

**EXECUTIVE SUMMARY
OF
ENVIRONMENTAL IMPACT ASSESSMENT
AND
ENVIRONMENTAL MANAGEMENT PLAN**

For

**KHUB LIMESTONE MINE
OVER AN AREA OF 9.66 HECTARES
IN LUMSHNONG VILLAGE, EAST JAINTIA HILLS
MEGHALAYA**

Prepared For

**CEMENT MANUFACTURING COMPANY Ltd.
VILLAGE LUMSHONG, EAST JAINTIA HILLS DISTRICT
MEGHALAYA**

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EXECUTIVE SUMMARY

1. PROJECT DESCRIPTION

Mining Lease for the Lumshnong limestone project of Khub area over 9.66 ha. (Amalgamation) was issued by the Govt. of Meghalaya vide letter number MG.98/2008/23 (LOI) dated 01.04.2009 to M/s Cement Manufacturing Company Limited which is a public limited company. The project area is of private land category. No forest area is involved. The mining operation will be carried out as per Mining Plan and Progressive Mine Closure plan approved by Indian Bureau of Mines. Mining plan for the period 2013-14 to 2014-15 was submitted to IBM, Govt. of India on 20/02/2014. TOR has been issued by SEIAA, Meghalaya for production capacity upto 8, 50,000 MT as per the pre-feasibility report. The Limestone from the mine shall be utilised in the cement plant of the company. Cement Manufacturing Company Ltd (CMCL) an ISO 9001:2000 certified company and was incorporated as a Public Limited Company on 2nd November 2001 with Registered office and works at Lumshnong, East Jaintia Hills district, Meghalaya. CMCL was given approval for setting up a 900 TPD cement plant at Lumshnong Village, East Jaintia Hills district Meghalaya by the Govt. of Meghalaya in the year 2002 and subsequently was given approval for expanding the capacity to 3000 TPD in the year 2003. The present capacity of the plant is 2400 tpd clinker/ cement.

The proposal for the cement project was conceived on the basis of reports of abundant occurrence of high grade limestone around Lumshnong village by Geological Survey of India and Directorate of Mineral Resources, Govt of Meghalaya.

The cement plant with the present production capacity of 2400 TPD consists of dry process coal fired kiln. The main components of mine consist of Levelling of the surface by dozer → Drilling → Blasting → Loading to transport vehicles by Hydraulic Excavator → Transporting by TATA HYVA to plant → Weigh Bridge for weighment → Unloading to crusher / Limestone Stockyard in plant → Weigh Bridge for Empty weighment of HYVA → Return to Mines.

Cement Manufacturing Company Limited (CMCL) has proposed to amalgamate the two existing mining leases over an area of 4.96 & 4.70 hectares respectively, separated by a land of 0.24 hectares. They are situated at Lumshnong, District East Jaintia hills, Meghalaya. The latitude and longitude of the project site are 25° 9'48" to 25°10'4.3"N & 92°22'05.3" to 92°22'23.6"E respectively. Company is applied to obtain Environment Clearance from SEIAA, Meghalaya. On 24.04.2013 SEIAA has granted the TOR.

Geographical Location (Fig. 1)

State	Meghalaya
District	East Jaintia hills
Village	Lumshnong
Lease Area	9.66 ha
Toposheet No.	83C/SW
Latitudes	25° 9'48" to 25°10'4.3"N
Longitudes	92°22'05.3" to 92°22'23.6"E
Altitudes	520 m AMSL to 546m AMSL

There is no public road or railway line within the M.L area. The lease area is situated at a distance 1 km west of NH-44 connecting Shillong to Silchar. The nearest railway station at a distance of 85km from Lumshnong is Badarpur on Guwahati-Lumding-Silchar meter gauge section of N.E.F. Railway. (**Fig. 2**). The lease area map is given in **Fig. 3** Topography of the ML area and its surroundings are rugged and mountainous. Maximum and minimum contours passing through the area are 546m and 520m respectively with graters relief of 20m. South-Western part of the area is at a higher elevation with respect to south-eastern part. The nearest airport at Silchar is 125 kms and Guwahati at about 211 kms from Lumshnong village. There is no national Park, wild life sanctuary or any eco-sensitive zone exists within 10kms of ML area.

As per the approved mining plan reserves are as follows.

Category	Khub-I	Khub-II	Total
Measured Mineral Resources (331)	6.05	5.40	11.45
Proved Mineral Reserve (111)	3.33	2.82	6.15

Based on the bore holes drilled in the limestone zone the grade wise resources have been computed below by taking borehole log analysis data into account.

Opencast fully mechanised method of mining will be adopted on one shift basis. Machineries/ vehicles like crawler drill, air compressor, hydraulic excavators, dumpers, etc. will be used. The limestone shall be dislodged by drilling and blasting. Limestone will be handled by dumpers/ tipper trucks and Excavators. Height and width of the working mine benches would be 6 meters and 12 meters respectively. Slope of the benches will be 45⁰ where as overall slope of the pit will be 45°. Production will be 8,50,000 TPA of limestone. Keeping the above production in view, the life of the mine will be 20 years. The capital cost of the project is Rs. 675 Lakhs. No waste will be generated from the mine.

2. DESCRIPTION OF THE ENVIRONMENT

The meteorological data for temperature and relative humidity were collected during the study period. The temperature ranged from 6.3⁰C to 25.7⁰C while the relative humidity varied from 62.0% to 95.0% during Post-monsoon season. The annual mean rainfall observed at Shillong was 2415.3 mm while total number of rainfall days were 129.1. While the annual mean annual rainfall observed at Silchar was 3213.7 mm while total number of rainfall days were 132.6. The predominant wind direction is from Southern side. The wind rose diagram is shown in **Fig. 4**. The sample location map is indicated in **Fig. 5**.

The CPCB value for rural and residential areas for PM₁₀, PM_{2.5}, SO₂, NO_x and CO (24 hourly) are 100, 60, 80, 80 and 2000 µg/cum respectively. We had taken various ambient air quality datas from eight stations for minimum one season. The analysis results are presented as follows. We had tested all the parameters as prescribed by CPCB but all the parameters found below the permissible limit in the study area, so we had not given them in tabular form.

Zone	Station Code	Station	Value of	PM ₁₀	PM _{2.5}	SO ₂	NO _x
Core zone	A1	Mine Site (4.96 Ha.)	MAX	63.5	35.7	19.3	22.6
			MIN	42.3	23.8	12.5	15.5
			AVERAGE	52.90357	31.16786	15.475	18.14643
			95 PERCENTILE	59.35	34.06	18.3	21.3
Buffer zone	A2	Mine Site (4.70 Ha.)	MAX	62.3	37.1	18.5	28.1
			MIN	44.8	29.9	13.1	16.1
			AVERAGE	54.96071	33.98214	15.8	19.25357
			95 PERCENTILE	59.9	36.8	19.8	24.5
	A3	Umlaper	MAX	44.4	26.9	12.8	15.7
			MIN	54.41071	33.02143	16.725	20.46429
			AVERAGE	59.765	36.665	19.355	23.795
			95 PERCENTILE	59.765	36.665	19.355	23.795
	A4	Tongseng	MAX	68.8	43.8	19.3	20.8
			MIN	54.7	28.3	13.3	15.7
			AVERAGE	61.34286	34.20357	16.56071	18.81429
			95 PERCENTILE	67.76	39.485	18.695	20.565
	A5	Umlong	MAX	61.5	48.6	21.7	23.6
			MIN	50.4	30.4	11.4	14.3
			AVERAGE	56.47857	35.71786	15.33929	17.61111
			95 PERCENTILE	61.06	39.98	20.085	21.35
	A6	Umbadoh	MAX	62.6	40.5	20.8	23.4
			MIN	52.8	30.5	11.2	10.2
			AVERAGE	59.00714	36.70357	16.24643	14.775
			95 PERCENTILE	62.155	40.165	20.1	18.33
	A7	Lumshnong	MAX	61.3	40.8	20.8	20.5
			MIN	42.5	22.7	10.3	16
			AVERAGE	53.46071	32.475	16.75357	18.75357
			95 PERCENTILE	60.66	39.255	20.6	20.43
	A8	CMCL Plant site	MAX	58.5	35.7	20.8	25.7
			MIN	47.5	27.4	15.1	16.7
			AVERAGE	53.63929	32.38929	18.44643	21.97857
			95 PERCENTILE	58.12	35.12	20.23	24.96

The vehicular movements are the main noise source during the study period. The noise level data are varying from 43.4 to 66.5 dBA in the day time and in the night it varies from 40.2 to 46.7 dBA. The noise level of the area is within the prescribed limit.

The annual ground water recharge is 2.3184 Ham. whereas ground water table is at 420m AMSL (in summer) and 425m AMSL (in rainy season). The quality of surface and ground water is within the prescribed limit of Inland Surface Water, class-A, IS 3025 and IS 10500 respectively.

Result of Surface Water Samples Analysis

Parameter	Unit	Standard	Surface Water Samples			
			SW ₁	SW ₂	SW ₃	SW ₄
pH	---	6.5 - 8.5	6.7	6.6	6.8	6.8
Colour	---	Colourless	Colourless	Colourless	Colourless	Colourless
Odour	----	Odourless	Odourless	Odourless	Odourless	Odourless
Total solid	mg/l	----	228	236	241	236
Total suspended solid	mg/l	----	15	14	15	16
TDS	mg/l	1500	227	219	224	217
Oil and Grease	µg/l	----	0.04	0.06	0.03	0.04

Parameter	Unit	Standard	Surface Water Samples			
			SW ₁	SW ₂	SW ₃	SW ₄
Dissolve oxygen	Mg/l	----	5.8	6.3	5.7	6.5
Total kjeldahl nitrogen as N	mg/l	----	5.1	4.7	4.8	4.4
Ammoniacal nitrogen as N	mg/l	50	0.84	0.67	0.62	0.77
Free ammonia as NH ₃	mg/l	----	<0.1	<0.1	<0.1	<0.1
BOD	mg/l	3	0.3	0.5	0.7	0.9
Arsenic as As	mg/l	0.2	<0.01	<0.01	<0.01	<0.01
Mercury as Hg	mg/l	----	<0.005	<0.005	<0.005	<0.005
Lead as Pb	mg/l	0.1	<0.005	<0.005	<0.005	<0.005
Total chromium as Cr	mg/l	2.0	<0.1	<0.1	<0.1	<0.1
Hexavalent Chromium as Cr	mg/l	0.05	<0.01	<0.01	<0.01	<0.01
Copper as Cu	mg/l	3.0	<0.02	<0.02	<0.02	<0.02
Cadmium as Cd	mg/l	0.01	<0.002	<0.002	<0.002	<0.002
Zinc as Zn	mg/l	5	<0.002	<0.002	<0.002	<0.002
Selenium as Se	mg/l	0.05	<0.005	<0.005	<0.005	<0.005
Nickel as Ni	mg/l	3.0	<0.01	<0.01	<0.01	<0.01
Boron as B	mg/l	2.0	<0.05	<0.05	<0.05	<0.05
Cyanide as CN	mg/l	0.05	<0.01	<0.01	<0.01	<0.01
Chloride as Cl	mg/l	600	27	29	25	22
Nitrate as NO ₃	mg/l	50	0.7	0.5	0.9	0.8
Flouride as F	mg/l	1.5	<0.1	<0.1	<0.1	<0.1
Dissolved PO ₄	mg/l	5.0	0.4	0.2	0.3	0.4
Sulphate as SO ₄	mg/l	400	12	17	16	18
Sulphide as S	mg/l	2.0	0.8	0.5	0.4	0.3
Iron as Fe	mg/l	5.0	0.6	0.7	0.5	0.4
Silica as SiO ₂	mg/l	----	<0.01	<0.01	<0.01	<0.01
Phenolic compound	mg/l	0.005	<0.0001	<0.0001	<0.0001	<0.0001
Residual pesticide	mg/l	Absent	Absent	Absent	Absent	Absent
Sodium Percentage	mg/l	60	<0.05	<0.05	<0.05	<0.05
Calcium as Ca	mg/l	74	22	27	29	24
Magnesium as Mg	mg/l	32	8	7	5	9
Total hardness	mg/l	298	82	76	91.7	128
Coliform cells/100ml	MPN	BDL	Absent	Absent	Absent	Absent
Standard : IS 2296, Class – A, Inland Surface Water ND: Not detected Surface water sampling stations:- S1: Nalla near ML area S2- Wah Larian N. S3- Nalla near Lumshnong S4- Nalla near Plant site						

Result of Surface Water Samples Analysis

Parameter	Unit	Standard	Surface Water Samples		
			W ₅	W ₆	W ₇
pH	---	6.5 - 8.5	6.7	6.6	6.9
Colour	---	Colourless	Colourless	Colourless	Colourless
Odour	----	Odourless	Odourless	Odourless	Odourless
Total solid	mg/l	----	263	214	217
Total suspended solid	mg/l	----	14	16	13
TDS	mg/l	1500	248	217	209
Oil and Grease	µg/l	----	0.04	0.07	0.08
Dissolve oxygen	Mg/l	----	4.7	4.9	5.2
Total kjeldahl nitrogen as N	mg/l	----	3.1	3.3	3.5
Ammoniacal nitrogen as N	mg/l	50	0.74	0.71	0.82
Free ammonia as NH ₃	mg/l	----	<0.1	<0.1	<0.1
BOD	mg/l	3	0.1	0.1	0.2
Arsenic as As	mg/l	0.2	<0.01	<0.01	<0.01
Mercury as Hg	mg/l	----	<0.005	<0.005	<0.005
Lead as Pb	mg/l	0.1	<0.005	<0.005	<0.005
Total chromium as Cr	mg/l	2.0	<0.1	<0.1	<0.1
Hexavalent Chromium as Cr	mg/l	0.05	<0.01	<0.01	<0.01
Copper as Cu	mg/l	3.0	<0.02	<0.02	<0.02
Cadmium as Cd	mg/l	0.01	<0.002	<0.002	<0.002
Zinc as Zn	mg/l	5	<0.002	<0.002	<0.002
Selenium as Se	mg/l	0.05	<0.005	<0.005	<0.005
Nickel as Ni	mg/l	3.0	<0.01	<0.01	<0.01
Boron as B	mg/l	2.0	<0.05	<0.05	<0.05
Cyanide as CN	mg/l	0.05	<0.01	<0.01	<0.01
Chloride as Cl	mg/l	600	27	25	28
Nitrate as NO ₃	mg/l	50	0.8	0.7	0.5
Flouride as F	mg/l	1.5	<0.1	<0.1	<0.1
Dissolved PO ₄	mg/l	5.0	0.3	0.4	0.6
Sulphate as SO ₄	mg/l	400	15	17	12
Sulphide as S	mg/l	2.0	0.5	0.3	0.4
Iron as Fe	mg/l	5.0	0.6	0.7	0.8
Silica as SiO ₂	mg/l	----	<0.01	<0.01	<0.01
Phenolic compound	mg/l	0.005	<0.0001	<0.0001	<0.0001
Residual pesticide	mg/l	Absent	Absent	Absent	Absent
Sodium Percentage	mg/l	60	<0.05	<0.05	<0.05
Calcium as Ca	mg/l	74	27	29	23
Magnesium as Mg	mg/l	32	10	8	5.4
Total hardness	mg/l	298	102	94	87
Coliform cells/100ml	MPN	BDL	Absent	Absent	Absent
Standard : IS 2296, Class - A, Inland Surface Water ND: Not detected Surface water sampling stations:- S5:Nalla near Tongseeng S6- Nalla near Umlong S7- Nalla near Umbadoh					

The area exposes hilly ever green and deciduous forests. The recorded fauna species are common reptiles, birds, amphibians, insects and few mammals such as Bamboo Rat, Squirrel, Otter, House rat, Monkey. No rare or endangered flora and fauna species are found.

3. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Mining activities and related operations can cause several beneficial and adverse impacts on the environment. The adverse impacts proposed to mitigate the impact on the environment has been assessed by using 'Matrix method'.

The expected beneficial impacts on the society are Health, Population/Migration, Employment, Literacy, Services and Aesthetic sense. The proposed mining operation will generate direct employment for 100 nos. of employees and indirectly for 90 people. Communication, education, medical, power and employment facilities will be improved.

Various phases of mining operations will generate dust and gaseous pollutants. With a view to the scale of mining and existing environmental back ground condition it is anticipated that increment impact due to the mining operation will be within the prescribed limit. Further mitigation measures like wet drilling, water sprinkling and plantation will reduce the pollution level in the area.

Contamination/siltation of surface water might occur due to mixing of run off during rainy season with high-suspended particles, likely to be caused. As it is proposed to construct settling tank and garland drain around the mining area the level of concentration of suspended particles in the surface water shall be well within the prescribed limit.

The contamination of surface water may cause diseases in the area. Treatment of water will be done. Medical treatment will be provided as per the requirement. The impact on ground water will be marginal since proposed mining activities will be much above the ground water table.

Due to the opencast mining project, the noise level of the area due to drilling, blasting, transportation and running of heavy machineries will increase. Controlled blasting, proper maintenance of machineries and soundproof cabins and plantation will minimise noise level.

Greenbelt development will neutralize the impact on flora. The present and so also proposed land use pattern of the mine will be as follows. (**Fig. 3**).

Existing Core Zone Land use Pattern

Classification of land	Village/District	Total area in Hects.
Total Private Land (non-forest)	Lumshnong/East Jaintia hills	9.66 Waste land

Proposed Land Pattern (Area in Ha.)

Sl. No.	Pattern of Utilisation	Existing	Planned 5 years	Beyond 5 years	Total
1.	Area to be excavated ML area 4.96Ha &- ML area4.7Ha.	7.17	0.42	0.5	8.09
2.	Storage for top soil	Nil	Nil	Nil	Nil
3.	Overburden/dump	Nil	Nil	Nil	Nil
4.	Mineral Storage	Nil	Nil	Nil	Nil
5.	Infrastructure (Workshop, administrative building)	Nil	Nil	Nil	Nil
6.	Roads	Nil	Nil	Nil	Nil
7.	Railways	Nil	Nil	Nil	Nil
8.	Green Belt	Nil	Nil	Nil	Nil
9.	Tailing pond	Nil	Nil	Nil	Nil
10.	Effluent Treatment Plant	Nil	Nil	Nil	Nil
11.	Mineral Separation Plant	Nil	Nil	Nil	Nil
12.	Township area	Nil	Nil	Nil	Nil
13.	Others to specify	Nil	Nil	Nil	Nil
	Sub-Total	7.17	0.42	0.5	8.09
14.	Safety zone (7.5 ML boundary)	---	---	---	1.57
	Total	7.17	0.42	0.5	9.66

Post-Operational Land Pattern (Area in Ha.)

Sl. No.	Pattern of Utilisation	Existing	Planned 5 years	Beyond 5 years	Total
1.	Area to be excavated ML area 4.96Ha &- ML area4.7Ha.	7.17	0.42	0.5	8.09
2.	Storage for top soil	Nil	Nil	Nil	Nil
3.	Overburden/dump	Nil	Nil	Nil	Nil
4.	Mineral Storage	Nil	Nil	Nil	Nil
5.	Infrastructure (Workshop, administrative building)	Nil	Nil	Nil	Nil
6.	Roads	Nil	Nil	Nil	Nil
7.	Railways	Nil	Nil	Nil	Nil
8.	Green Belt	Nil	Nil	Nil	Nil
9.	Tailing pond	Nil	Nil	Nil	Nil
10.	Effluent Treatment Plant	Nil	Nil	Nil	Nil
11.	Mineral Separation Plant	Nil	Nil	Nil	Nil
12.	Township area	Nil	Nil	Nil	Nil
13.	Others to specify	Nil	Nil	Nil	Nil
	Sub-Total	7.17	0.42	0.5	8.09
14.	Safety zone (7.5 ML boundary)	---	---	---	1.57
	Total	7.17	0.42	0.5	9.66

The stage wise cumulative plantation is as follows.

Stage Wise Cumulative Plantation

REQUIREMENT OF PLANTS FOR AFFORESTATION / RECLAMATION										
Year	Un-worked Area (Greenbelt)		Out Side Dump		Dump Area		Top Soil Dump		Total	
	Area (Ha)	Trees	Area (Ha)	Trees	Area (Ha)	Trees	Area (Ha)	Trees	Area (Ha)	Tree
1st	0.5	1250	--	--	--	--	--	--	0.5	1250
2nd	1.0	2500	--	--	--	--	--	--	1.0	2500
3rd	1.5	3750	--	--	--	--	--	--	1.5	3750
4th	1.57	3925	--	--	--	--	--	--	1.57	3925
5th	1.57	3925	--	--	--	--	--	--	1.57	3925
Ultimate	1.57	3925	8.09	20225	--	--	--	--	9.66	24150

The post mining land use is represented in **Fig. 6**.

There will be less chance of improvement in agriculture. By using these land in mining there will be generation of employment and revenue.

4. ENVIRONMENT MONITORING PROGRAMME

An environmental monitoring cell will be formed for regular environmental assessment on air, water, noise and soil qualities at nearby habitation area. Four permanent Air quality stations will be fixed as per the MSPCB guidance to monitor the AAQ in quarterly basis. Quarterly water samples of ground water and surface water shall be collected and analysed. Noise level monitoring at Noise generating points and AAQ locations shall be done in quarterly basis.

5. ADDITIONAL STUDIES

Additional studies like soil erosion and nutrient quality at river bed soil will be taken up.

6. PROJECT BENEFITS

The limestone to be produce from the mine shall be utilised in the plant of the Lessee. The mining project along with the cement plant shall uplift the socio-economic, educational and cultural status of the local inhabitants. The project will in addition generate revenue to the state and central governments in the way of Royalty and cesses.

7. ENVIRONMENT MANAGEMENT PLAN

The mining activities will have certain adverse effects on the existing environment like air, water, land and noise. The following protection measures will be adopted to minimize pollution.

- Provision of planting emission and noise absorbing species (with dense/thick type canopy), soil erosion control and nutrient enhancing species
- To suppress fugitive dust, provision of water sprinkler, dust extractor etc at the dust generation source
- Adoption of control blasting techniques (using advance non-electric detonator)
- Construction of garland drains around the quarry area with proper gradients
- The settling tank will have adequate dimension
- Surface runoff through drain and channel shall be channelized into sedimentation pond before discharging into natural drainage
- Proper maintenance of plant and machinery
- Providing sound proof cabins with proper ventilation
- Provision of personal protective equipments according to the pollution.
- Stone pitched walls in garland drains will be prepared to arrest flow of loose sediments.
- Provision of speed breaker (stone pitching) at regular intervals on garland drains
- Reclamation through plantation

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