period:

Mining will be carried out with the help of machinery and manual manpower for digging, excavation and removal of limestone in conjunction with shot hole drilling by Jack Hammer drill. Mining operation shall be carried out in compliance with the provisions of the MMR, 1961. During the 5 years plan period the area will be worked out maintaining a 7.5m Safety Barrier. The voids created by mining will be reclaimed after the conceptual period.

Land Use Pattern:

Existing Land Use pattern

Category	Area in Hectares
Excavated Land	0.16
Road	0.01
Total area in use	**0.17**
Balance unused area	1.19
Total Applied Lease Area	**1.36**

Land Use pattern after first five years plan period

Category	Area in Hectares
Excavated Land including road	1.01
Green belt in Safety Barrier	0.26
Dump with Parapet wall & Garland drain	0.09
Total area in use	**1.36**
Balance unused area	0.00
Total Applied Lease Area	**1.36**

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Land Use pattern after life of the mine

Category	Area in Hectares
Excavated Land including Reclamation	1.01
Green belt	0.35
Total area in use	**1.36**
Balance used area	0.00
Total Applied Lease Area	**1.36**

4.7. Machinery Deployment:

JACK HAMMER: (Drilling Equipment)

Annual Production of Stone	:	50544 MT
No. of working days	:	300
Per day production of Stone	:	50544= 168.48 MT say 168 MT 300
Drilling pattern (Spacing X Burden X Depth)	:	1mX0.8mX1.76m (including sub-grade drilling)
Yield per hole (Tonnes per hole)	:	1.6mx0.8mx1.0mx2.7= 3.456 Tonnes.
Daily No. of holes required	:	168/3.456=48.61 Nos. say 49
Meterage required	:	1.76mx49 = 86.24 meters say 86
Rate of drilling(meters/hr)	:	10m
In one shift of 8 hours (assuming 6 effective hours) Daily meterage drilled by 1 jack hammer.	:	10mx6=60m
No. of Jack Hammers required	:	86/60 = 1.43 say 2 No
Total No. of Jack hammers required	:	2 Nos.

EXCAVATORS: (Loading Equipment)

For Material Production:

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Production of Stone	:	50544 MT/annum
Production of Soil (gritty)	:	3402
No. of working days	:	300
Production of stone per day	:	50544 = 168.48 MT say 168MT 300
Production of Soil (gritty) per day	:	3402 =11.34 MT say 11MT 300
Material required to be handled per day	:	(168 + 11)MT = 179 MT
Bucket fill factor	:	80%
Bucket Capacity	:	0.6 cu.m. i.e. 0.48 cum @ 80%
Bulk density loose	:	1.85
Material handled by each bucket	:	0.48 x 1.85 = 0.888 MT
Cycle time (including pastime) for each bucket Utilization (Job efficiency)	: :	30 sec 70% i.e 0.888X 0.7 = 0.6216 MT
Numbers of Cycles required to fill a dumper with capacity 10 MT	:	10/0.6216 =16
Total loading time	:	16X30 = 480 Seconds i.e. 8 minutes
Tonnage handled/hr	:	0.6216x60x 60 = 74.592 MT 30 Say 75 MT/hr
Tonnage handled per shift (6hrs shift) for one shift working	:	6 x1x 75= 450 MT

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Number of excavators required	:	179 / 450 = 0.40
Considering 80% availability the requirement of excavator is 0.40/0.8 = 0.5 say 1 no. One more is suggestible for emergency purpose. Therefore 2 Excavators would be sufficient to meet the production target.		

Specification of Excavator:

Type	Nos.	Bucket capacity In cu m	Motive power	H.P
Hydraulic Excavator	2	0.6	Diesel	115

Haulage and Transport Equipment:
No. of Tippers required for Stone Transportation:

1. Lead distance	=	0.3 km
2. Uphill at 20 kmph speed	=	(60/20)x0.3 = 0.9 min say 1 minute
3. Downhill at 25 kmph speed	=	(60/25)x0.3 = 0.72 min say 1 minute
4. Loading time	=	8 minutes
5. Spotting time	=	1 minute
6. Unloading	=	1 minute
7. Total time requited per trip	=	12 minutes
8. No. of trips per hour	=	60/12= 5
9. With 80% efficiency	=	5 x 0.80 = 4 trips per hour
10. Hourly output per tipper	=	4 x 10 = 40 MT
11.Production of stone per day	=	$\frac{50544}{300}$ = 168.48 MT say 168 MT
12.Production of Soil (gritty) per day	=	$\frac{3402}{300}$ =11.34 MT say 11 MT
13.Material required to be handled per day	=	(168 + 11)MT = 179 MT
14. Considering one shift per day, 6 hrs per shift so output of 1 tipper per day	=	40 x 6=240MT
15. No. of Tippers required	=	179 /240 = 0.75
Considering 80% availability, number of tippers required are 0.75/0.8 = 0.94 no. say 1. One more tipper is suggestible for emergency purpose. Therefore 2 tippers would be enough to meet the requirement of transport.		

Details of Tippers:

Description	Nos.	Size/ Capacity	Motive power	H.P
Tippers for stone transportation	2	10 MT	Diesel	98.5

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Machinery Deployed

Salient features of the Proposed Mining Machinery are as under:

S. No	Type of machine	No	Dia of hole In mm	Size/ capacity	Motive power	H.P
1	Excavators	2	-	0.6 cu. m	Diesel	115
2	Compressor	2	-----	120 cfm	Diesel	--
3	Jackhammer Drill	2	--	--	Compressed Air	--
4	Tippers	2	-	10 MT	Diesel	98.5
5	Rock Breaker	1	--	--	Diesel	--
6	Water tanker	1	--	--	Diesel	--

** [All machineries will be deployed on hire basis.]

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CHAPTER – V
BLASTING

5.0. Blasting:

Equipment for compressed air drilling

5.1.1 Air Compressor

Diesel-operated, compressors with 120 cfm capacity.-2 Nos.

5.1.2 Jack Hammer Drill

Air operated with 1800 to 2000 RPM – 2 Nos. 2 Jack Hammer drills will be sufficient to meet the production target.

5.2 Blasting

In this mine, shallow – hole drilling would be in practice. Holes would be drilled in hard formation by jackhammer drill having diameter from 35mm to 32mm. The holes are generally made up to 1.76m (including 0.16m sub-grade drilling to break the toe) depth. Burden and spacing would be maintained as 0.8m and 1.0m depending upon the compactness of formation. The pattern of delay blasting will take into account existence of any natural cleavage, layout and sequence of firing of the blast-holes pattern proposed for blasting.

The distribution of charge in the blast hole will be bottom charge is to column charge in the ratio of 15:85.

Blast holes shall be initiated by non-electric (NONEL) down-the-hole (DTH) delay detonators. NONEL trunk-line delay detonator will be used for trunk line connections. The shots will be fired using exploder approved by DGMS. In case of non-availability of detonators provision will be kept for ordinary fuse blasting.

5.3 The blasting parameters adopted would be as under:

Burden	:	0.8m
Spacing	:	1.0m
Bulk density	:	2.7 MT/m3
Depth of hole	:	1.76m(including 0.16m sub-grade drilling to break the toe)
Tonnage per hole	:	1.6mx0.8mx1.0mx2.7= 3.456 Tonnes
Powder factor	:	8 Tonnes/KG (hoped to be achieved)
Charge per hole	:	3.456/8 = 0.432 Kg
Production/day (Peak)	:	50544 = 168.48 MT say 168 MT 300
Number of hole / day	:	168/3.456 = 48.61 say 49.
Explosive	:	ANFO with slurry primer charge
Explosive Consumption	:	49X0.432= 21.168 Kg per day

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Thus to extract 168 Tonnes of limestone per day drilling and blasting will be required. Therefore 49 holes are required to be drilled per day, which can be performed by 2 drilling crew consisting of four persons. Delay Blasting will be practiced in the area for 49 holes.

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Types of Explosive:

For column charge, blasting agent like ANFO will be preferred. However, in wet conditions (especially during monsoon) bulk slurry explosives is proposed to be used if necessary.

Cap-sensitive Slurry explosive will be used as primer charge.

Deck charging will be used wherever necessary depending upon the nature of the strata.

Storage of Explosive:

An agreement will be made with the blasting agency by the applicant before starting the mining operations so that storage of explosive can be as less as possible.

5.4 SAFE PRACTICES DURING SHOT FIRING

Required precautionary measures would be taken to avoid Kinking during firing.

Drilling and charging of holes shall not be carried out in the same area simultaneously. A detailed record of the hole positions, type of explosives, quantity of explosives, hole depth, charge column and stemming would be maintained in a Register for locating/ finding out the depth of the charge in case of a chance misfire.

Before firing of shots in a cycle of blasting all persons shall be withdrawn from the blasting site to a safe place, i.e. more than 300m away from the spot/site of blasting.

Blasting time will be fixed in consultation with the neighboring mines and preferably after the end of working shift taking all required precautions, like marking the danger zone of 300m with red flags/ posting of sentries waving red flags, use of warning signals/blowing sirens and providing blasting shelters etc. Controlled blasting will be done to minimize blast vibration impacts and contain fly rocks.

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CHAPTER – VI
MINE DRAINAGE

6.0. Mine Drainage:

Tharia River is situated at about 1.1 km south-east of the project area. The area is sloping and workings will be kept restricted above ground water table.

However, adequate control measures will be taken to prevent water pollution / contamination.

During rainy season the rain water falling on the mine with silt and clay, wash off particles of the surrounding area will be flown through the garland drain to the settling tank into which the transported suspended particles will be precipitated and allow clear sump water to overflow to the storage tank from where it will be used for plantation, water sprinkling on haul road and daily washing of machineries / transport vehicles.

As such, there is no impact on water regime due to mining activities.

Water quality monitoring will be done as per CPCB norms & MSPCB guidelines.

CHAPTER – VII
STACKING OF MINERAL REJECT AND DISPOSAL OF WASTE

7.0. Nature of Waste:

The entire produce of Limestone will be used as building material and according to its end use as discussed in the next chapter (Use of Minerals).

7.1. Nature of soil & selection of dump site:

The soil is basically alluvial and gritty in nature. During plan period, the generated gritty soil will be dumped temporarily in north and north-east part of the applied area. After exhaustion of mineable reserve, quarry will be reclaimed to the extent possible.

To prevent dump failure/soil erosion in the existing dump, toe-wall with weep-holes and garland drains will be provided towards lower side of the dumps to check the wash off during the rainy season. During rainy season the rain water falling on the mine with silt and clay, wash off particles of the dump will be flown through the garland drain to the settling tank into which the transported suspended particles will be precipitated and allow clear sump water to overflow to the storage tank.

CHAPTER – VIII
USE OF MINERALS

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8.1. USE OF MINERALS:

Limestone of the area will be used in kilns for manufacturing of lime used as building materials.

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CHAPTER – IX
MAN POWER

9.1. Manpower Deployment:

There would be 300 working days in a year. Taking into account 2 years of plan period, the requirement of management & supervisory personnel has been considered as under Reg. 34 (2) (C) of MMR, 1961 & would be as follows:

Employment Potential:

The following employment will be maintained & generated due to mining operation in the area.

Employees	Proposed
Manager	1
Supervisor	1
Storekeeper	1
Attendance Clerk – cum Register Keeper	1
Excavator Operator	2
Driller	1
Driller helper	1
Tipper Driver	3
Rock Breaker Operator	1
Water Tanker Driver	1
Miners Semi-skilled (inclusive of absentees & leave)	7
Unskilled	5
Total	**25**

9.2 Labour Source: Labours will be employed from nearby villages.

9.3 Site Services

The services provided outside the working site are:

1) Rest Shelter

2) Pit Office

3) First Aid Arrangement and

4) Drinking Water.

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CHAPTER – X
MINERAL PROCESSING

10.1 Mineral Processing:

The beneficiation/processing of limestone are not required as the entire limestone will be used in kilns for manufacturing of lime used as building materials.

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CHAPTER – XI
ENVIRONMENT MANAGEMENT PLAN

Mining, especially through open casting methods, typically impacts the environment. To safeguard the environment in this area, and Environment Management Plan has been devised. Environmental Clearance has been obtained for the area, and the recommendations of the regulatory authority granting the clearance will be adhered to throughout the planning period. Plate-7 illustrates the current environmental conditions and activities.

11.1 Base Line Data,

11.1.1 Existing Land Use Pattern

Category	Area in Hectares
Excavated Land	0.16
Road	0.01
Total area in use	**0.17**
Balance unused area	1.19
Total Applied Lease Area	**1.36**

11.1.2 Water

Tharia River is situated at about 1.1 km south-east of the project area.The terrain of the area is significantly elevated above the highest flood level (HFL), and there have been no instances of flooding recorded in the area. The mining activity will not disrupt the natural drainage patterns, and operations will be conducted above the groundwater table.

11.1.3 Terrestrial Ecology

The study of Terrestrial Ecology involves the identification of animals, birds including nomadic and migratory, reptiles and amphibian fauna.

11.1.3.1 Fauna:

In and around the project area Insects, Lizards, dogs etc. are rarely noticed.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

11.1.3.2 Flora:

Different types of Creepers, Bushes, Shrubs and small plants etc. are commonly found in the applied area and in its surroundings.

11.1.4 Quality of Air

The mining operation will be carried out by open cast semi- mechanized method. So after the commencement of mining operation, following measures shall be undertaken:

- Regular water spraying on haul roads, waste dumps and maintaining approach roads to suppress the dust as per practice.
- Transporting equipment shall be maintained regularly.
- Adequate plantation shall be done along lease boundary and transport road.
- Wet drilling shall be practiced.

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► Maintenance of nearby local roads through which transportation of minerals shall be carried out by the project proponent.

Monitoring of ambient air quality shall be done and report of such monitoring shall be submitted to competent authority.

11.1.5 Climate

The area experiences dominantly humid climate with moderate winter. The area experiences severe rainfall between May and August with average annual rainfall of 11000 mm.

11.1.6 Social and Demographic Profile

Local people of the region are mainly dependent on farming and mining will help them providing additional sources of job opportunity and would prevent migration. Local people are fully dependent on daily -rated jobs, forest products, agriculture and employment in mines. Area within 500m radius is shown in Plate – 1.

11.1.7 Public buildings, places of worship and monuments:

There is no public building, places of worship or monument of historical importance within the proposed applied area.

11.1.8 Whether the area falls under the Water (Prevention & Control of Pollution) Act 1974:

Yes.

11.2.1 Relief and Landscape Alteration:

With the gradual extraction/mining of the limestone deposit stretching from surface to below ground the profile of the virgin area will change and the topography of the area will also get altered. Thus the altered topographic scenario will have a different visual effect.

11.2.2 Impact on the Water Table:

Limestone mining operation would not require much water except for water sprinkling at points/source of dust generation. No chemical beneficiation would be necessary for ROM limestone mined. As the Mining operations would be carried out above Water Table there is no likelihood of impact on ground water table.

11.2.3 Water Contamination

In the project area very thin soil cover is there & less possibilities of rain water causing soil erosion. As precautionary measure garland drain shall be cut surrounding the quarry to collect the runoff water and this shall be connected to the settling tank which will collect the solid particles of silt and clay and allow clear sump water to flow to the storage tank from where it will be used for plantation, water sprinkling and daily washing of machineries / transport vehicles.

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Meghalaya, Shillong

11.2.4 Air and Noise Pollution

There will be impact on air up to a certain limit due to dust generation during loading operation, transportation of gritty soil/limestone and drilling & blasting. Similarly, due to mining operation noise pollution will be there, due to movement of transportation vehicles.

However effective measures shall be taken to maintain the pollution limit within prescribed CPCB norms and MSPCB guidelines **(For precautionary measures please refer Para 11.3.1, 11.3.2 & 11.3.5)**.

11.2.5 Impact on Climate:

No impact on climate is anticipated due to proposed level of working.

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11.2.6 Impact on Human Environment:

There will be a beneficial impact on human environment due to generation and growth of employment with commencement of mining operation.

11.3 Environment Management Plan:

Necessary action will be taken to monitor Air Quality, Water Quality, Noise Level from time to time as indicated earlier **(Please refer Para 11.3.1, 11.3.2, 11.3.3, 11.3.5).**

11.3.1 Dust Suppression:

During Mining operation, fugitive dust will be the principal air pollutant. Following measures will be provided to reduce the air pollution-

- Water spraying will be there in haul road and operational area.
- Wet drilling will be preferred.
- Sharp drill bits will be used to reduce dust generation.
- Dust extractor will be used to reduce dust generation wherever necessary.
- Proper monitoring of air quality data has to be maintained and in case it exceeds the permissible limit, adequate measures have to be taken.
- Avenue plantation in and around the quarry, dump site is to be made.
- The 7.5m Safety Barrier shall be maintained for green belt development at 2.5m spacing left all around and shall be used for plantation of trees with deep and thick vegetation so that air pollution due to dispersal of dust from the mine can be arrested.
- Details of year wise greenbelt development along with number of plants and required area. (Taking 415 plants on 0.26 ha area or 2.5mX2.5m grid pattern in plan period).

Year	Area for greenbelt in m^2	No of plants
1st	520	83
2nd	520	83
3rd	520	83
4th	520	83
5th	520	83
Total	**2600**	**415**

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

- The species of plants having fast growth and are sustainable with high survival rate and as supported by the local prevailing environmental conditions would be chosen. The plantation shall be done in the safety zone area.
- Green belt plantation will be protected properly and will be maintained by daily watering and regular nursing. Necessary precaution and care will be taken to protect the saplings and to maintain the optimal rate of survival.

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

NOVOMINE

11.3.2 Precaution against Air Pollution:

Air pollution may occur due to the operation of mining machineries in the mining process. Measures will be taken to minimize and maintain pollution levels within permissible limits by regularly sprinkling water on haul roads and the mining operational area. Additionally, workers will be provided with personal protective equipment such as masks and goggles.

11.3.3 Water Pollution Control Measures:

During the rainy season, rainwater carrying silt and clay particles from the mine and surrounding areas will be directed through the garland drain to a settling tank. Here, suspended particles will settle, allowing clear water to overflow into the storage tank. This water will then be utilized for plantation, sprinkling on haul roads, and daily washing of machinery and transport vehicles.

11.3.4 Storage of Top Soil/Rejects:

The soil is basically alluvial and gritty in nature. During plan period, the generated gritty soil will be dumped temporarily in north and north-east part of the applied area. After exhaustion of mineable reserve, quarry will be reclaimed to the extent possible.

To prevent dump failure/soil erosion in the existing dump, toe-wall with weep-holes and garland drains will be provided towards lower side of the dumps to check the wash off during the rainy season. During rainy season the rain water falling on the mine with silt and clay, wash off particles of the dump will be flown through the garland drain to the settling tank into which the transported suspended particles will be precipitated and allow clear sump water to overflow to the storage tank.

11.3.5 Noise Pollution Control Measures

The main source of noise in the mining area is the operation of Machines like Excavators, Tippers. In order to minimize the noise pollution following measure will be adopted:

- Regular, proper and timely maintenance of machinery.
- Plantation along the periphery of mining lease area.
- Providing ear plugs to the workers.

11.3.6 Land Reclamation

After the full extraction of minable limestone deposit and completion of quarrying operation the excavated vacant area will be reclaimed to the extent possible.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

0CHAPTER – XII
PROGRESSIVE MINE CLOSURE PLAN

12.1. Introduction:

Smt. Idalis Ryngnga has applied for a mining lease for minor mineral (Limestone) mining over an area of 1.36 Ha located at Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya.

12.1(a)Name, Address, Status of the Lessee:

Smt. Idalis Ryngnga

Address – At-Sohbar Area, Sohbar Sirdarship, East Khasi Hills District, Meghalaya.

Status of the Lessee - The Lessee is a Private Individual

12.1(b) The Extent of the Area:

Details of the Area: Applied Area: 1.36 Ha

12.1(c) Name & Address of the RQP Preparing the Mining Plan:

Ashok Kumar Sarkar

Flat no-304, Block B-12, Airport Enclave Co-operative Housing Society

Jessore Road, Kolkata, Pin- 700051.

Registration No: RQP/KOL/377/2013/A

12.1.(d) Method of Mining:

Please refer Chapter – IV.

12.1.(e)Mineral Processing:

Please refer Chapter – X.

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Meghalaya, Shillong

12.1.1. Reasons for Closure:

i) Quality Deterioration of Mineral: If the mineral is found to be bad in quality in the proposed mining area at any stage of operation, then the mine may have to be closed.

ii) Government Departmental Objection for Violation: During mining operation if any violation/deviation from the approved mining plan is observed/pointed out by the State Government Department officials concerned they may direct to close the mine.

iii) Exhaustion of Reserves in the quarry:

As per the Letter of Intent, the lessee is required to cease mining operations once the workings reach the ultimate pit limit depth due to the depletion of the estimated mineable reserve.

iv) Stay order from the Court: If any stay order comes from a Court of Law the mine will have to be stopped forthwith.

12.1.2. Statutory Obligations:

The Lessee will comply with all the statutory obligations and clearance from concerned authority.

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RQP/KOL/377/2013/A

12.1.3. Closure Plan Preparation:

The name and address of the Lessee and the recognized qualified person who prepared the Progressive Mine Closure Plan and the name of the executing agency is furnished in para 1.4.

12.2. Mine Description:

12.2.1. Geology:

Please refer Chapter – III.

12.2.2. Resource & Reserve:

Please refer Chapter – III.

12.2.4. Mining Method:

Please refer Chapter – V.

12.2.5. Mineral Beneficiation:

Please refer Chapter – X.

12.2.6. Review of Implementation of Mining Plan / Scheme of Mining including Two Years Progressive Closure Plan up to the Final Closure of Mine:

This is a fresh mining plan. All statutory obligations and clearances will be taken and complied with the concerned authority.

12.3. Closure Plan:

12.3.1. Mined-Out Land:

As a result of mining operation, the original ground profile will be got altered. The de-stoned quarry will be reclaimed after conceptual plan period. Details of year wise production land use pattern have been mentioned in the mining chapter (Chapter No- IV).

12.3.2. Environment:

The 7.5m Safety Barrier shall be maintained for green belt development at 2.5m spacing left all around and shall be used for plantation of trees with deep and thick vegetation so that air pollution due to dispersal of dust from the mine can be arrested.

- Details of year wise greenbelt development along with number of plants and required area. (Taking 415 plants on 0.26 ha area or 2.5mX2.5m grid pattern in plan period).

Year	Area for greenbelt in m^2	No of plants
1st	520	83
2nd	520	83
3rd	520	83
4th	520	83
5th	520	83
Total	**2600**	**415**

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

- The species of plants having fast growth and are sustainable with high survival rate and as supported by the local prevailing environmental conditions would be chosen. The plantation shall be done in the safety zone area.

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

- Green belt plantation will be protected properly and will be maintained by daily watering and regular nursing. Necessary precaution and care will be taken to protect the saplings and to maintain the optimal rate of survival. (Details of all the environmental attributes are discussed in Chapter–XI).

12.3.3. Ground Vibration due to Blasting:

Please refer Chapter – V.

12.3.4. Water Regime:

Please refer Chapter–XI. (Please see para 11.1.2, 11.2.2, 11.2.3, 11.3.3)

12.3.5. Air Quality Management:

Please refer Chapter–XI.(Please see para 11.1.4,11.2.3)

12.3.6. Waste Management:

The produced stone from the mine will be entirely used as building material.

12.3.7. Top Soil Management:

Please refer Chapter–XI. (Please see para 11.3.4)

12.3.8. Tailing Dam Management:

As there will be no beneficiation activity in the area, no tailing dam management would be necessary.

12.3.9. Infrastructure:

Please refer Chapter–IX.

At the final closure stage the infrastructure so constructed will be dismantled after the completion of mining activity.

12.3.10. Disposal of Mining Machinery:

The mining machineries will be engaged on hire basis. After the abandonment of mines all the machineries will be returned to the owner.

12.3.11. Safety & Security:

The size of the working benches will be maintained as per Reg. 106 of MMR, 1961. Personal Protective Equipment (PPE) like industrial safety helmets, gloves, safety spectacles, goggles, visors, high-visibility clothing, safety boots, shoes with protective toecaps, safety harness, earplugs, earmuffs, etc. will be provided to the workers .Respiratory Protective Equipment (RPE) like nose masks etc. will be provided to the workers keeping in mind of their comfort ability and friendly fittings and beside these the project proponent would provide Health insurance/Accidental insurance, Hours of work and over time payment, meal and tea breaks, leaves applicable/sick leave, first-aid and medical treatment.

At the time of final closure of the mines, the abandoned pits shall be fenced properly and signboards will be set up indicating the safety cautions at prominent places.

12.3.12. Disaster Management & Risk Assessment:

The applied lease area is small and the mining operation will be in semi-mechanized method. No heavy seismic activities are recorded in this area during the last 50 years as per the village officials. The mining operation will not go to the much deeper side; hence chances of land slide or subsidence are rare. The proposed project site falls in zone- V as per IS 1893 (Part-I): 2002. Hence, seismically it is an active zone.

12.3.13. Care & Maintenance during Temporary Discontinuance:

Proper care and maintenance during temporary discontinuance will be taken. Proper safety and security for the machineries as well as for staffs will be taken.

12.3.14. Economic Repercussions of Closure of Mine & Manpower Retrenchments:

Taking into account of the plan period of two years the requirement of management & supervisory personnel has been considered as under Reg. 34 (2) (C) of MMR, 1961. Since a handful of workmen would be employed for mining activity, no major repercussion is expected after closure of mine.

12.3.15. Number of Local Residents Employed in the Mine, Status of the Continuation Family Occupation & Scope of Joining the Occupation Back:

The mine is providing employment to local workers mostly from the nearby villages outside the applied area. The main occupation of their family is farming. All the statutory facilities under the mines rules will be extended to the workers. In case of final closure, they can revert back to their family occupation along with the statutory monetary benefits given by the management.

12.3.16 Time Scheduling for Abandonment:

Time schedule of all abandonment operations as proposed is given below in self-explanatory bar chart.

Activities	Tentative time frame for completion of jobs for mine closure operation (In months) from date of cessation.											
	1	2	3	4	5	6	7	8	9	10	11	12
Reclamation & Rehabilitation of mined out land	The excavated area will be reclaimed, after complete extraction of mineable reserve to the extent possible.											
Waste management	Not Applicable											
Decommissioning of infrastructure	→											
Safety & Security	Safety and security will be provided and ensured by the mine proponent.											
Monitoring of air & water	→											

Mining Engineer
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Meghalaya, Shillong

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

12.3.17 **Expenditure during the two years plan period: -**

Description	Quantum of work to be done	Approx. total cost of process (in Rs)
Reclamation and Rehabilitation of excavated pits	Quarry will be reclaimed after extraction of total mineable reserve.	3,00,000/-
Soil dump Management	Top gritty soil will be dumped in northern side of the applied area.	1,00,000/-
Plantation & green belt development	0.26 Ha area within the safety barrier will be used for greenbelt development about 415 plants.	83,000/-
Air Noise and water Quality monitoring	Monitoring will be done yearly for five years (Air, Water, and Noise).	2,00,000/-
Settling tank & Garland drain	Construction of garland drain & Settling tank.	1,00,000/-
Settling tank cleaning	Silt and clay remove from settling tank.	70,000/-
Tentative cost of abandonment		**8,53,000/-**

12.3.18 Financial Assurance : Computation of financial assurance:

Total Applied Lease Area – 1.36 Ha say 2 Ha

Rates. – Rs. 10000/-per Hectare.

Amount of financial assurance – 2 Ha X 10000/ - = Rs. 20,000/-

The amount of financial assurance as may be specified by the State Govt. will be submitted in the form of Bank Guarantee by the Lessee to the concerned authority of the State Govt, Meghalaya before execution of the lease deed.

12.3.19 Certificate:

The above certificates are enclosed at the beginning of the Mining Plan.

12.3.20 Plans, sections etc.:

All the plans & sections are enclosed at the end of this Mining Plan.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

SMT. IDALIS RYNGNGA

SOHBAR AREA, SOHBAR SIRDARSHIP, EAST KHASI HILLS DISTRICT, MEGHALAYA

APPROVED

GOVERNMENT OF MEGHALAYA

UNDERTAKING

I Would hereby like to declare that the Limestone mined out from my mine located at Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya. Will be used in kilns for manufacturing of lime used as building materials.

I. Ryngng

Smt. Idalis Ryngnga

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

LYNTI DKHAR LIMESTONE MINE

RI-U-SIAR, LYNTI DKHAR AREA, SOHBAR SIRDARSHIP, EAST KHASI HILLS DISTRICT, MEGHALAYA.

APPROVED

GOVERNMENT OF MEGHALAYA

UNDERTAKING

The Mining Plan with Progressive Mine Closure plan of Smt. Idalis Ryngnga made as per Letter of Intent received from Divisional Forest Officer, East Khasi Hills & Ri Bhoi (T) Division, Shillong, Vide Letter NO. KH/8/ML/Limestone/68/6085 which complies with the Amended Rule 4(1) of MMMCR,2016 Vide notification No. MG/42/2011/Pt-1/184 dated 21 September,2020.

Ashok Kumar Sarkar

REG.NO.; RQP/KOL/377/2013/A

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

GOVERNMENT OF MEGHALAYA
DEPARTMENT OF FORESTS & ENVIRONMENT
OFFICE OF THE DIVISIONAL FOREST OFFICER: EAST KHASI HILLS & RIBHOI TERRITORIAL DIVISION: SHILLONG

No.KH/8/ML/Limestone/68/ 6085 Dated Shillong, the 26th /March/2024.

To,

Smti. Idalis Ryngnga,
Sohbar Area,
Sohbar Sirdarship,
East Khasi Hills District.

APPROVED

Subj: Renewal of Letter of Intent (LOI).

Ref: No.KH/8/ML/Limestone/68/3790 dated 17.11.2022.

Sir,

With reference to the subject cited above and also on perusal of your application no nil dated 19.03.2024. Letter of Intent (LOI) issued to you vide this office letter cited under reference is hereby renewed for a period of 3 (three) months from the date of issue of this letter.

Yours faithfully,

Divisional Forest Officer
East Khasi Hills & Ri-bhoi (T) Division
Shillong.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Forest Management Building, 1st Floor
Lower Lachumiere, Shillong - 793001

Phone No: 0364-2226375
Email Id :dfotkhasihills@gmail.com

GOVERNMENT OF MEGHALAYA
THE DEPARTMENT OF FORESTS AND ENVIRONMENT
OFFICE OF
THE DIVISIONAL FOREST OFFICER:: EAST KHASI HILLS & RI-BHOI (T) DIVISION::
SHILLONG

NO.KH/8/NOC/Limestone/41/Pt.IV/ 2720 Dated Shillong, the 2 / 9 /2022.

APPROVED

To,
Smti. Idalis Ryngnga,
Sohbar area,
Sohbar Sirdarship,
East Khasi Hills District.

Subj: Non Forest Land Certificate (NFC) : Limestone Quarry.

Ref: Your letter No. Nil dated, 20.01.2022.

Sir,

With reference to the subject cited above and also on perusal of your application and tree enumeration data conducted by the Range Forest Officer i/c Southern Range Shillong, I have been directed to issue Non Forest Land Certificate (NFC) for the applied area i.e 1.36 ha located at Ri-U-Siar, Lynti Dkhar area, Sohbar Sirdarship, East Khasi Hills District and subject to the following conditions :

1. You shall obtain Mining Lease / Quarry Permit under Meghalaya Minor Mineral Concession Rules, 2016.
2. The applied area is subject to inspection by the officials/ staff of this Division/ District Council.
3. This Non Forest Land Certificate (NFC) issued shall stand cancel on violation of any extant Acts and Rules of both the State Government and District Council.
4. The certificate shall be applicable only to the applied area (as indicated below) and as per map submitted to this Division.

Sl.no	GPS Co-ordinates	
1.	N – 25° 10' 43.83"	E – 91° 44' 29.65"
2.	N – 25° 10' 43.95"	E – 91° 44' 32.36"
3.	N – 25° 10' 47.91"	E – 91° 44' 33.20"
4.	N – 25° 10' 48.29"	E – 91° 44' 31.71"
5.	N – 25° 10' 49.27"	E – 91° 44' 31.65"
6.	N – 25° 10' 49.03"	E – 91° 44' 30.08"
7.	N – 25° 10' 48.19"	E – 91° 44' 29.03"
8.	N – 25° 10' 48.19"	E – 91° 44' 29.48"

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

[illegible] of trees from the applied area shall be carried out only on prior permission from this Division.

Yours Faithfully,

Divisional Forest Officer
East Khasi Hills & Ri Bhoi (T) Division
Shillong.
Dated Shillong, the ____/____/2022.

Memo NO.KH/8/NOC/Limestone/41/Pt. IV/

Copy to

1. The Principal Chief Conservator of Forests & HoFF Meghalaya, Shillong along with copy of Inspection Report, Tree Enumeration List and other relevant documents for favour of your information. This has a reference to his letter No.MFG.68/20/Vol-II/Pt/3768-76 dated 02nd July 2020.
2. The Conservator of Forests (T), Khasi and Jaintia Hills, Shillong, Meghalaya, along with copy of inspection report, Tree Enumeration List and other relevant documents for favour of your information.
3. The Member Secretary, State Environmental Impact Assessment Authority, Meghalaya for favour of information.
4. The Member Secretary, Meghalaya State Pollution Control Board for favour of information.
5. The Range Forest Officer i/c Southern Range, Shillong for favour of his information and necessary action. He is also instructed to monitor/inspect the applied area for any violation under the extant Acts & Rules of both the State Government and District Council.

Divisional Forest Officer,
East Khasi Hills & Ri Bhoi (T) Division,
Shillong

Forest Management Building, Lower Lachumiere, Shillong-793001
Phone No. 0364-2226[illegible] Email- dfokhasihills@gmail.com

88/2021

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भारतीय गैर न्यायिक

पाँच रुपये FIVE RUPEES

रु.5 RS:5

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

1

मेघालय MEGHALAYA 00AA 614048

Sub Registrar,
Sohra

DEED OF DECLARATION

THIS DEED OF DECLARATION is made on this the 28th day of October, 2021, by me **SMTI IDALIS RYNGNGA**, aged about 53 years, daughter of SMTI SKOTISH RYNGNGA, Category – Tribal (Khasi Scheduled Tribe) ,Block – Shella, by profession House wife and a resident of Sohbar Area, Sohbar Sirdarship, East Khasi Hills District, Meghalaya, hereinafter call the **DECLARANT/EXECUTANT**.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Fees Paid
R-12f.
F-36f.
Dt. 29/10/21

WHEREAS, I am the sole absolute owner of a plot of land lying and situated at Lynti Dkhar Area, Sohbar Sirdarship, known as **"Ri-U-Siar"**, measuring an area of about **12,274 Sq. mts** more or less herein after referred to as the said "LANDED PROPERTY", which is morefully and specifically described in the Scheduled herein below

Certified to be true copy

Sub Registrar
Sohra

(contd....Page 2)

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GOVERNMENT OF MEGHALAYA

2

मेघालया MEGHALAYA 00AA 614047

(Photo Copy of the EPIC,NOC, from acting Sirdar, Sohbar Sirdarship, confirmation, clarification and justification along with sketch map dated 16.12.2013, 16.07.2017 are annexed herewith for ready reference)

AND WHEREAS , I being the absolute owner of the said landed property and am in continous, legal occupation and physical possession of the said landed property which has also been registered before the office of the Sohbar Sirdarship, by which the Acting Sirdar Sohbar issued a **public notification** vide ref no. SSS/Adm/A-39/2012-13/55 dated 25th.10. 2013 and which is more specifically described in the schedule below.

WHEREAS THE said landed property as per the scheduled below/herein after is free from all sorts of encumbrances, mortgages,charges,linens,etc.whatsoever.

WHEREAS I am executing this Deed for declaring my right, title, interest and possession and for all future intents and purposes and for all future reference, use and record.

Certified to be true copy

Sub Registrar,
Sohra

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

(contd....Page 3)

3

मेघालया MEGHALAYA ODAA 614046

WHEREAS, by this DEED OF DECLARATION, I do hereby solemnly affirm and declare that I am the sole and absolute owner in occupation and continuous physical possession of the landed property (specifically described in the Schedule) which is still lying unregistered till date and as such I do hereby made this deed of declaration for the purpose of personal records, future reference and for any other mode of future transferred or alienation, etc.

SCHEDULED OF THE SAID LANDED PROPERTY

ALL THAT PART AND PARCEL of the said landed property known as "Ri U Siar", lying and situated at **Sohbar Area**, **Sohbar Sirdarship**, East Khasi Hills District, Meghalaya, measuring an areas of **12,274 Sq. Mts** more or less which is bounded and butted as under :-

Certified to be true copy
Sub Registrar,
Sohra.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

(contd....Page 3)

4

मेघालय MEGHALAYA 00AA 614045

EAST :	(L) Smti Sidis Tymmeniang	181 m
WEST :	Smti Saribon Iawim	181 m
NORTH:	Smti Bhir (Ria Shabong)	36 m
WEST:	Road of Elaka Sohbar	100 m

Total Area : 12,274 Sq. Mts more or less

(contd....Page 4)

Certified to be true copy
Sub Registrar,
Sohra.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

(contd....Page 3)

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भारतीय गैर न्यायिक

दो रुपये TWO RUPEES

रु.2 Rs.2

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

GOVERNMENT OF MEGHALAYA

5

मेघालय MEGHALAYA OOAA 314004

IN TESTIMONY WHEREOF I said and subscribe my signature in presence of the following witnesses, who have put their signatures herein below on the day month and year, first above mentioned.

WITNESSES:-

DECLARANT

Name: KEIMAPHISHISHA RYNGNGA
D/S/o SAWBORLANG KHONGNGNI
Tribal/Non Tribal : Tribal (Scheduled Tribe)
District: East Khasi Hills
State: Meghalaya
Occupation: HOUSEWIFE
Address: SOHRA

2. Name: LAWANHUN SYNRON
D/S/o: IARABHUN SYNRON
Tribal/Non Tribal : Tribal (Scheduled Tribe)
Block: C&RD Block Shella Bholaganj
District: East Khasi Hills
State: Meghalaya
Occupation TEACHER
Address: SOHRA

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Certified to be true copy
Sub Registrar,
Sohra.

(contd....Page 3)

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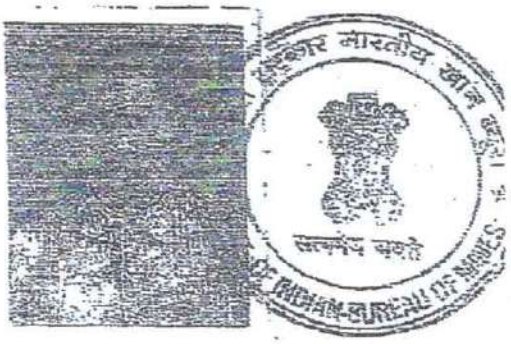
GOVERNMENT OF MEGHALAYA

भारत सरकार /GOVERNMENT OF INDIA
खान मंत्रालय /MINISTRY OF MINES
भारतीय खान ब्यूरो /INDIAN BUREAU OF MINES



Ashok Kumar Sarkar

अर्हताप्राप्त व्यक्ति के रुप में मान्यता प्रमाण पत्र

(खनिज रियायत निमावली, 1960 के नियम 22सी के तहत्)

CERTIFICATE OF RECOGNITION AS QUALIFIED PERSON

(Under Rule 22C of Mineral Concession Rules, 1960)

श्री अशोक कुमार सरकार पुत्र स्व. श्री चित्तरंजन सरकार, निवासी फ्लेट सं. 304, ब्लॉक बी –12, एयरपोर्ट एनक्लेव कॉपरेटिव हाउसिंग सोसायटी, जेसोर रोड, कोलकाता – 700 051, जिनका फोटो और हस्ताक्षर उपर दिया हुआ है, तथा जिन्होंने अपनी अर्हता और अनुभव का संतोषजनक साक्ष्य दिया है, को खनन् योजना तैयार करने हेतु खनिज रियायत निमावली, 1960 के नियम 22सी के तहत् अर्हता प्राप्त व्यक्ति के रुप में मान्यता प्रदान की जाती है ।

Shri Ashok Kumar Sarkar, S/O Late Shri Chittaranjan Sarkar, resident of Flat No. 304, Block B-12; Airport Enclave Co-operative Housing Society, Jessore Road, Kolkata – 700 051, whose Photograph and signature is affixed herein above, having given satisfactory evidence of his qualifications and experience is hereby **RECOGNISED** under Rule 22(C) of the Mineral Concession Rule, 1960 as a Qualified Person to prepare Mining Plans.

उनकी पंजीयन संख्या है
His registration number is **RQP/KOL/377/2013/A**

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

यह मान्यता 10(दस) वर्षों की अवधि के लिए मान्य है जो दिनांक 21.02.2023 को समाप्त होगी । This recognition is valid for a period of 10(ten)years ending on 21.02.2023.

उनके द्वारा प्रस्तुत खनन् योजना में गलत जानकारी / दस्तावेज पाए जाने की स्थिति में यह प्रमाण पत्र वापस लिया जाएगा / निरस्त किया जाएगा ।

This certificate is liable to be withdrawn/cancelled in the event of furnishing the wrong information/documents in the Mining Plan submitted by him.

22/2/2013

स्थान / Place : Kolkata
दिनांक / Date : 22.02.2013

क्षेत्रीय खान नियंत्रक / Regional Controller of Mines
भारतीय खान ब्यूरो / Indian Bureau of Mines
कोलकाता क्षेत्र / Kolkata Region

Lynti Dkhar Limestone Mine

Applied Area- 1.36 Ha
Applicant - Smt. Idalis Ryngnga

APPROVED

INDEX

- APPLIED LEASE BOUNDARY
- 1 2 BOUNDARY PILLARS
- 500M RADIUS BOUNDARY
- APPROACH ROAD

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Plate No. - 1

Google Map

Lynti Dkhar Limestine Mine

Applicant
Smt. Idalis Ryngnga
Address: At-Sohbar Area, Sohbar Sirdarship
East Khasi Hills District, Meghalaya.

Applied Lease Area - 1.36 Ha

Applied Lease Area Located at - Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya.

PREPARED BY:	NOVOMINE INDIA PRIVATE LIMITED QCI-NABET ACCREDITATION NO. NABET/APA-MPPA/IA/018

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A

00 300N

100E

200E

300E 300N

200N

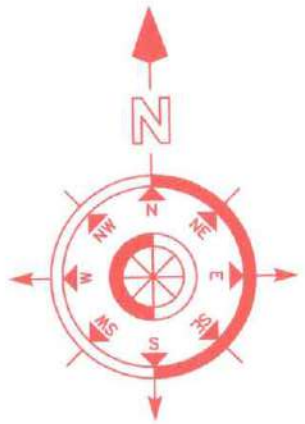
100N

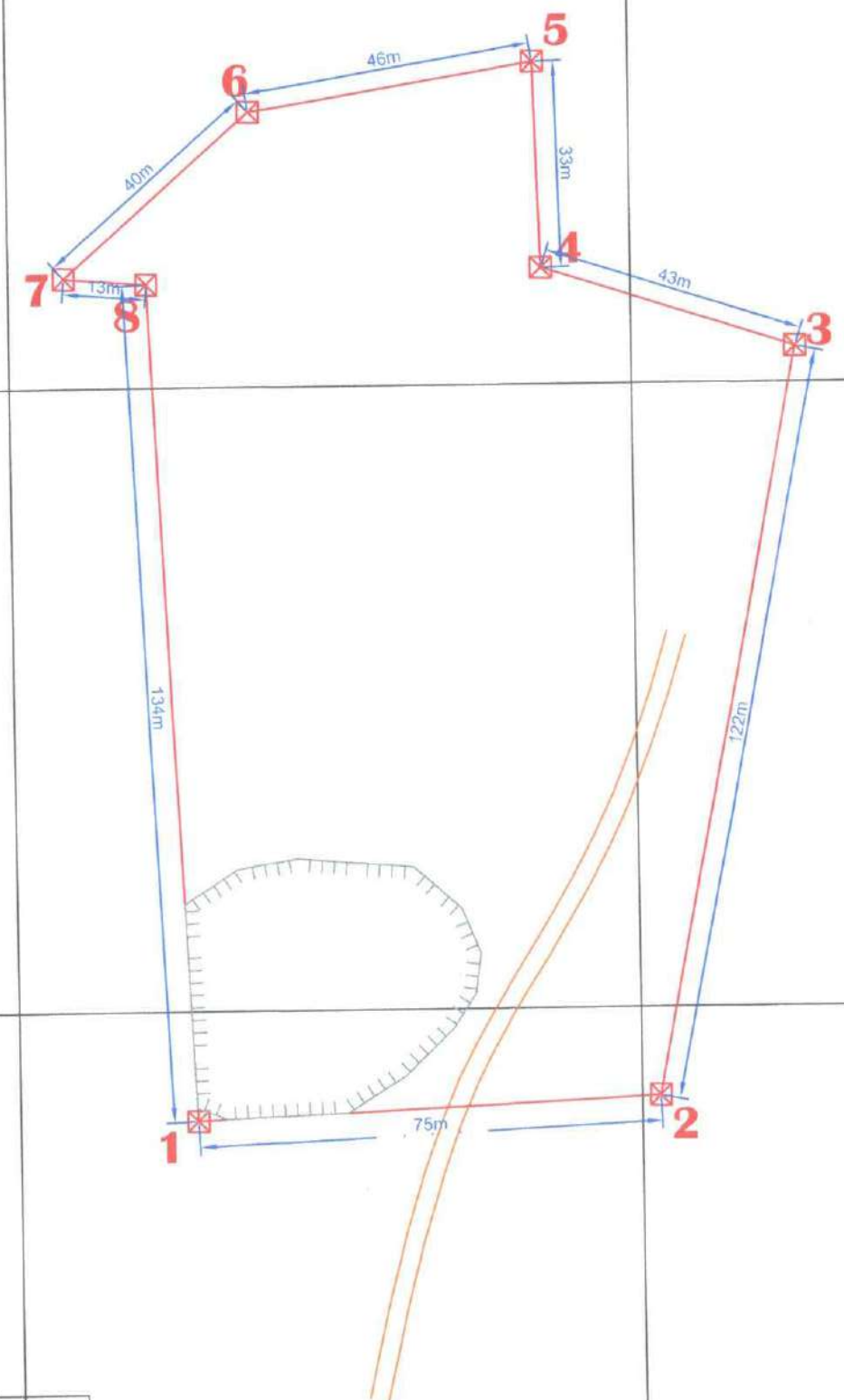
00

100E

200E

300E





GOVERNMENT OF MEGHALAYA

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Coordinate of Pillars

Sl.No	Coordinates	
1	25°10'43.83"N	91°44'29.65"E
2	25°10'43.95"N	91°44'32.36"E
3	25°10'47.91"N	91°44'33.20"E
4	25°10'48.29"N	91°44'31.71"E
5	25°10'49.27"N	91°44'31.65"E
6	25°10'49.03"N	91°44'30.08"E
7	25°10'48.19"N	91°44'29.03"E
8	25°10'48.19"N	91°44'29.48"E

INDEX

- APPLIED LEASE BOUNDARY
- ⊠3 BOUNDARY PILLARS
- GRID LINES
- APPROACH ROAD
- BOUNDARY DISTANCE

1cm=15m 2cm=30m
0 10 20 30 40 50 60 70 80 90 100
SCALE:-1:1500

Plate No. - 2

Coordinate Plan

Lynti Dkhar Limestine Mine

Applicant
Smt. Idalis Ryngnga
Address: At-Sohbar Area, Sohbar Sirdarship
East Khasi Hills District, Meghalaya.

Applied Lease Area - 1.36 Ha

Applied Lease Area Located at - Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship,
East Khasi Hills District, Meghalaya.

Scale 1:1500

PREPARED BY: NOVOMINE INDIA PRIVATE LIMITED
QCI-NABET ACCREDITATION NO. NABET/APA-MPPA/IA/018

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

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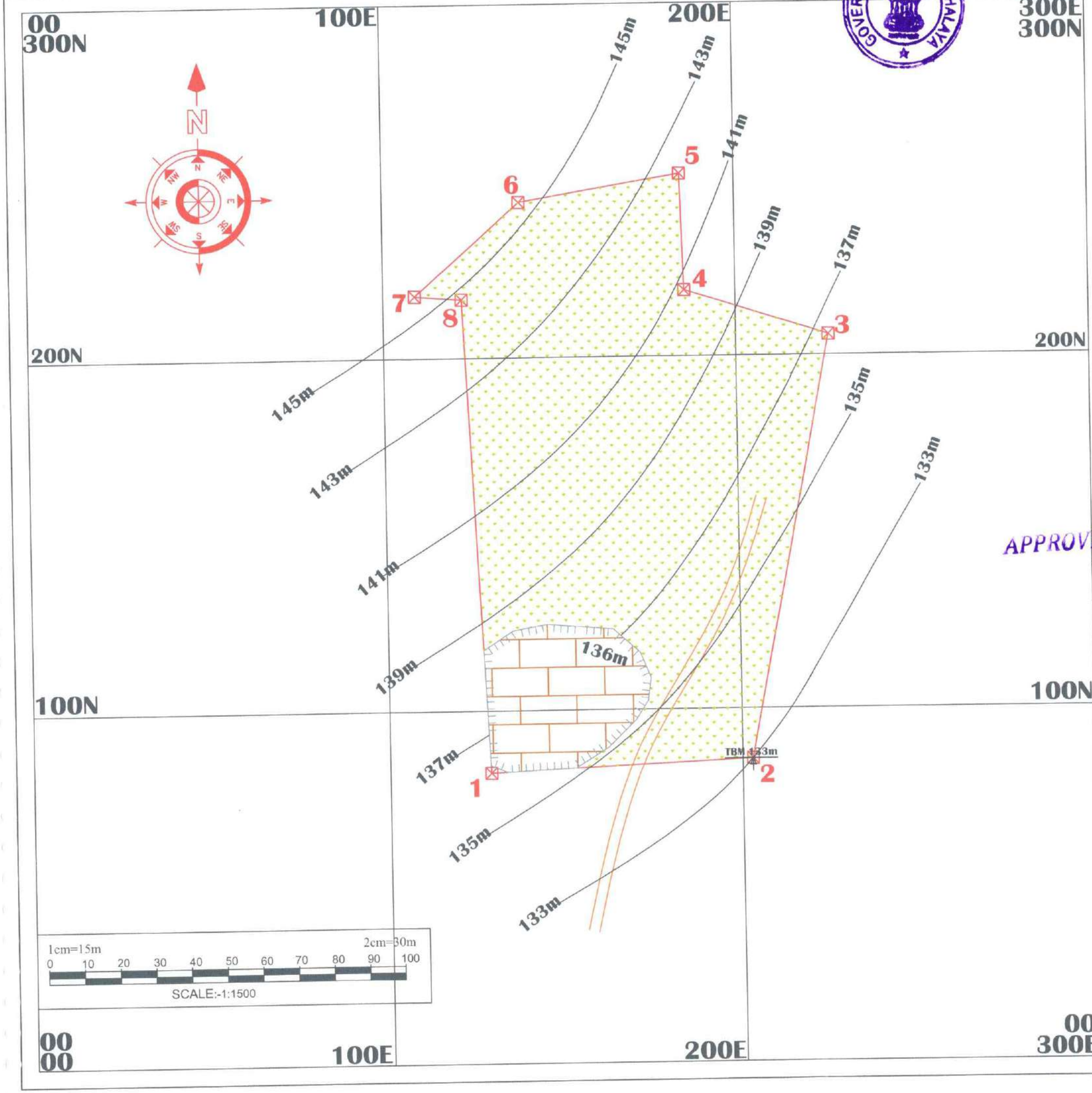
Reg No- RQP/KOL/377/2013/A



Coordinate of Pillars

Sl.No	Coordinates	
1	25°10'43.83"N	91°44'29.65"E
2	25°10'43.95"N	91°44'32.36"E
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7	25°10'48.19"N	91°44'29.03"E
8	25°10'48.19"N	91°44'29.48"E

INDEX

- APPLIED LEASE BOUNDARY
- GRID LINE
- CONTOUR LINE (139 / 137)
- TEMPORARY BENCH MARK (TBM 133m)
- APPROACH ROAD
- GRITTY SOIL
- LIMESTONE

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

APPROVED

Plate No. - 3

Surface Plan

Lynti Dkhar Limestine Mine

Applicant
Smt. Idalis Ryngnga
Address: At-Sohbar Area, Sohbar Sirdarship
East Khasi Hills District, Meghalaya.

Applied Lease Area - 1.36 Ha

Applied Lease Area Located at - Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship,
East Khasi Hills District, Meghalaya.

Scale 1:1500

PREPARED BY: NOVOMINE INDIA PRIVATE LIMITED
QCI-NABET ACCREDITATION NO. NABET/APA-MPPA/IA/018

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

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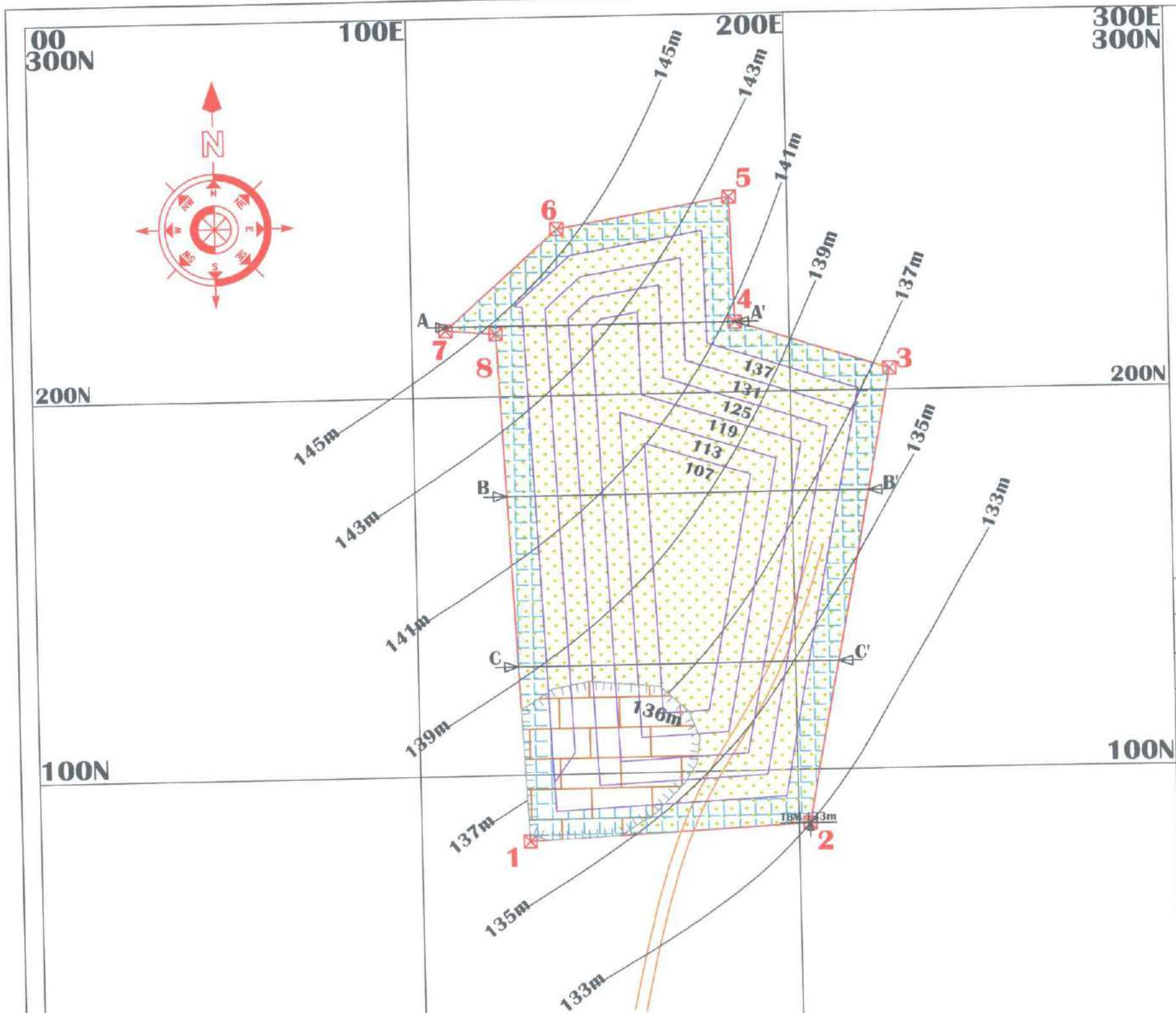
Reg No- RQP/KOL/377/2013/A



INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- GRID LINE
- CONTOUR LINE (145 / 143)
- TEMPORARY BENCH MARK (TBM 133m)
- APPROACH ROAD
- GRITTY SOIL
- LIMESTONE
- ULTIMATE PIT LIMIT

Plate No. - 4

Geological Plan & Section

Lynti Dkhar Limestine Mine

Applicant

Smt. Idalis Ryngnga
Address: At-Sohbar Area, Sohbar Sirdarship
East Khasi Hills District, Meghalaya.

Applied Lease Area - 1.36 Ha

Applied Lease Area Located at - Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya.

Scale 1:1500

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QCI-NABET ACCREDITATION NO. NABET/APA-MPPA/IA/018

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

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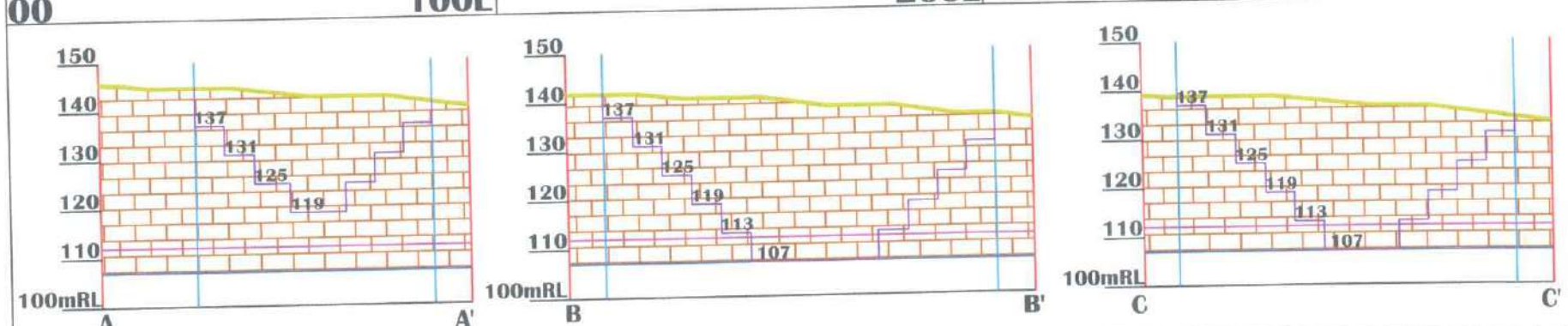
Reg No- RQP/KOL/377/2013/A



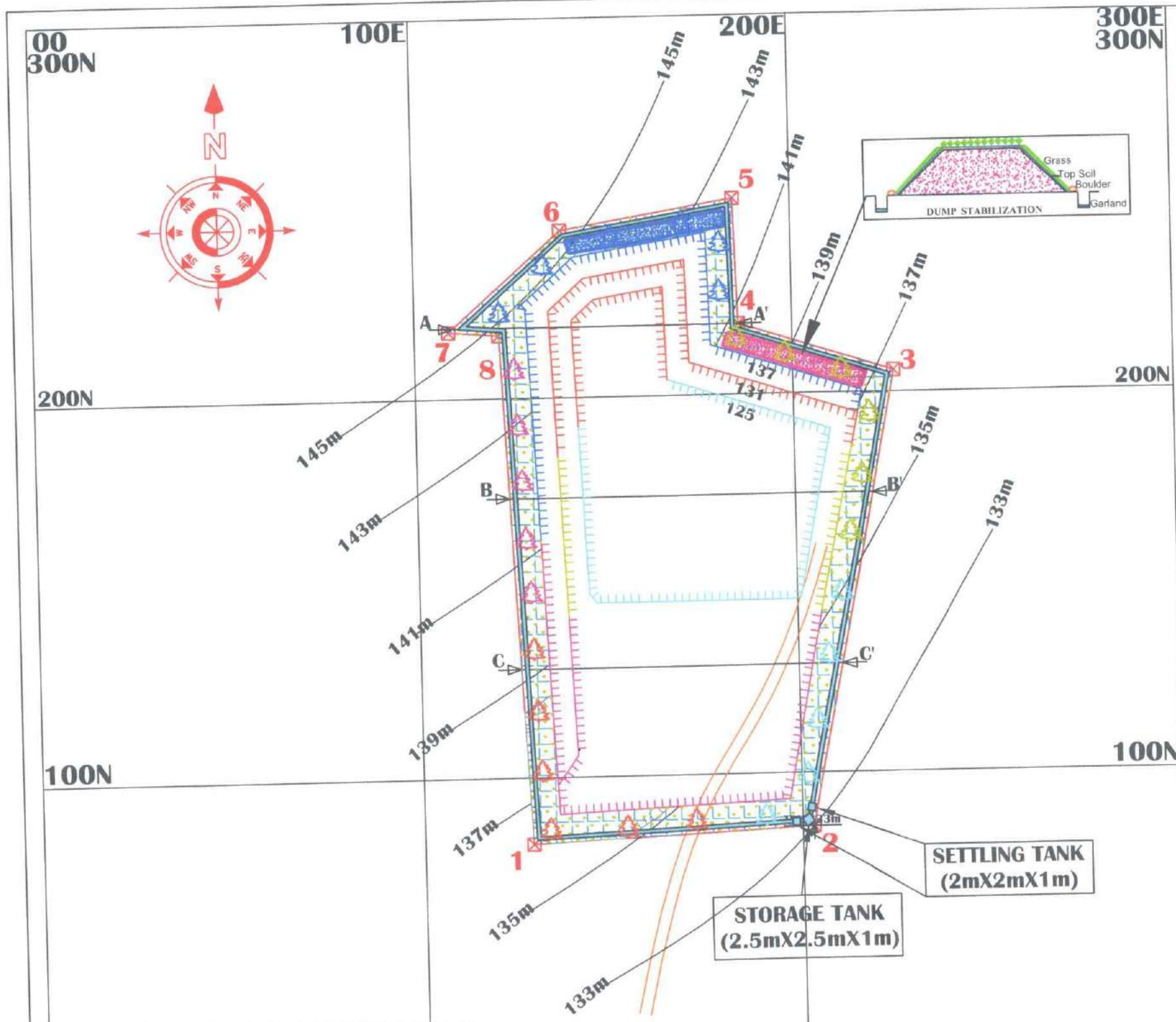
SECTION INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- SPOT LEVELS (137,131,...)
- GRITTY SOIL
- LIMESTONE
- ULTIMATE PIT LIMIT
- PROVED ZONE
- PROBABLE ZONE

GOVERNMENT OF MEGHALAYA

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong



INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- GRID LINE
- CONTOUR LINE (145 / 143)
- TEMPORARY BENCH MARK (TBM 133m)
- APPROACH ROAD
- GRITTY SOIL
- LIMESTONE
- ULTIMATE PIT LIMIT

	PROPOSED WORKING	PROPOSED PLANTATION	PROPOSED DUMPING	PROPOSED GARLAND DRAIN
1ST YEAR	✓	✓	✓	✓
2ND YEAR	✓	✓	✓	NA
3RD YEAR	✓	✓	NA	NA
4TH YEAR	✓	✓	NA	NA
5TH YEAR	✓	✓	NA	NA

Plate No. - 5

Development Plan & Section

Lynti Dkhar Limestine Mine

Applicant

Smt. Idalis Ryngnga
Address: At-Sohbar Area, Sohbar Sirdarship
East Khasi Hills District, Meghalaya.

Applied Lease Area - 1.36 Ha

Applied Lease Area Located at - Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya.

Scale 1:1500

PREPARED BY: NOVOMINE INDIA PRIVATE LIMITED
QCI-NABET ACCREDITATION NO. NABET/APA-MPPA/IA/018

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

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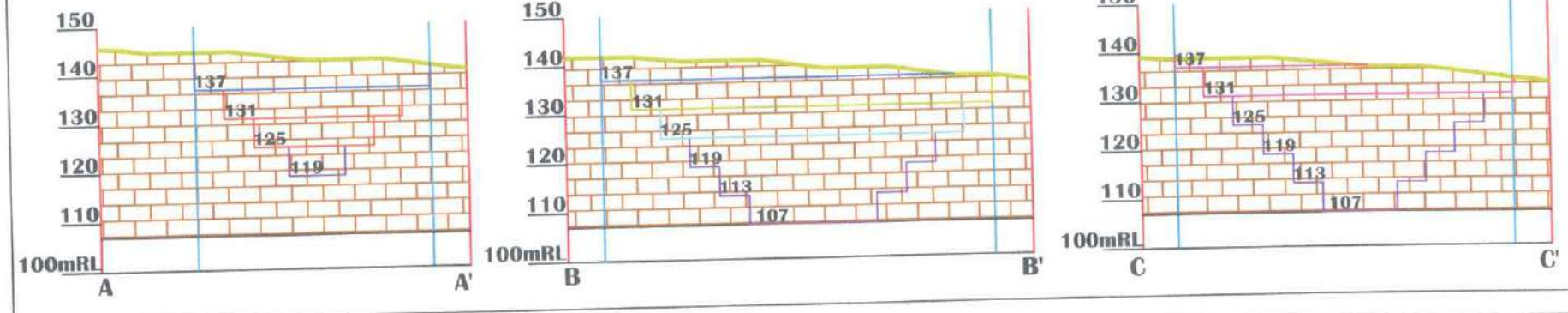
RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A



SECTION INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- 137,131,... SPOT LEVELS
- GRITTY SOIL
- LIMESTONE
- ULTIMATE PIT LIMIT

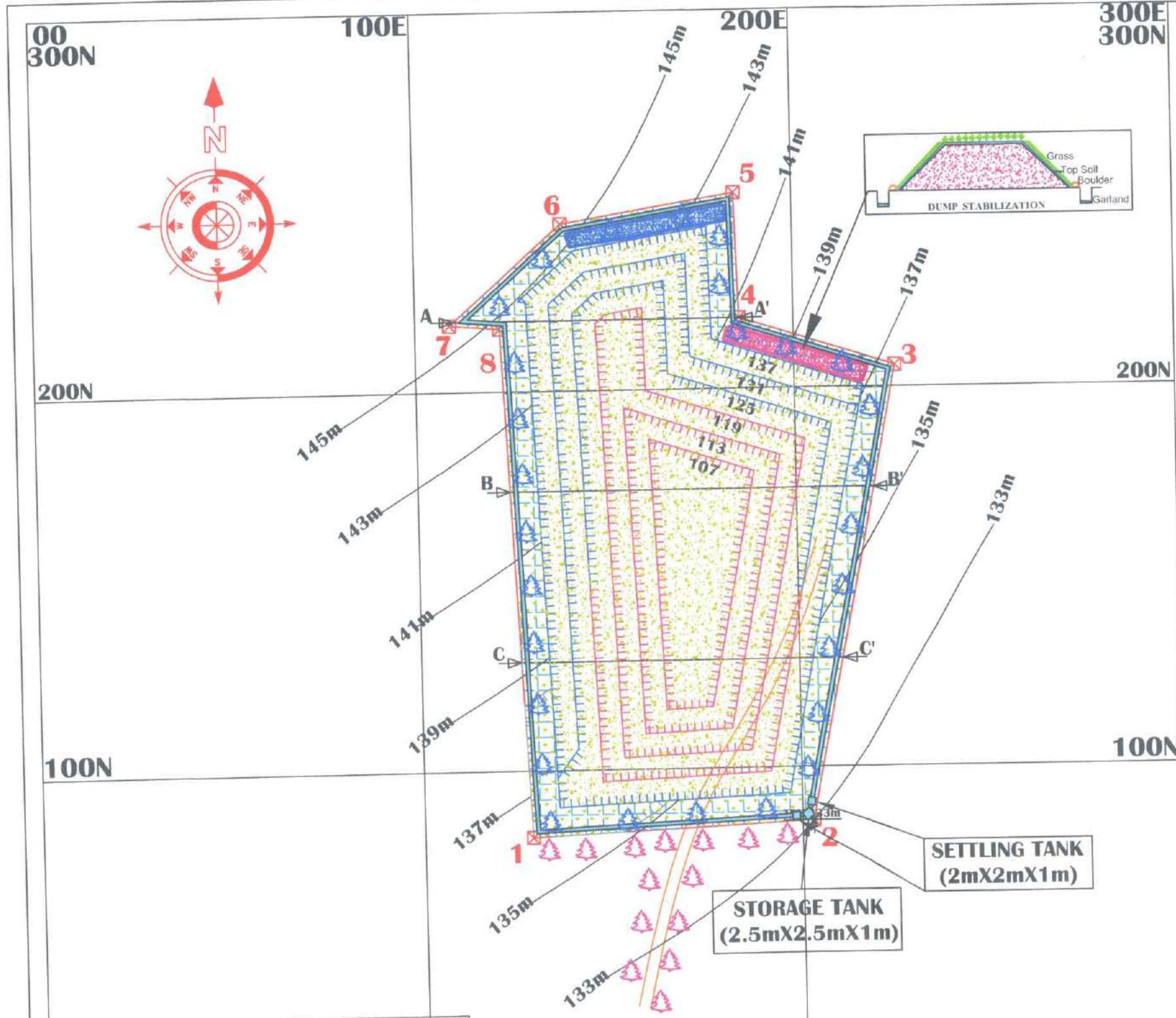
PROPOSED WORKING

- 1ST YEAR
- 2ND YEAR
- 3RD YEAR
- 4TH YEAR
- 5TH YEAR

GOVERNMENT OF MEGHALAYA

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong



INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- GRID LINE
- CONTOUR LINE (145 / 143)
- TBM 133m — TEMPORARY BENCH MARK
- APPROACH ROAD
- GRITTY SOIL
- LIMESTONE
- ULTIMATE PIT LIMIT

PLAN PERIOD PROPOSAL	CONCEPTUAL PROPOSAL
PROPOSED WORKING	PROPOSED WORKING
PROPOSED PLANTATION	PROPOSED PLANTATION
	PROPOSED DUMPING

Plate No. - 6

Conceptual Plan & Section

Lynti Dkhar Limestine Mine

Applicant

Smt. Idalis Ryngnga
Address: At-Sohbar Area, Sohbar Sirdarship
East Khasi Hills District, Meghalaya.

Applied Lease Area - 1.36 Ha

Applied Lease Area Located at - Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya.

Scale 1:1500

PREPARED BY: NOVOMINE INDIA PRIVATE LIMITED
QCI-NABET ACCREDITATION NO. NABET/APA-MPPA/IA/018

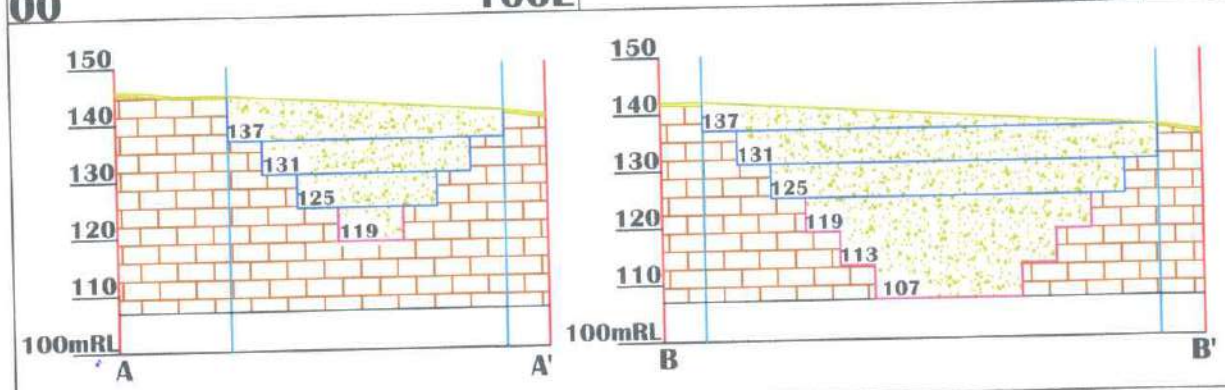
CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A

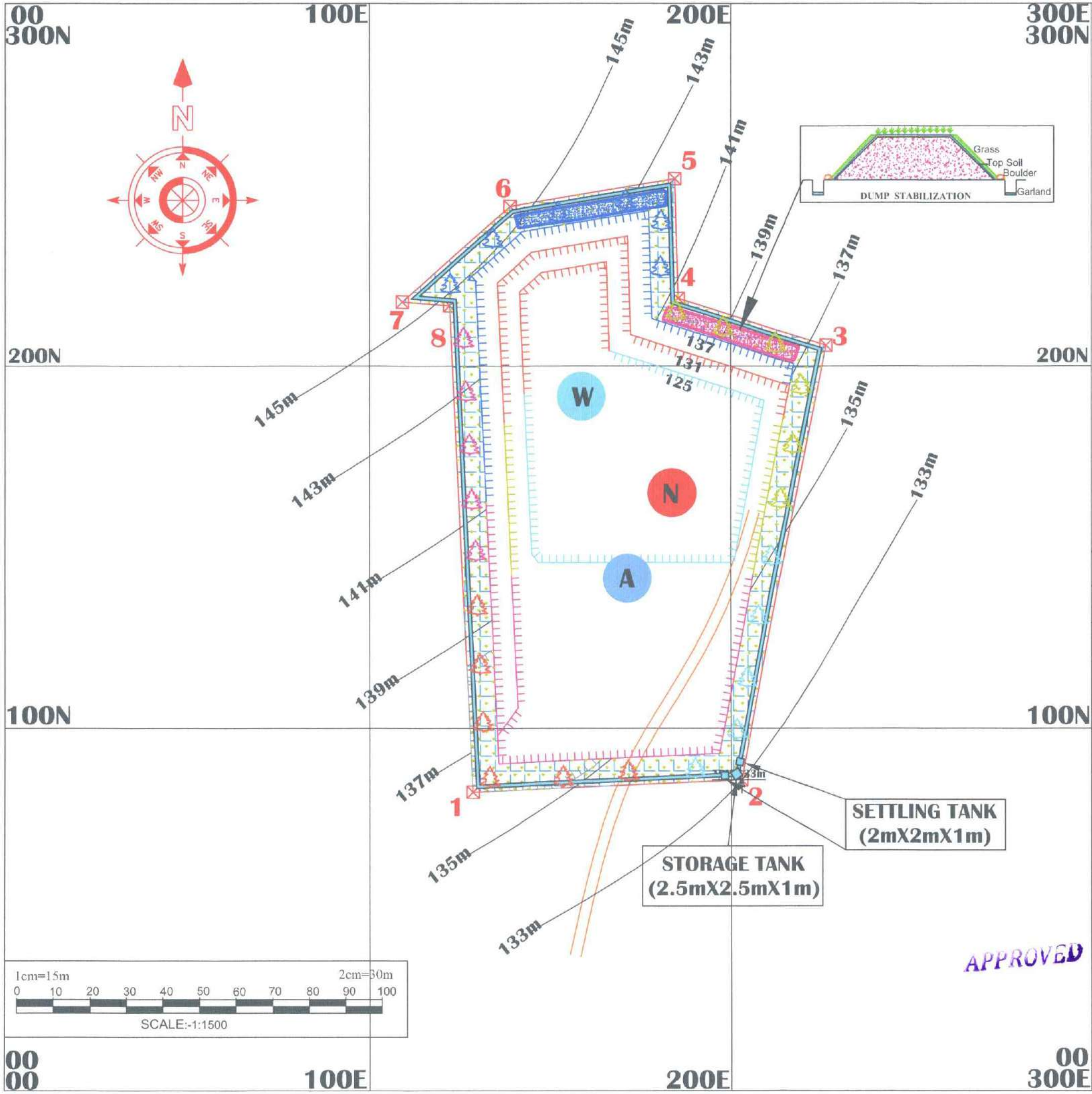
APPROVED

Mining Engineer
Directorate of Mineral Resour
Meghalaya, Shillon



SECTION INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- 137,131,... SPOT LEVELS
- GRITTY SOIL
- LIMESTONE
- ULTIMATE PIT LIMIT
- PROPOSED WORKING
- CONCEPTUAL WORKING
- CONCEPTUAL RECLAMATION



INDEX

	APPLIED LEASE BOUNDARY
	SAFETY BARRIER
	GRID LINE
145 143	CONTOUR LINE
TBM 133m	TEMPORARY BENCH MARK
	APPROACH ROAD
	GRITTY SOIL
	LIMESTONE
	ULTIMATE PIT LIMIT

MONITORING STATION	
A	AIR
N	NOISE
W	WATER

PROPOSED WORKING	PROPOSED PLANTATION	PROPOSED DUMPING	PROPOSED GARLAND DRAIN	
				1ST YEAR
			NA	2ND YEAR
		NA	NA	3RD YEAR
		NA	NA	4TH YEAR
		NA	NA	5TH YEAR

Plate No. - 7

Environment Management Plan

Lynti Dkhar Limestine Mine

Applicant

Smt. Idalis Ryngnga
Address: At-Sohbar Area, Sohbar Sirdarship
East Khasi Hills District, Meghalaya.

Applied Lease Area - 1.36 Ha

Applied Lease Area Located at - Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya.

Scale 1:1500

PREPARED BY: NOVOMINE INDIA PRIVATE LIMITED
QCI-NABET ACCREDITATION NO. NABET/APA-MPPA/IA/018

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A

GOVERNMENT OF MEGHALAYA

00 300N | 100E | 200E | 300E 300N

200N | 200N

100N | 100N

00 | 100E | 200E | 300E

N

145m 143m 141m 139m 137m 135m 133m

1 2 3 4 5 6 7 8

137 131 125

33m

DUMP STABILIZATION

Grass
Top Soil
Boulder
Garland

SETTLING TANK
(2mX2mX1m)

STORAGE TANK
(2.5mX2.5mX1m)

1cm=15m 2cm=30m
0 10 20 30 40 50 60 70 80 90 100
SCALE:-1:1500

INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- GRID LINE
- CONTOUR LINE (145 / 143)
- TBM 133m — TEMPORARY BENCH MARK
- APPROACH ROAD
- GRITTY SOIL
- LIMESTONE
- ULTIMATE PIT LIMIT

PLAN PERIOD PROPOSAL

- PROPOSED WORKING
- PROPOSED PLANTATION
- PROPOSED DUMPING

GOVERNMENT OF MEGHALAYA

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Plate No. - 9

Progressive Mine Closure Plan

Lynti Dkhar Limestine Mine

Applicant
Smt. Idalis Ryngnga
Address: At-Sohbar Area, Sohbar Sirdarship
East Khasi Hills District, Meghalaya.

Applied Lease Area - 1.36 Ha

Applied Lease Area Located at - Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship,
East Khasi Hills District, Meghalaya.

Scale 1:1500

PREPARED BY:	NOVOMINE INDIA PRIVATE LIMITED QCI-NABET ACCREDITATION NO. NABET/APA-MPPA/IA/018	NOVOMINE INDIA PVT. LTD.

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A

1. INTRODUCTION

1.1. Project Description

The proposed **Lynti Dkhar Limestone Mine** project is located at Ri-U-Siar, Lynti Dkhar Area, Sohbar Sirdarship, Shella Bholaganj C&RD Block, East Khasi Hills District. The total mine lease area is 1.36 Ha. Mining will be carried out by opencast semi-mechanized mining with drilling and blasting of limestone and single shift basis (as per approved Mining Plan). The salient features of the project are given below:

Table 1.1: Project Details

Description	Details
Name of the Project	Lynti Dkhar Limestone Mine
Type of Project	Opencast Semi-mechanized Limestone Mining Project
Geographical Extent	**Latitude:** 25°10'43.83"N to 25°10'49.27"N **Longitude:** 91°44'29.03"E to 91°44'33.20"E
Toposheet No.	78 O/12 (Restricted)
Project Area	1.36 Ha.
Elevation Range	133 mRL to 145 mRL
Seismic Zone	Zone V
Project Category	B1
Expected Life of Mine (LoM)	10 years
Extractable Mineral Reserve	505197 Tonnes
Peak Production	50544 Tonnes (During 5th year)
Production of Gritty Soil	4650 Tonnes (for LoM)
Depth of Quarry	16 m (During Plan period of 5 year)
No. of Working Days	300
Manpower	25
Water Demand	3.5 KLD
Sources of Water	Nearby Wah Tharia river via water tankers and direct-use plastic rainwater harvesting tank

1.2. Objectives and Scope of Work

The broad objectives are:

- To establish the ground water dynamics of the area through detailed hydrogeological explanations
- Institute relationships between various geo environmental parameters and ground water
- Quantification of ground water from underlying aquifers
- Assessment of likely impacts of ground water withdrawal on ground water regime of the area
- Suggest technically viable strategies/ plans for utilization of pumped water and ground water recharge measures

Hydrogeological study will be carried out for:

i. Establishing whether working will intersect the local groundwater table, and
ii. Preparing a comprehensive hydrogeological report of the core and buffer zones within a radius of 2 km and 10 km, respectively – including details of the aquifers present and impact of mining activities on these aquifers.

1.3. Approach and Methodology

In order to achieve the objectives and scope of work outlined above, a multidisciplinary approach has been adopted dovetailing the domain skill of hydrogeological and groundwater modelling giving equal opportunities so as to arrive at optimal strategy addressing the issues holistically. The methodology encompasses detailed hydrogeological investigation in and around the lease area, establishing aquifer extent and an optimal groundwater monitoring network for the surveillance of changes in water quantity and quality. Further, an attempt has been made to arrive at technically viable engineering interventions for water harvesting and groundwater recharge following the results of this report.

1.4. Location and Accessibility

SH 5 is located about 2.5 km towards NW of the proposed site. SH 5 connects the District HQ Shillong via NH 106. The nearest railway station, i.e., the Guwahati Railway Station is about 168 km towards the South from ML area via MDR 27. Shillong Airport which is the nearest airport from the lease area is about 103 km away towards NE direction via SH 5. Shella Bholaganj C&RD Block and Pynursla C&RD Block of East Khasi Hills District encompass the study area, excluding the portion within Bangladesh. A location map of the mine lease area and a google earth image of the study area are shown in **Figure 1** and **Figure 2**, respectively.

Table 1.2: Particulars of accessibility to the Mine Lease area

Description	Details
Nearest Town	Bholaganj/Majai village is about 3.0 km towards S direction from the ML area via MDR 27
Nearest Highway	SH 5 (aerial distance ~2.5 km, NW Direction)
Nearest Railway Station	Guwahati Railway Station (168 km by road via MDR 27, S Direction)
Nearest Airport	Shillong Airport (103 km by road via SH 5, NE Direction)

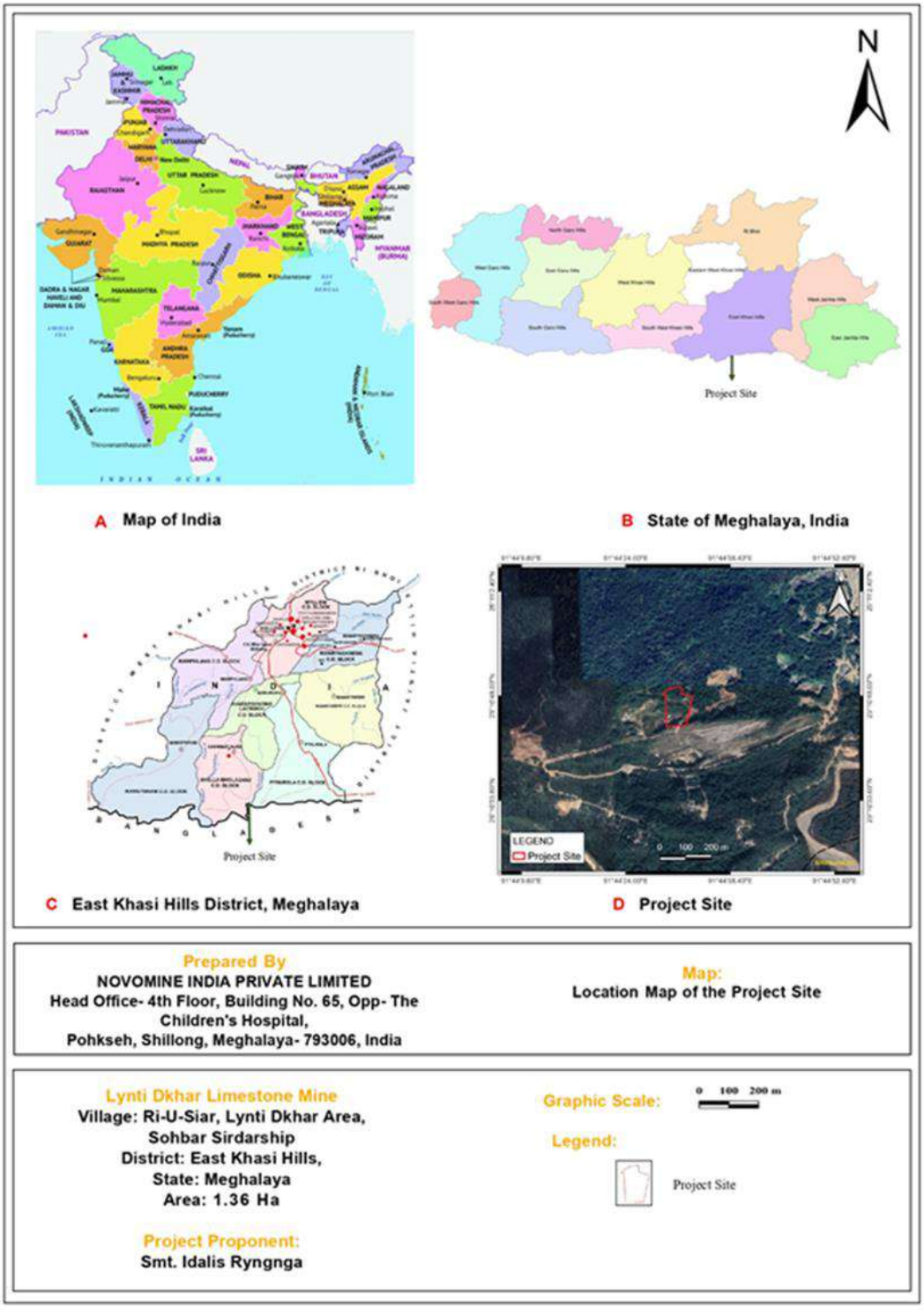


Figure 1: Location map of the Study Area

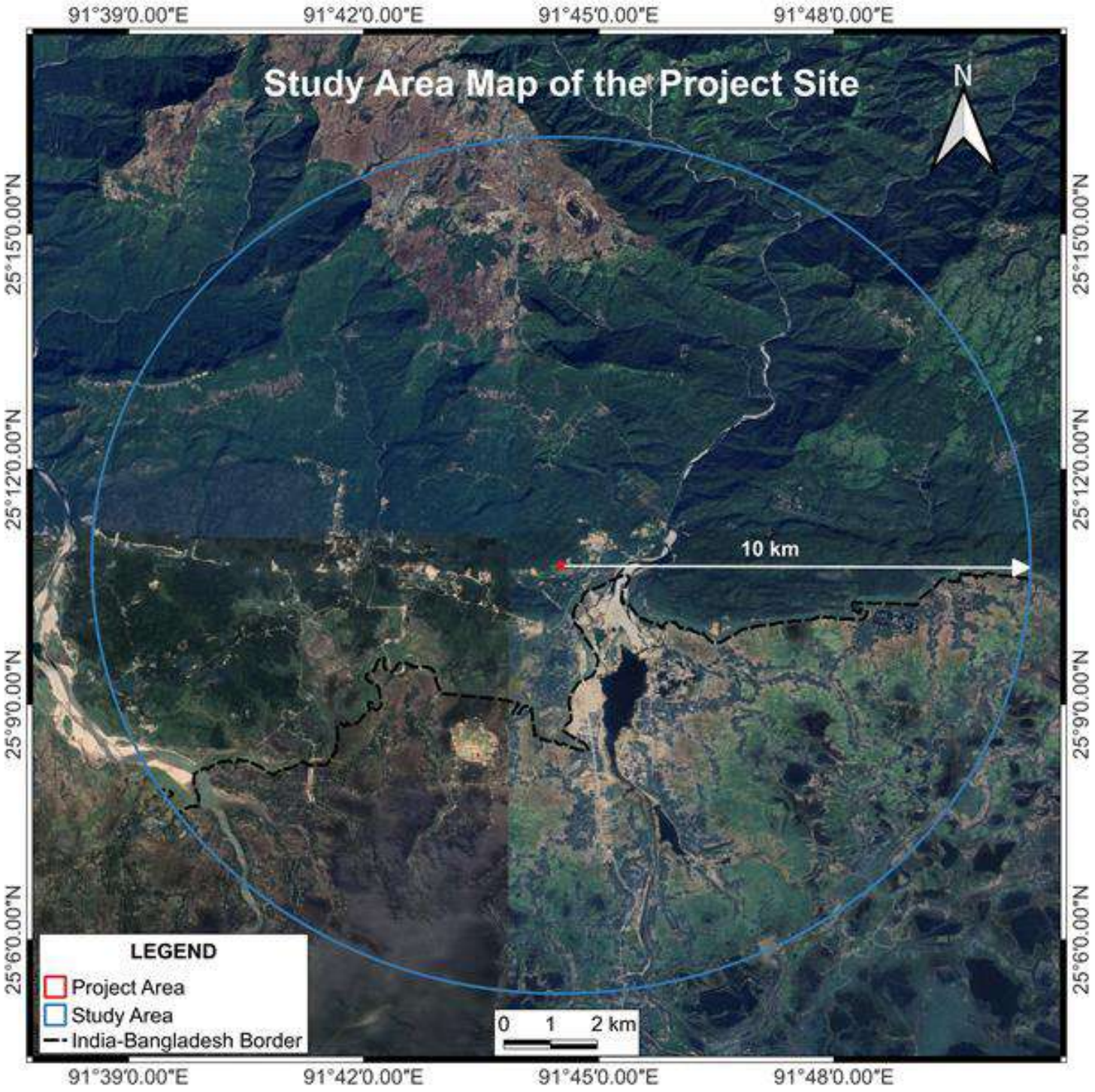


Figure 2: Study Area Map of the Project Site

1.5. Land Use and Land Cover of the Surrounding Area

Land use pattern of the study area:

Existing land use in the study area has been studied through satellite image processing *(SENTINEL-2B, MSI of March, 2024)*. According to the area's land use and land cover (LULC) classification, the predominant land use in the study area is vegetation, which is occupying 82.84% of the study area. Followed by 6.12% of barren land, 4.65% of agricultural land, 3.42% area of built-up area, 1.73% of waterbodies, 1.17% of mining area, and rest is area under plantation. Details of LULC of the study area and pie diagram are given below:

LULC Types	Area (Ha)	%
Built-up Area	716.23	3.42
Mining	244.78	1.17
Waterbodies	361.37	1.73
Barren/ Rocky/ Fallow Land	1281.74	6.12
Agricultural Land	974.24	4.65
Vegetation Area	17338.38	82.84
Plantation	13.54	0.07
Total Area in hectare	**20930.28**	**100.00**

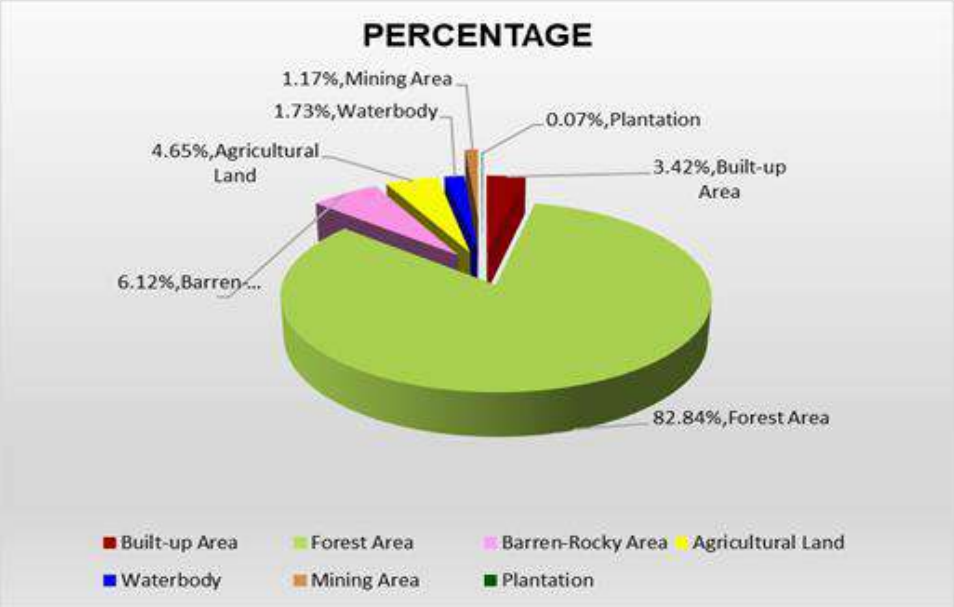


Figure 3: Land-Use Break-Up (%) of the Study Area

The land use land cover pattern of the study area as deciphered from satellite imagery is given in **Figure 4**.

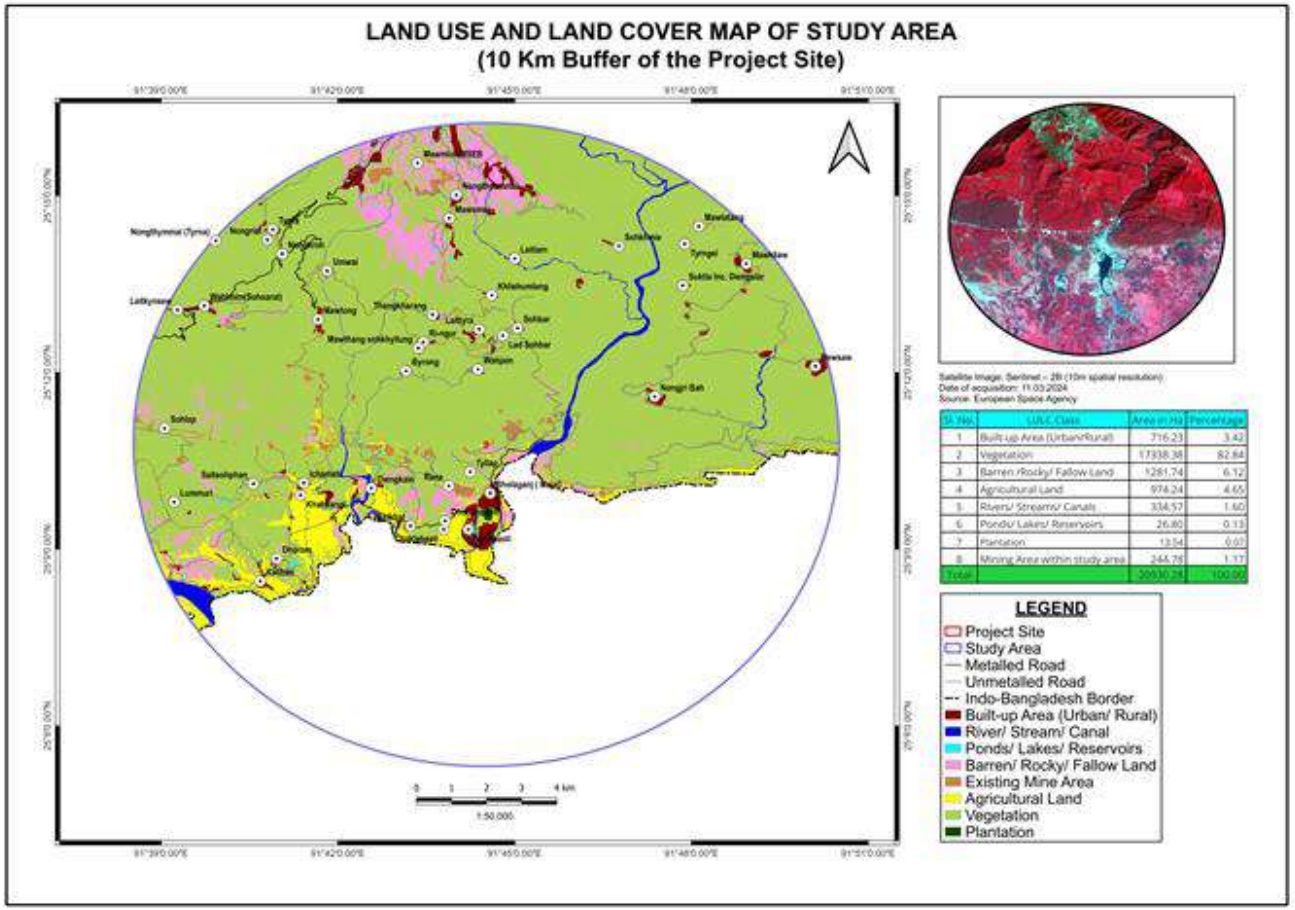


Figure 4: Land Use Land Cover Map of the Study Area

1.6. Climate and Rainfall

The climate of the district ranges from temperate in the plateau region to the warmer tropical and sub-tropical pockets on the Northern and Southern regions. The whole of the district is influenced by the south-west monsoon which begins generally from May and continues till September. The weather is humid for the major portion of the year except for the relatively dry spell usually between December and March. (https://eastkhasihills.gov.in/district-profile/)

Rainfall:

Due to the fluctuations of meteorological data with time, interpretations are only valid for long-term reliable data sources such as the IMD (India Meteorological Department), Directorate of Agriculture, Government of Meghalaya, Ministry of Jal Shakti, Government of India. The nearest Automatic Weather Station (AWS) and Automatic Rain Gauge Station (ARG) is in Shillong, approximately 44 km from the project boundary.

The annual patterns of rainfall in the area during last 5 years from 2019 to 2023 have been shown in the following table and graphical figure. The average annual rainfall is 1956.4 mm.

Table 1.3: Rainfall distribution at the observatory station in Shillong, East Khasi Hills

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2019	0.3	14	27.6	212	212.4	273.8	486.8	133.8	136.4	232.8	2.8	0.8	**1733.5**
2020	16.5	19.3	25.9	183.4	438.7	552.2	704.0	12.5	697.0	260.2	4.7	0.6	**2915.0**
2021	0.0	1.0	41.5	82.4	232.7	229.8	352.4	443.9	196.2	108.0	0.0	35.9	**1723.8**
2022	16.6	37.2	11.7	113.7	590.1	612.8	207.6	205.5	253	274.4	2.1	7.6	**2332.3**
2023	0.0	0.0	164.0	35.0	123.0	54.5	186.0	271.5	229.0	9.0	5.5	0.0	**1077.5**
Ave	**6.7**	**14.3**	**54.1**	**125.3**	**319.4**	**344.6**	**387.4**	**213.4**	**302.3**	**176.9**	**3.02**	**9.0**	**1956.4**

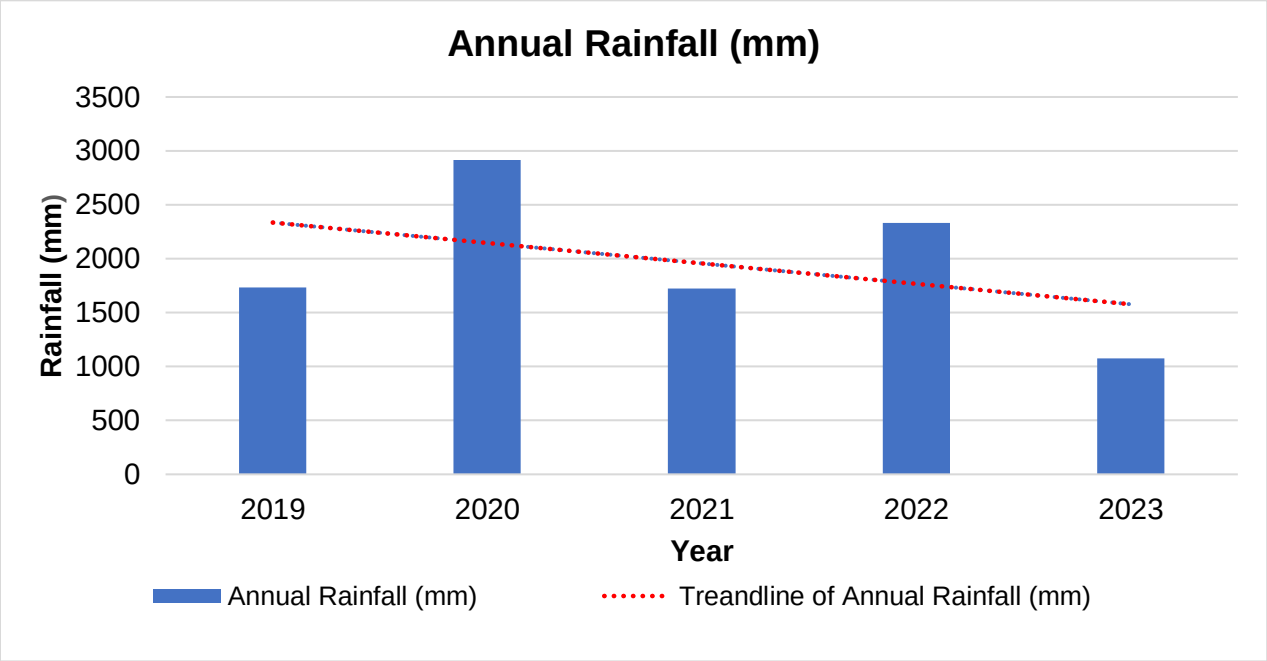


Figure 5: Graphical Representation of Annual Rainfall in the area with trendline

1.7. Soil

Soil type of an area is dependent on factors like geology, relief, climate and vegetation. In the central part of the district, red loamy soil rich in organic matter, nitrogen, clay forming minerals, and acidic in nature, are found. Laterite soil is a weathering product of rocks and is found exposed in the northern area of East Khasi Hills. Alluvial soils are found exposed in the southern part of the district that are rich in potash but poor in phosphate content. They are acidic in nature. The acidic character is due to leaching of bases caused by high rainfall. The study area lies within the southern part of the district. The soil texture of the study area varies from sandy to clayey-loam with varying degree of nitrogen and is acidic in nature. The soils are rich in potash but poor in phosphate content. (*Source: Report on "Aquifer Mapping and Management Plan of East Khasi Hills District, Meghalaya" (AAP 2018-19), CGWB)*. A soil map of the study area is given in **Figure 6.**

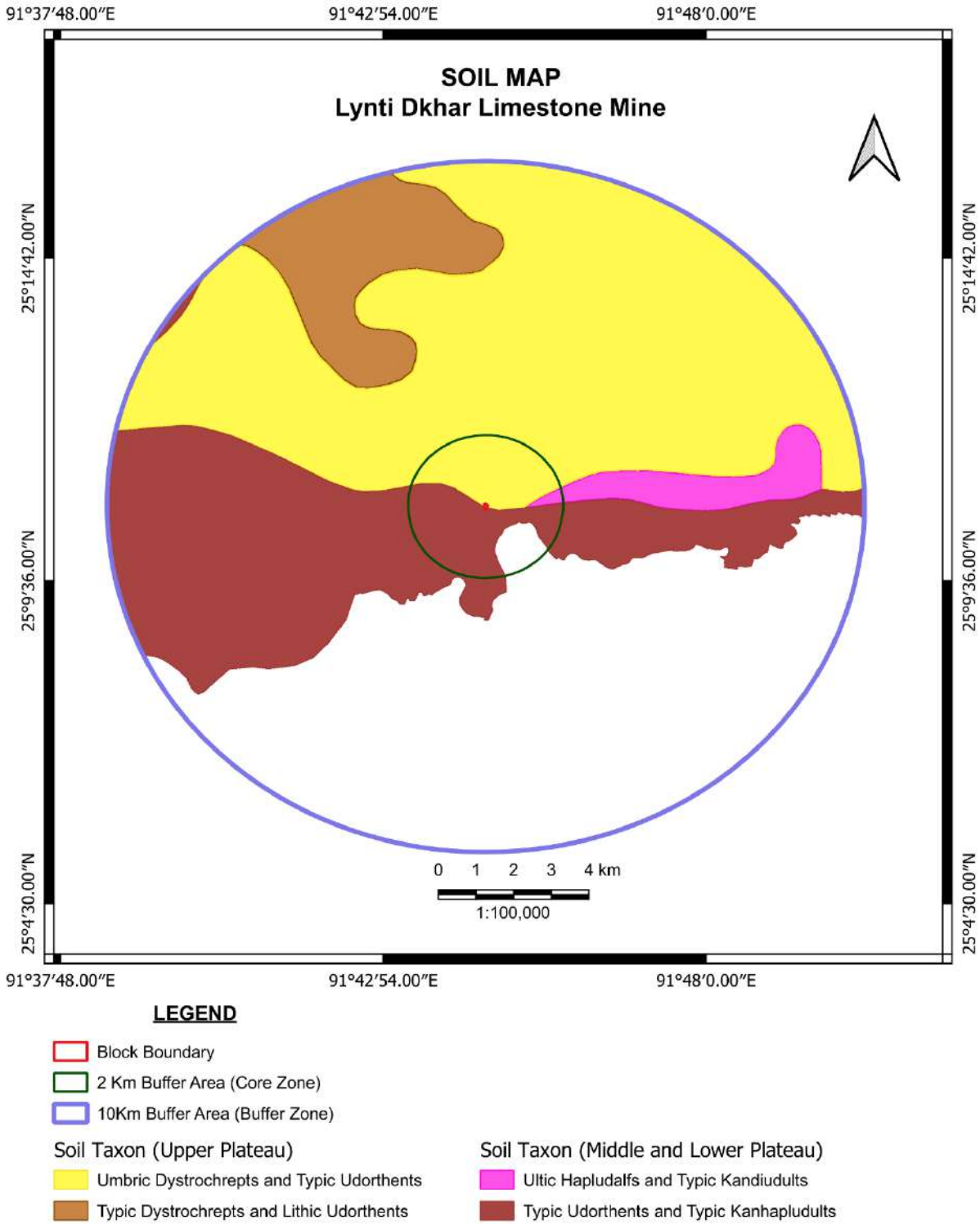


Figure 6: Soil map of the core zone and surrounding areas

1.8. Topography and Drainage

The topography controls the drainage system as it divides the state of Meghalaya into two watersheds namely the Brahmaputra system in the North and Meghna/ Surma system in the South. Drainage of the East Khasi Hills district in the north flows toward the Brahmaputra River and in the south, the rivers flow towards the Bangladesh plains into Surma River. The general topography around the block is of a dissected hilly terrain type. This is determined by the general ground slope. In the proposed block, elevation difference is noted from 82 meters to 56 meters. In the study area, rives Umstew, Um Rew, Um Sohryngkew, Um Sohra and Umiew (or Bagra) etc are flowing within the study area.

There is no naturally-occurring surface water body in the mine block. The nearest surface water body is the Tharia river that flows from North to South at a distance of about ~1.1 km SE direction from the project boundary. The topography map with drainage, and geomorphology map of the study area are given in **Figure 7**, and **Figure 8**, respectively.

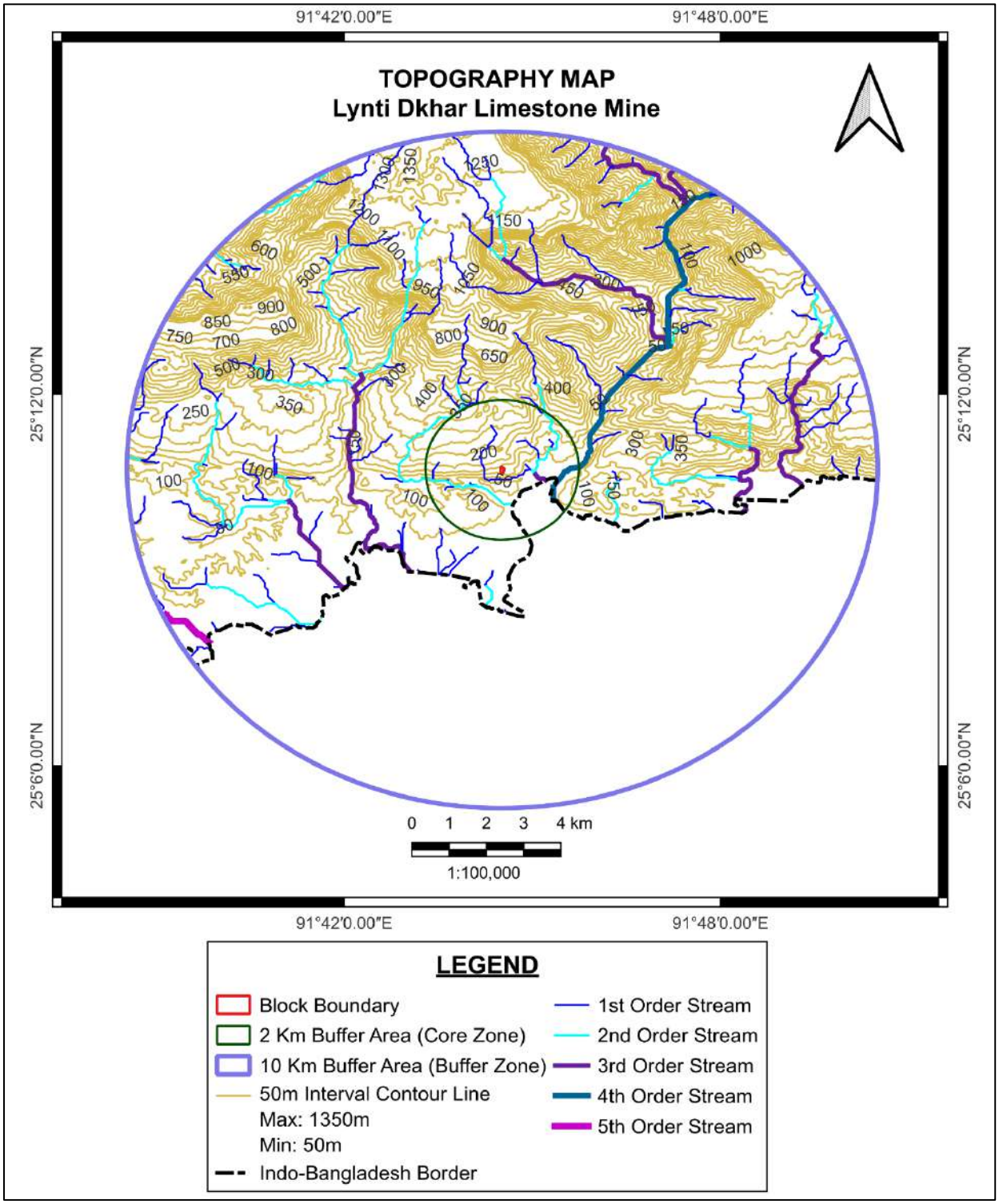


Figure 7: Topography Map of the Study Area

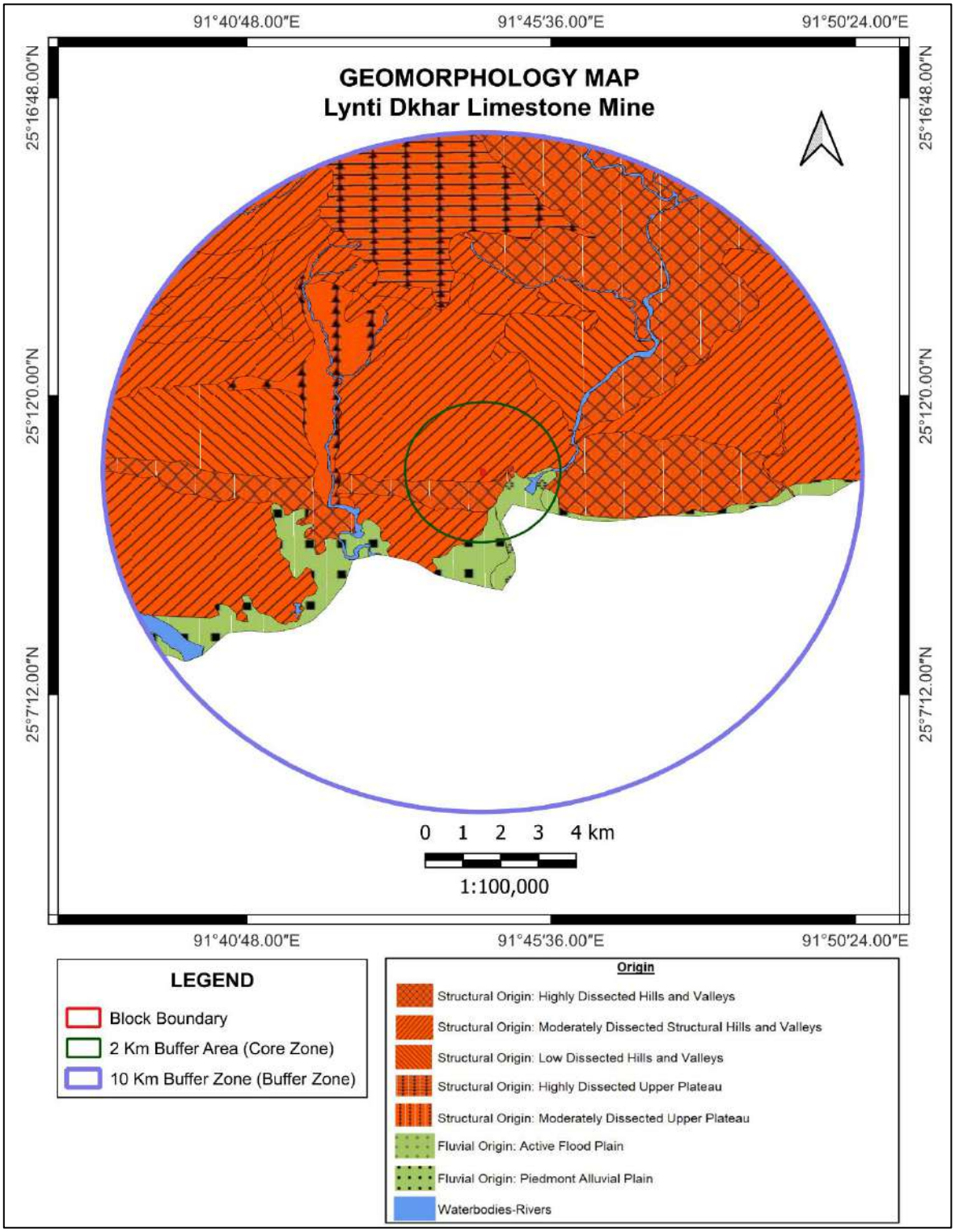


Figure 8: Geomorphology Map of the Study Area

2. GROUNDWATER SITUATION IN THE STUDY AREA

2.1. Regional Geology

In a regional scale, the area forms a part of the Meghalaya Plateau exposing geological milieu representing Precambrian to Tertiary sequence in this part of East Khasi Hills District of Meghalaya.

2.2. Regional Structure

Based on the Geology and Mineral Resource of Meghalaya, 3rd Revised Edition, 2023 and DRM of East Khasi Hills, 2023 published by GSI, Regional stratigraphic succession and geology of the study area is presented below:

Geological Age	Group	Formation	Member	Lithology
Quaternary	Quaternary	Undifferentiated quaternary		Undifferentiated fluvial sediments – sand, silt and clay
Eocene to Palaeocene	Jaintia	Kopili		Sandstone, siltstone, shale & phosphatic nodules
		Shella	Sylhet Sandstone	Fossiliferous limestone/calcareous shale-sandstone
				Arkose/ gritty sandstone, clay & shale
				Arkose/ gritty sandstone, coal, fireclay and shale
Palaeocene to Upper Cretaceous		Langpar		Sandstone, limestone and calcareous shale
Cretaceous	Khasi	Jadukata		Gritty sandstone alternating with conglomerate
	Sylhet Traps			Basaltic/ gabbroic & doleritic dykes
				Basalt
Mesoproterozoic to Palaeoproterozoic	Shillong			Quartzite with thin phyllite interbands
Proterozoic	Assam – Meghalaya Gneissic Complex			Calc gneiss
				Biotite gneiss

2.3. Local Geology

The proposed mining area is small and exposes only the limestone of the Sylhet Limestone Formation. The table below provides a glimpse of the geology that is seen in the area:

Geological Age	Group Name	Formation Name	Summarized rock types
Recent	Newer alluvium	Unclassified	Unconsolidated soil, scree material
Eocene	Jaintia	Sylhet (=Shella)	Top part with grey/white limestone Bottom part with dark /steel grey limestone.

A Geological Map of the study area is shown in **Figure 9**.

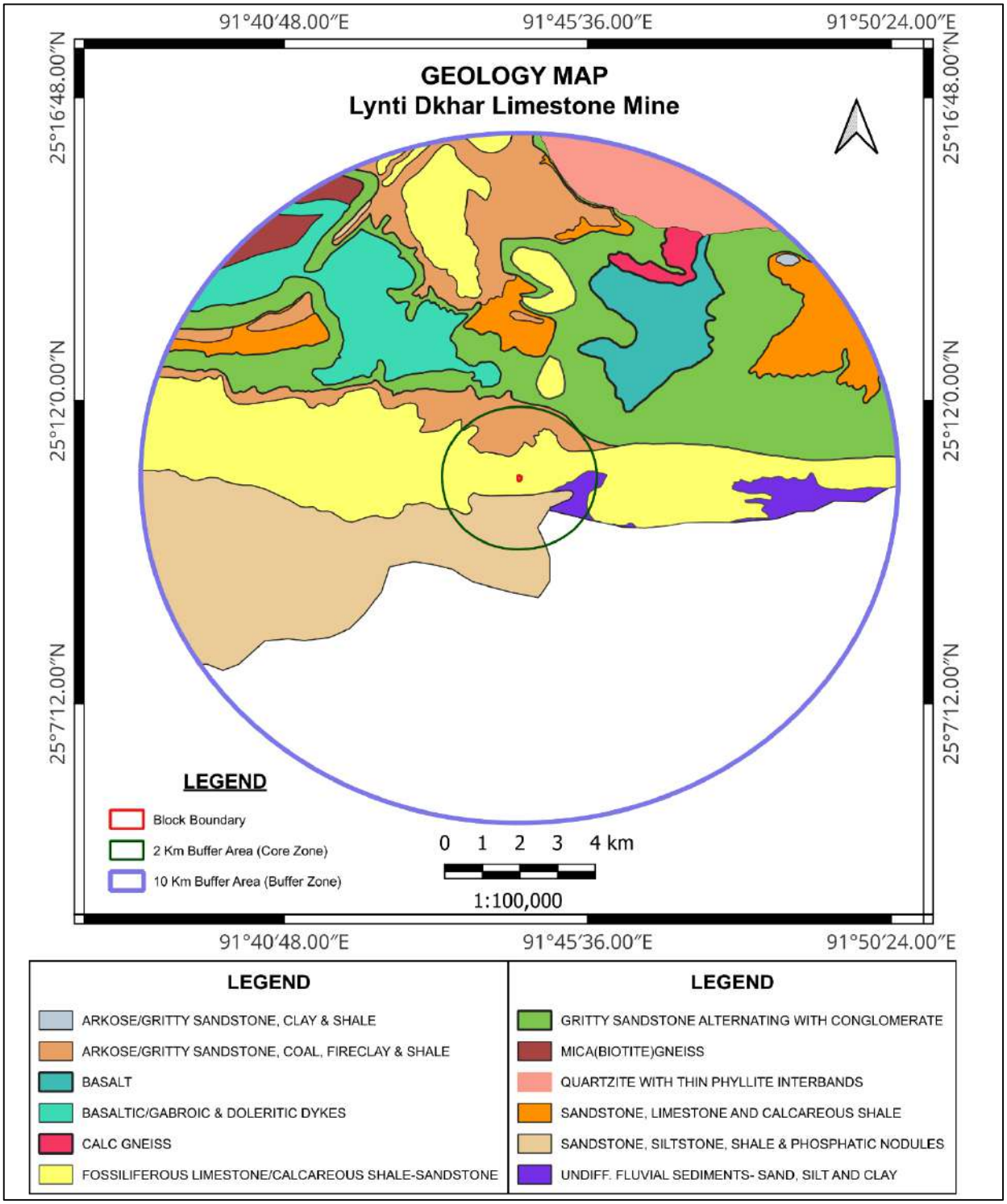


Figure 9: Geological Map of the study area

2.4. General Hydrogeology and Occurrence of Groundwater

The hydrogeological formation of the study area comprised of Quartzite of Palaeo-Meso-Proterozoic, sandstone/ limestone of Ecocene to Upper Cretaceous. The presence of weak planes like fractures and joints in these hard rock formation forms the principal aquifer in the district. The ground water in the district occurs under unconfined, semiconfined to confined conditions. The principal aquifers present in the study area is shown in **Figure 10**.

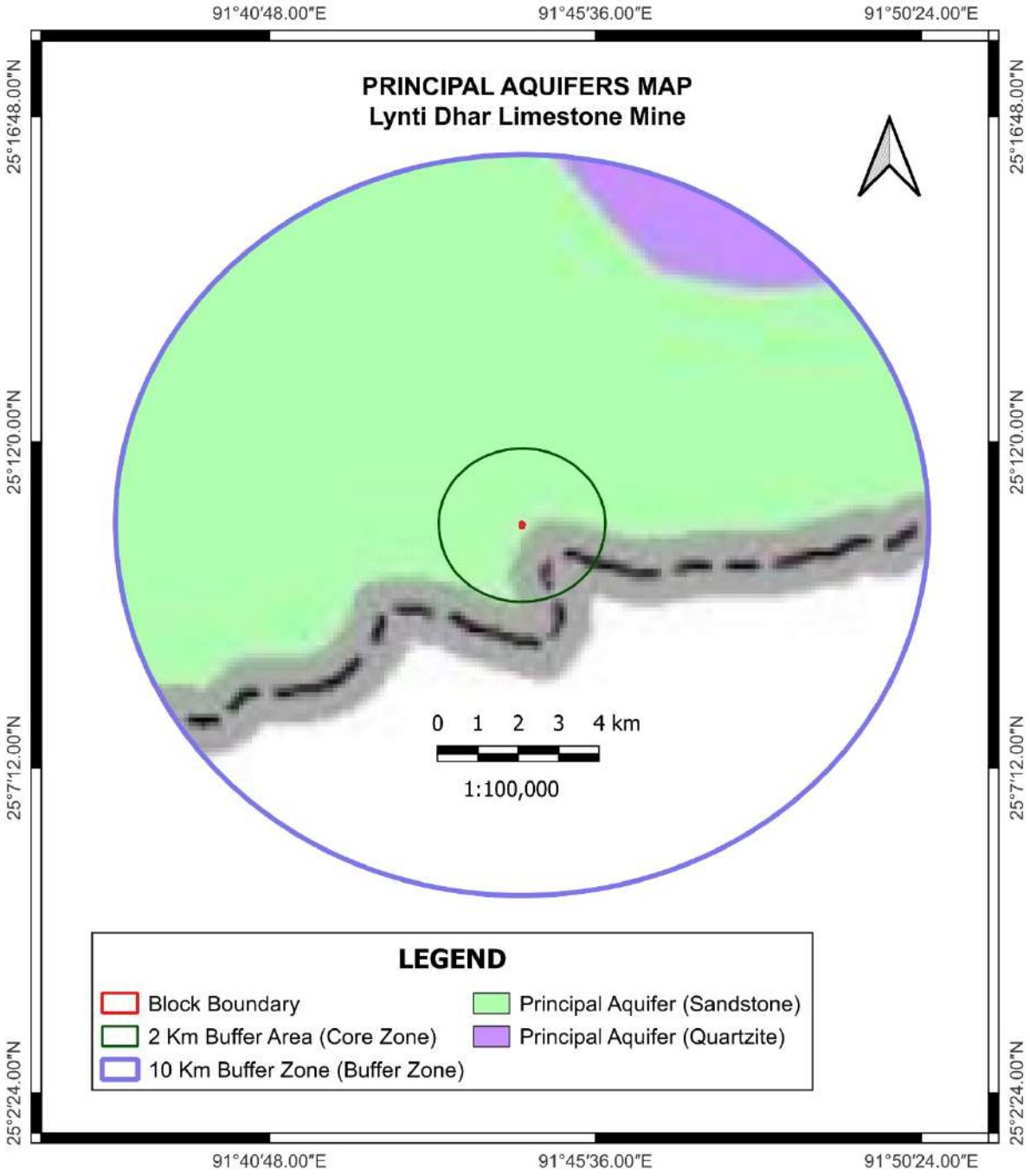


Figure 10: Principal Aquifers Map of the Study Area

Occurrence of ground water in the East Khasi Hills district is mainly in weathered and fractured Gneissic, Granite pluton Quartzite formation. The aquifer system in this district can be divided as a two aquifer system viz., first aquifer (shallow) and second aquifer (deeper). Shallow or first aquifer consists of weathered residum where ground water occurs under water table condition and is mainly developed through construction of dug wells. The depth of shallow aquifer in the district ranges from 1.5 to 10.74 meters. The second aquifer/ deeper aquifer occurs as semi-confined to confined condition where ground water is found in the fractured zone and is mainly developed through boring and construction of tubewells. Based on the study of litholog and analysis of depth of construction of dug wells and bore wells, it is found that the first aquifer occur within 2 to 35 m bgl. Ground water in the second aquifer occurs under semi-confined to confined condition in the fractures upto the maximum explored depth of 247.6 m bgl. Study of springs was also carried out in the study area. Most of these springs are defined as depression and topographic or fractured springs. It is observed that the discharge of springs in this area ranges from 0.6 to 240 litre/minute during pre-monsoon and 3 to more than 360 litre/minute during post-monsoon season. The lithologs of exploratory well (EW) at NIT, Cherrapunji in Shella Bhlolaganj C&RD Block near the mine lease area is provided below:

Table 2.1: Litholog of EW at Shella Bhlolaganj (25°15'01" N and 91°44'39" E)

Depth Range (m b.g.l)		Thickness (m)	Litholog
From	To		
0	2.0	2.0	Topsoil, reddish brown in colour
2.0	4.0	2.0	Sandstone, weathered, sample cuttings are fine grained size, greyish brown in colour
4.0	22.0	18.0	Sandstone, compact, sample cuttings are fine grained size, greyish brown in colour.
22.0	22.5	0.5	Sandstone, fractured, sample cuttings are fine grained size, grey in colour.
22.5	68.68	46.18	Sandstone, compact, sample cuttings are fine to medium grained size, grey in colour
68.68	69.68	1.0	Limestone, fracture (Dry), sample cuttings are fine grained size, grey in colour
69.68	111.59	41.91	Limestone, compact, sample cuttings are fine to medium grained size, grey in colour

2.5. Aquifer Parameters

The Sandstone covers the major part of the study area. The occurrence of ground water in sandstone is largely controlled either by weathering and or by fractures patterns. This aquifer system comprises of limestone in which ground water occurs owing to secondary porosity viz. fracture, solution cavity etc. This aquifer is not very common and is confined to Shella Bholaganj block. ***(Source: Report on "Aquifer Mapping and Management Plan of East Khasi Hills District, Meghalaya" (AAP 2018-19), CGWB)***

2.6. Groundwater Level

From the report on "Aquifer Mapping and Management Plan of East Khasi Hills District, Meghalaya" (AAP 2018-19), CGWB, it is observed that groundwater level data ranges between 4.48 to 6.63 m bgl in an EW at NIT, Cherrapunji. The water level trend has not shown any significant decline.

Pre-monsoon and post-monsoon water table contour maps in the study area are given in **Figure 11** above and **Figure 12** below.

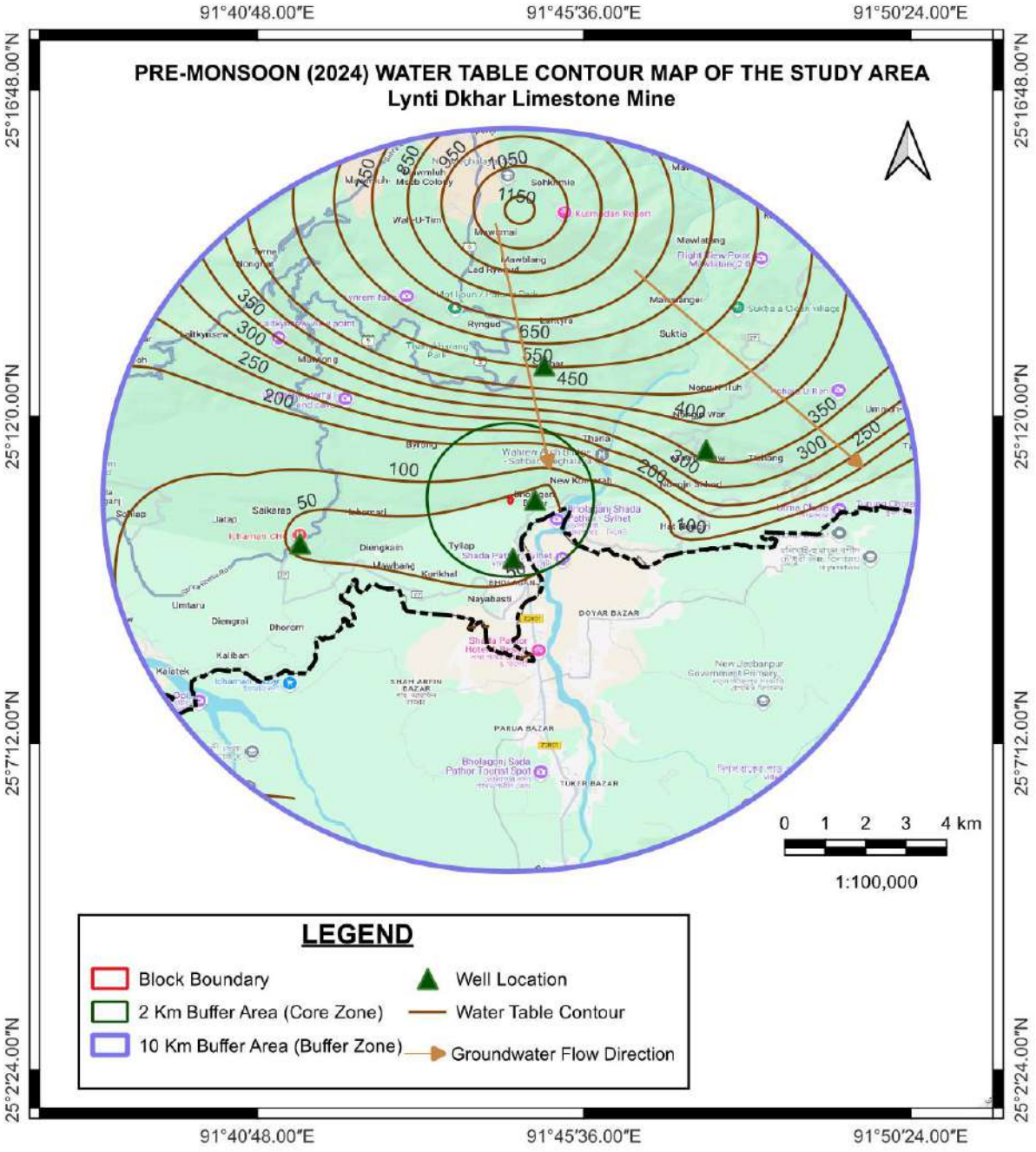


Figure 11: Pre-monsoon (2024) water table contour map of the Study Area

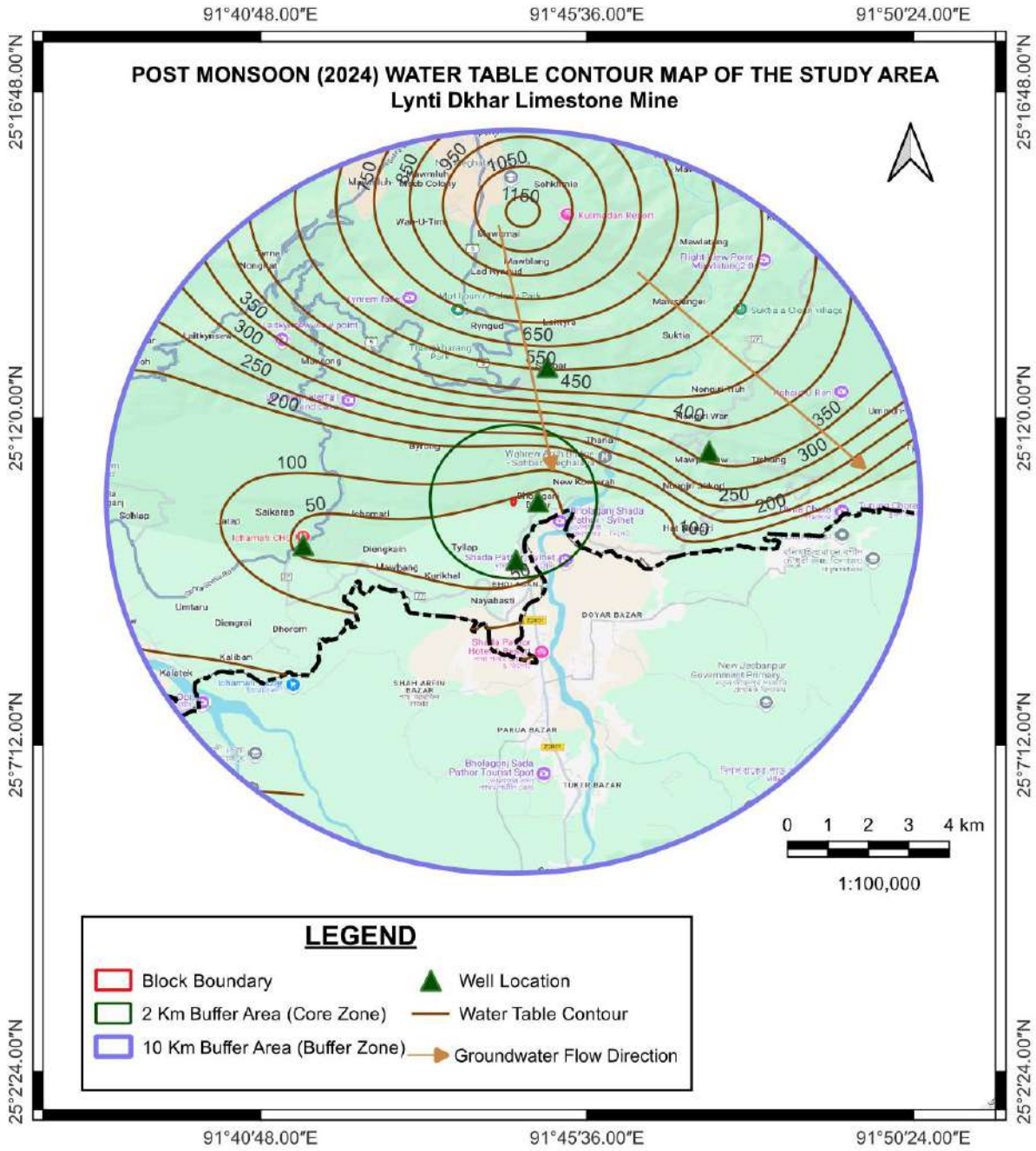


Figure 12: Post-monsoon (2024) water table contour map of the Study Area

2.7. Water Quality

Groundwater samples were collected from five locations of the study area. The groundwater quality analysis was done for all the samples and analysis report was prepared and presented in the following Table. The pH of groundwater samples varies from 6.6 to 7.3. The TDS varies from 146.2 to 157.5 mg/L.

Table 2.2: Groundwater analysis results in the study area (March 2024 - May 2024)

Parameters	Unit	Permissible Limit*	Ground Water Samples				
			GW1	GW2	GW3	GW4	GW5
pH	-	6.5 to 8.5	6.6	7.1	7.3	6.7	6.9
Total Dissolved Solid	mg/l	500 (2000)	148.1	146.2	157.5	152.8	155.6
Electrical Conductivity at 25°C	µS/cm	-	244.9	243.7	262.5	254.7	259.3
Total Hardness ($CaCO_3$)	mg/l	300 (600)	68.6	69.3	77.5	68.1	70.0
Total Alkalinity ($CaCO_3$)	mg/l	200 (600)	89.2	77.0	82.0	81.3	84.3
Chloride as Cl^-	mg/l	250 (1000)	42.1	43.5	46.6	42.9	44.2
Sulphate as SO_4^{2-}	mg/l	200 (400)	7.2	8.5	9.8	10.1	9.7
Calcium as Ca^{2+}	mg/l	75 (200)	21.8	21.8	23.6	21.5	22.6
Magnesium as Mg^{2+}	mg/l	30 (100)	3.7	3.6	4.5	3.5	3.3
Iron as Fe	mg/l	0.3 (1)	0.21	0.22	0.24	0.21	0.20

***Standard: IS 10500: 2012**

Ground water sampling stations:

GW1: Lynti Dkhar area (0.55 Km, E Direction from the Project Site)
GW2: Bholaganj (1.5 Km, S Direction from the Project Site)
GW3: Ichamati (5.27 Km, WSW Direction from the Project Site)
GW4: Sohbar (3.67 Km, NNE Direction from the Project Site)
GW5: Nongjri Nongbah (4.95 Km, ENE Direction from the Project Site)

2.8. Groundwater Resource

Dynamic Groundwater Resources of the study area has been estimated based on the methodology recommended by Groundwater Estimation Committee (GEC'97). As per the AAP 2017-18, CGWB report of East Khasi Hills district, the net ground water availability assessed as 9569 ham (Hectare meter) and the stage of ground water development as 2.45% which indicate the study area falls under **'SAFE'** category. The details of the resource available for the block is given in the following table.

Table 2.4: Recharge from various sources (ham) in East Khali Hills district (2017-18)

District	Recharge from rainfall (ham)	Return flow from Surface water Irrigation (ham)	Return flow from Ground water Irrigation (ham)	Recharge from ponds & tanks (ham)	Total recharge from other sources (ham)	Total Annual Recharge (ham)
East Khasi Hills	10425	206	0	1	207	10632

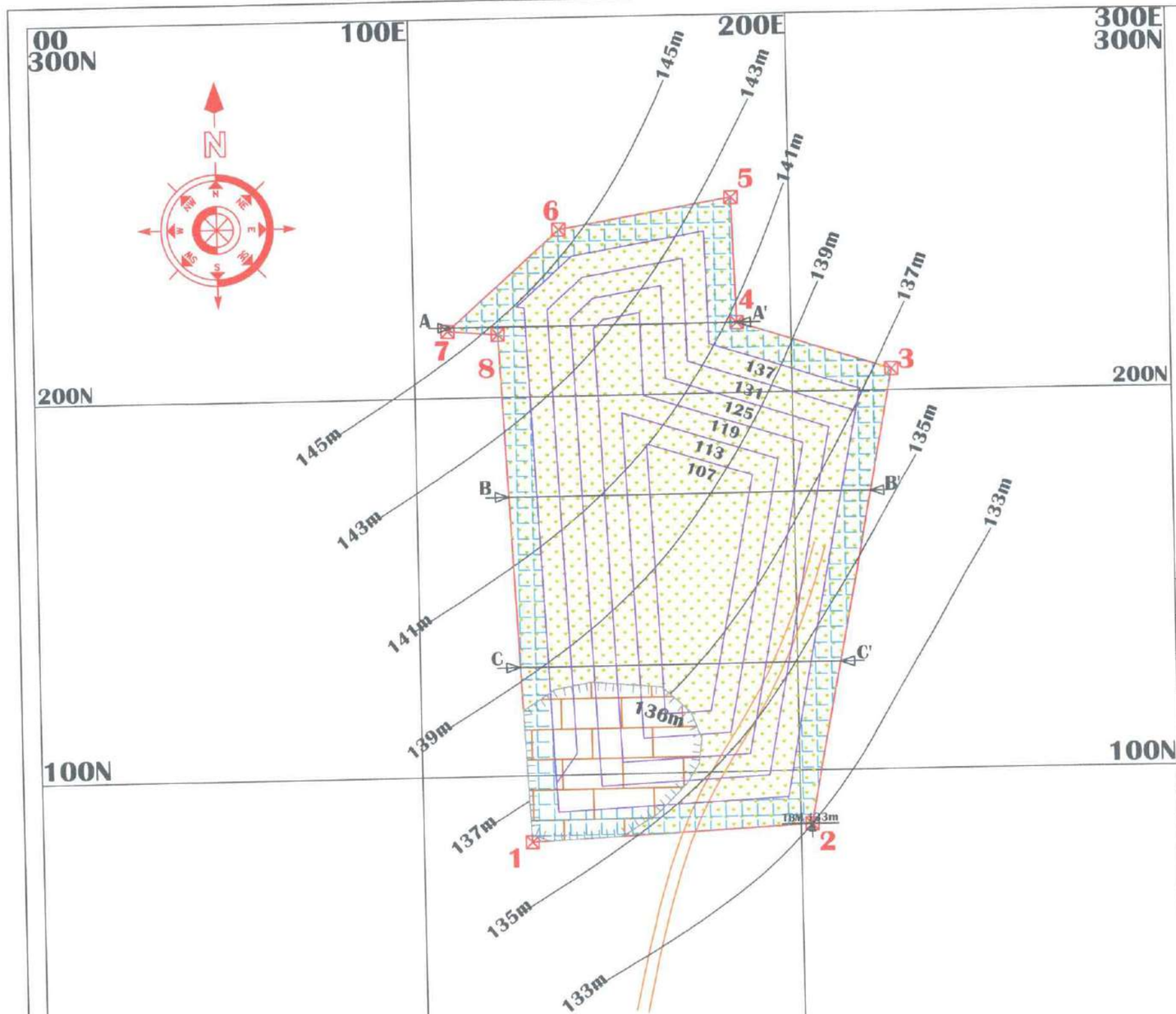
Table 2.5: Ground Water Resource Potential in East Khasi Hills district (2017-18)

District	Total area of groundwater assessment unit (Ha)	Area considered for groundwater recharge (non-command area) (ha)	Recharge from rainfall during monsoon season (ham)	Recharge from other sources during monsoon Season (ham)	Recharge from rainfall during non-monsoon season (ham)	Recharge from other sources during non-monsoon Season (ham)	Total annual ground water recharge (ham)	Net annual ground water availability (ham)
East Khasi Hills	256764.80	105261	7128.22	0	3297.08	206.92	10632.22	**9569**

Table 2.6: Ground Water Draft for all uses in East Khasi Hills district (2017-18)

District	Net annual ground water availability	Total draft for irrigation	Gross GW extraction	Stage of GW Development
East Khasi Hills	9569 ham	0 ham	234.61 ham	**2.45%**

Annexure 9



INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- GRID LINE
- CONTOUR LINE (145 / 143)
- TEMPORARY BENCH MARK (TBM 133m)
- APPROACH ROAD
- GRITTY SOIL
- LIMESTONE
- ULTIMATE PIT LIMIT

Plate No. - 4

Geological Plan & Section

Lynti Dkhar Limestine Mine

Applicant

Smt. Idalis Ryngnga
Address: At-Sohbar Area, Sohbar Sirdarship
East Khasi Hills District, Meghalaya.

Applied Lease Area - 1.36 Ha

Applied Lease Area Located at - Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya.

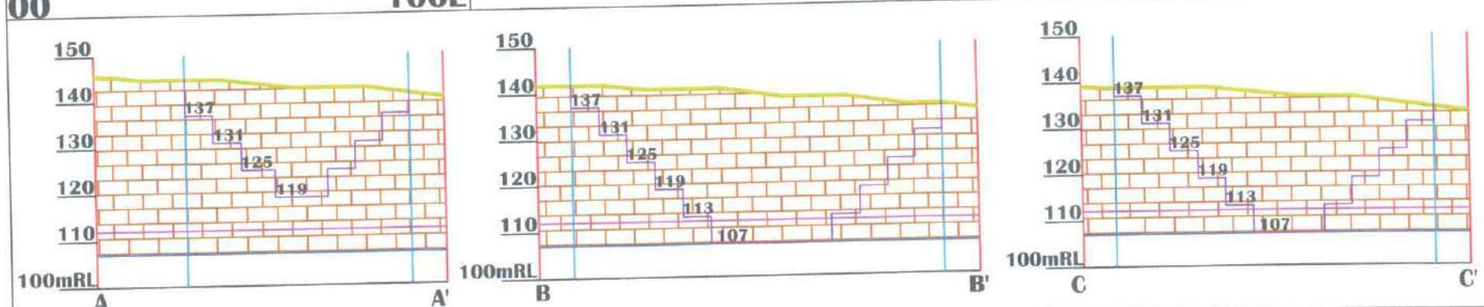
Scale 1:1500

PREPARED BY: NOVOMINE INDIA PRIVATE LIMITED
QCI-NABET ACCREDITATION NO. NABET/APA-MPPA/IA/018

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A



SECTION INDEX

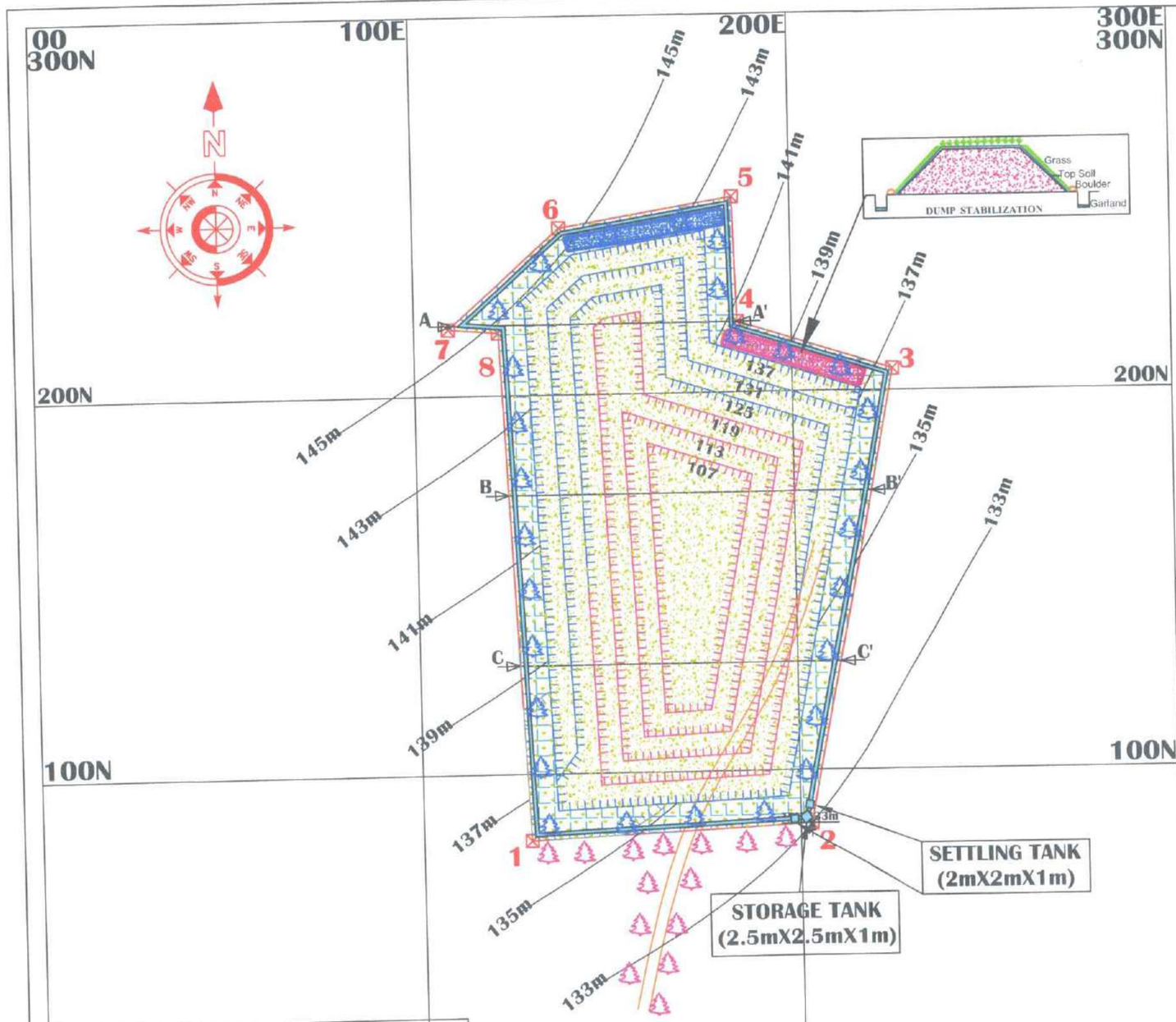
- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- SPOT LEVELS (137,131,...)
- GRITTY SOIL
- LIMESTONE
- ULTIMATE PIT LIMIT
- PROVED ZONE
- PROBABLE ZONE

GOVERNMENT OF MEGHALAYA

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Annexure 10



INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- GRID LINE
- CONTOUR LINE (145 / 143)
- TBM 133m — TEMPORARY BENCH MARK
- APPROACH ROAD
- GRITTY SOIL
- LIMESTONE
- ULTIMATE PIT LIMIT

PLAN PERIOD PROPOSAL	CONCEPTUAL PROPOSAL
PROPOSED WORKING	PROPOSED WORKING
PROPOSED PLANTATION	PROPOSED PLANTATION
	PROPOSED DUMPING

Plate No. - 6

Conceptual Plan & Section

Lynti Dkhar Limestine Mine

Applicant
Smt. Idalis Ryngnga
Address: At-Sohbar Area, Sohbar Sirdarship
East Khasi Hills District, Meghalaya.

Applied Lease Area - 1.36 Ha

Applied Lease Area Located at - Ri-U-Siar, Lynti Dkhar Area,Sohbar Sirdarship, East Khasi Hills District, Meghalaya.

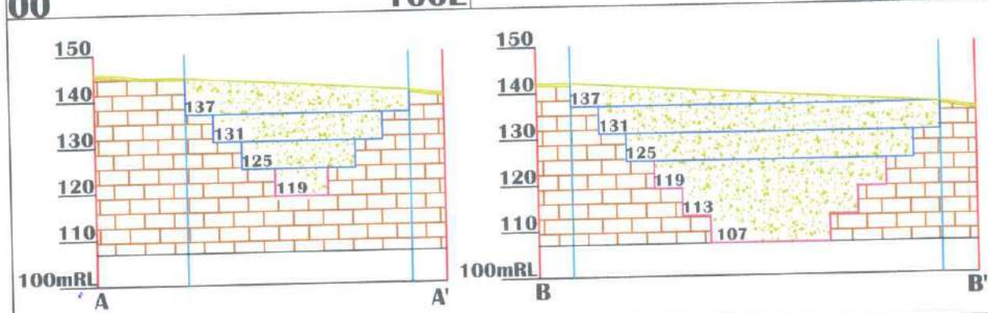
Scale 1:1500

PREPARED BY: NOVOMINE INDIA PRIVATE LIMITED
QCI-NABET ACCREDITATION NO. NABET/APA-MPPA/IA/018

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A



SECTION INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- 137,131,... SPOT LEVELS
- GRITTY SOIL
- LIMESTONE
- ULTIMATE PIT LIMIT
- PROPOSED WORKING
- CONCEPTUAL WORKING
- CONCEPTUAL RECLAMATION

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong


P1
GPS Map Camera
East Khasi Hills, Meghaleya, India


GPS Map Camera
East Khasi Hills, Meghalaya, India


GPS Map Camera
East Khasi Hills, Meghalaya, India


P4
GPS Map Camera
East Khasi Hills, Meghalaya, India


GPS Map Camera
East Khasi Hills, Meghalaya, India


P6
GPS Map Camera
East Khasi Hills, Meghalaya, India


GPS Map Camera
East Khasi Hills, Meghalaya, India
Google


P8
25°91
10'44
48.29
19"48
N E
GPS Map Camera
East Khasi Hills, Meghalaya, India
Google

Air Quality Model

The existing ambient air quality in the area has been described in the **Chapter-3** of the EIA-EMP report. The integrated mining operations in the mining block may result in deterioration of air quality due to pollution arising from the project operation, if appropriate mitigative measures are not taken.

Impact on Air Quality : The particulate matter will be the prime pollutant during mine development phase generated from site activities and vehicular movement. Diesel operated vehicular traffic movement is also likely to increase the concentration of NOx, SO_2 but this is marginal. The activities will be on ground or within an open pit depending on the nature of the activities. The dust and other pollutants generated will be fugitive in nature, which can be controlled by suitable mitigation measures like enclosing the sources, providing dust suppression systems by sprinkling of water with or without wetting agents.

Due to the mining activities, there will be emission of pollutants and consequent dispersion to atmosphere increasing the background pollution levels. The year of maximum (peak) limestone production is taken for analysis. According to the approved Mining Plan, no overburden will be generated during that year. For transport of limestone both inpit haul road upto pit top and surface haul road from pit top to nearby metalled roads/ highways is considered.

Impact due to Local Traffic : To minimize traffic congestion on nearby highways/ roads, as well as to reduce public inconvenience caused by construction activities, several measures are proposed. These include strengthening and widening haul roads and utilizing alternative routes as outlined in the Transportation Plan. Consequently, no significant adverse impact is anticipated.

The model was run for the worst-case scenario of peak production level. The incremental levels are selected by software for the most critical day, i.e., day when the wind blows towards a receptor for most of the day. Resultant Ground level Concentrations of PM_{10} and $PM_{2.5}$ within an area of **10** km with mine at center for the prevailing meteorological conditions using mathematical model is estimated as discussed in **Box-1**.

The predicted 1st highest 24 hourly incremental and resultant concentration of PM_{10} in the study area and the project site is given in **Table**. The maximum GLC of PM_{10} and $PM_{2.5}$ occurs at the southern side of the project area.

Table: Resultant 24 hourly 98 P Ground Level Concentration (GLC) during Project Operation in µg/m^3

Stations	Distance (km)	Direction	Baseline	Incremental	Resultant
			Concentration of PM_{10} in µg/m^3		
CA-1: Project Site	0.0	-	56.0	26.0	82.0
BA-1: Bholaganj	1.50	S	52.4	0.6	53.0
BA-2: Ichamoti	5.84	WSW	44.5	ND	44.5
BA-3: Sohbar	3.67	N	48.5	ND	48.5
BA-4: Nongjri Nongbah	4.95	ENE	46.8	ND	46.8
			Concentration of $PM_{2.5}$ in µg/m^3		
CA-1: Project Site	0.0	-	34.5	6.5	41.0
BA-1: Bholaganj	1.50	S	31.9	0.1	32.0
BA-2: Ichamoti	5.84	WSW	20.9	ND	20.9
BA-3: Sohbar	3.67	N	26.5	ND	26.5
BA-4: Nongjri Nongbah	4.95	ENE	21.4	ND	21.4

On the basis of above prediction, it is found that in Lynti Dkhar Limestone Mine, Project Site (CA-1), which is within the mine lease area, where NAAQS of 100 µg/m^3 applies, the maximum resultant concentration of PM_{10} is 82.0 µg/m^3. All incremental concentrations for all AAQ stations are within of NAAQS.

Similar pattern also found in $PM_{2.5}$ concentration increase. The incremental concentration of $PM_{2.5}$ is 18.8% of NAAQS standard and maximum resultant concentration of $PM_{2.5}$ is 41.0 µg/m^3 at CA-1. All incremental concentrations for all AAQ stations are within of NAAQS.

BOX 1: PROCESS OF ESTIMATION OF GLC & DETAIL OF MODEL USED

For estimating the incremental Ground Level Concentration (GLC) due to dispersion to atmosphere from the proposed limestone mine, following activities have been considered in surface and open pit: **(i) Emission during to drilling; (ii) Emission during blasting; (iii) Emission during bulldozing of overburden; (iv) Emission during transport of overburden through haul road to overburden storage area; (v) Emission from external overburden dump area; (vi) Emission during truck loading of limestone from surface miner; (vii) Emission during transport of limestone within in-pit haul road; (viii) Emission during transport of limestone through surface haul road; (ix) Emission during limestone unloading or drop operation within the site**.

The emission factors have been obtained from relevant sections of US EPA AP 42. **The areas considered are: (i) Area and depth of open pit; (ii) Area of drilling, blasting and bulldozing; (iii) Area of haul road; (iv) Area of OB dump and limestone dump**.

Model Used: In this case, US EPA approved AERMOD 8.9.0 has been used for predicting the incremental GLC of particulate matter in the study area as well as the project site. This is an air dispersion-modelling package, which seamlessly incorporates the popular USEPA Models, ISCST3 and AERMOD into one interface without any modifications to the models. These models are used extensively to assess pollution concentration and deposition from a wide variety of sources. Area source algorithm has been considered in this case for emission from surface and open pit with emission units calculated as $g/s/m^2$for area sources and g/s for point sources.

Meteorological Data: In order to conduct an air dispersion modelling project using the AERMOD short-term air quality dispersion model, it is necessary to process the meteorological data representative of the study area being modelled. The collected meteorological data is not always in the format supported by the model. Therefore, the meteorological data needs to be pre-processed using AERMET program.

The AERMET program is a meteorological pre-processor, which prepares hourly surface data and upper air data for use in the AERMOD air quality dispersion model. AERMET is designed to allow future enhancements to process other types of data and to compute boundary layer parameters with different algorithms.

AERMET processes meteorological data in three stages and from this process two files are generated for use with the AERMOD model. A surface file of hourly boundary layer parameters estimates a profile file of multiple-level observations of wind speed, wind direction, temperature and standard deviation of the fluctuating wind components.

Air Quality Prediction: Emission factors of TSP=<30µ have been adopted from USEPA-AP42, **section 11.9, Table 11.9-2** (Emission Factor Equations for uncontrolled open dust sources at Western Surface Coal Mines). The PM_{10} emissions have been derived from the Emission Factors by applying scaling factor for converting it to from PM_{30} to PM_{10} and deriving emissions in $g/s/m^2$ as input to model. For calculating emission from haul road, reference has been taken from USEPA-AP42 section 13.2.2. The $PM_{2.5}$ emissions were arrived basing on the factor i.e., PM_{10} emission rate x 0.25.

Estimation for increase in PM_{10} in the air (incremental value) at the chosen AAQ data generation stations (having base line values) has been done with the help of the above-mentioned model and added to get the total GLC. Also, pollution isopleths have been plotted for the entire study area. The dust emissions from each operation of the mining activity have been estimated taking into account maximum annual coal and OB production.

EMISSION FACTORS CONSIDERED			
S.no	**Activities/ Operations**	**TSP=<30µ**	**Unit**
Overburden and Limestone related Emissions			
1	Drilling	0.59	Kg/hole
2	Blasting	$0.00022(A)^{1.5}$	kg/blast
3	Bulldozing	$2.6\ (s)^{1.2}/(M)^{1.3}$	kg/hr
4	Transportation on haul road	$k(s/12)^{a}(W/3)^{b}$	kg/VKT
5	Wind-blown dust from OB dumpsite	0.85	T/ha/Year
6	Loading/ unloading of material	$K(0.0016)(U/2.2)^{1.3}/(M/2)^{1.4}$	kg/tonne
(i) Dumper Capacity: 10 Tonne; (ii) No. of dumpers per day for OB: 1 (No OB production in the peck limestone production); (iii) No. of dumpers per day for limestone: 2; (iv) No. of shovel and dozers were considered 1(S) and 0 (D); (v) For Limestone blasting, (a) No. of holes per day considered as 43; (c) Depth of blast hole considered as 1.6m; (d) Density of OB considered as 1.5 tonnes/cum; (e) Density of limestone considered as 2.7 tonnes/cum; (f) k, a, b are imperial constants.			
Where, (i) A = horizontal area (m^2) (ii) s = material silt content (%); (iii) M = material moisture content (%); (iv) k,a& b are empirical constants; (v) W = mean vehicle weight in tonnes; (vi) K = particle size multiplier and (vii) U = mean wind speed, meters per second (m/s)			
PM_{10} Emission Rates with Control Measures			
S.no	**Source Type**	**Emission Rates (g/m2/s)**	
1	Open Pit Source	7.73E-06	
2	Active OB Dump	8.09E-07	
3	Internal Haul Rod for OB Transportation	9.79E-09	
4	Limestone Transportation	4.75E-07	

The emission rates for $PM_{2.5}$ is calculated considering 25% of the PM_{10} emission rates.

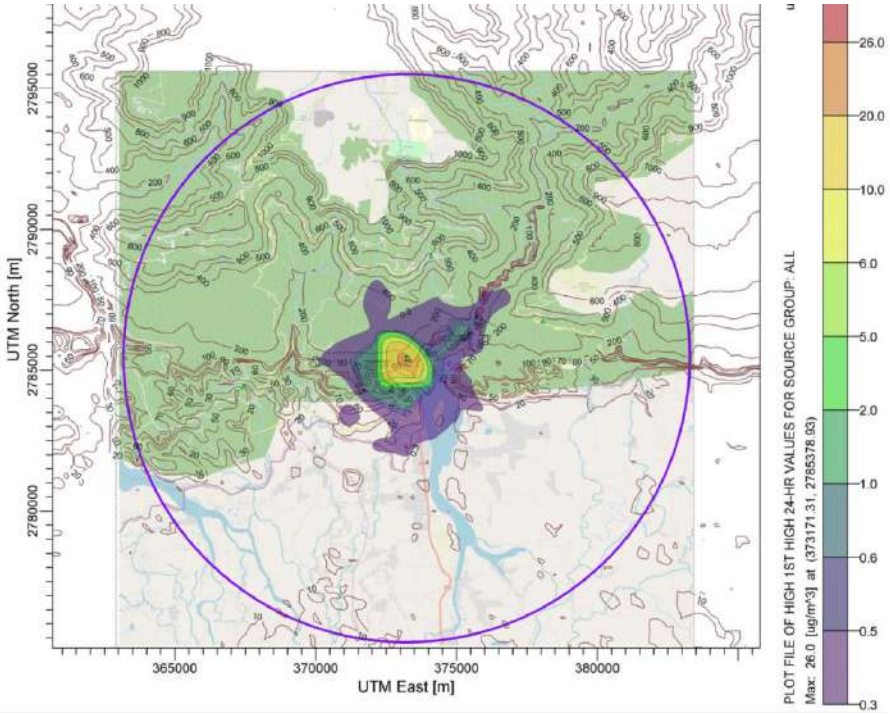


Figure 1: Isopleths of PM_{10}

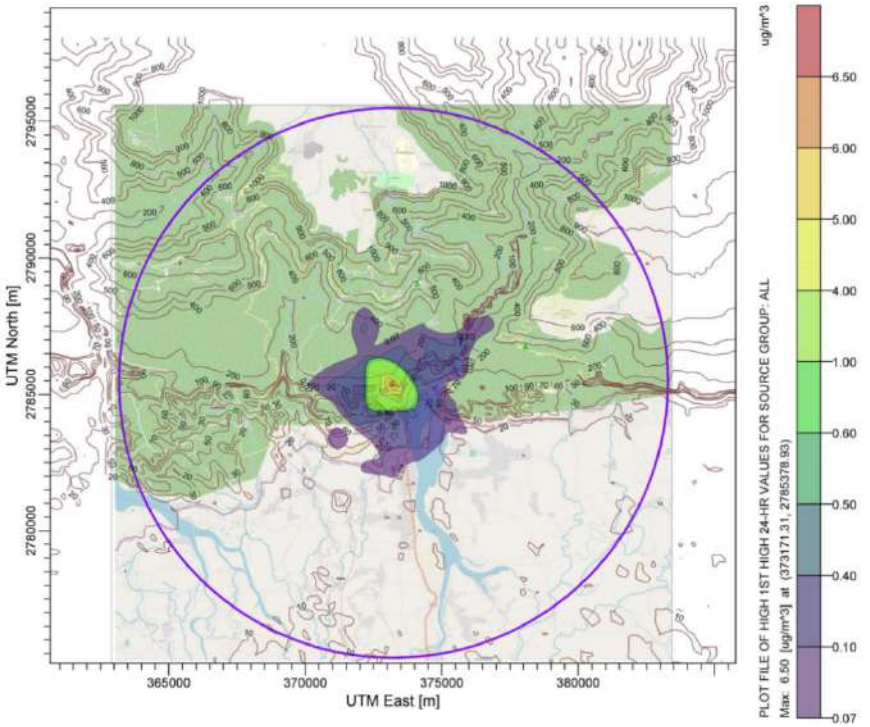


Figure 2: Isopleths of $PM_{2.5}$