EXECUTIVE SUMMARY
OF
ENVIRONMENTAL IMPACT ASSESSMENT
AND
ENVIRONMENTAL MANAGEMENT PLAN

For

SOUTH-KHLIEHJARI LIMESTONE DEPOSIT OVER AN AREA OF 33.45 HECTARES IN THANGSKAI VILLAGE, EAST- JAINTIA HILLS MEGHALAYA

Prepared For

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EXECUTIVE SUMMARY

1. PROJECT DESCRIPTION

The area owned by private individuals. to carry out prospecting operation Meghalaya Cements Limited (MCL) has purchased 91.824 ha. land from various land owners, which was transferred in the name of MCL by Revenue dept. of Govt. of Meghalaya vide letter no. R.D.S.19/2004/358, dated 31st May 2007. out of which 33.45 ha. of land is applied for ML.

Though local tribal people use to give their consent for filling of PL application, but they never allow prospecting work before the acquisition of said land. So, company has acquired the land in phase wise and carried exploration also in phase wise.

The existing Cement plant Capacity of Meghalaya Cement Plant is 2600 metric tonnes clinker per day. In view to meet the requirement of Cement plant M/s MCL has applied the ML over 33.45 ha. and got the approval. After getting the ML grant order from State Govt. Of Meghalaya M/s MCL has got the mining plan approved from Indian Bureau of Mines, Govt. of India for production of 2.24074 MTPA. Accordingly MCL has applied for Terms of Reference to prepare EIA report from SEIAA, Meghalaya and got the TOR on 24.04.2013.

Geographical Location (Fig. 1)

State	Meghalaya
District	East-Jaintia hills
Village	Thangskai
Lease Area	33.45 ha
Toposheet No.	83C/SW
Latitude	$25^0$12’12” to $25^0$12’48”N
Longitude	$92^0$23’00” to $92^0$23’18”E
Altitude	693 m AMSL to 749m AMSL

There is no public road or railway line within the M.L area. The lease area is situated at a distance of 2.5 kms. East of NH-44 connecting Shillong to Silchar. The nearest railway station at a distance of 80km 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 749m and 693m respectively. South-Western part of the area is at a higher elevation with respect to south-eastern part.

As per the approved mining plan Geological reserve of the area is 22.13 million tonnes including 17.96 million to**.**nes of measured resources and 4.17 million tones of indicated resources

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 mechanized 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 crawler drill and blasting. Limestone will be handled by dumpers/ tipper trucks and Excavators. Height and width of the mine benches would be 6 meters and 6 meters respectively. Slope of the benches will be 40-45^0 .life of the mines with maximum 2.24 MT annual production is 15 years. The capital cost of the project is Rs. 9.00 crores. Ultimate working depth of the mine will be 79m at 670m AMSL. Mining will not touch ground water table.

2. DESCRIPTION OF THE ENVIRONMENT

The meteorological data for temperature and relative humidity were collected during the study period. The temperature ranged from 14.3^{0}C to 32.6.0^{0}C while the relative humidity varied from 63.0% to 95.0% during Post Monsoon season. The annual normal rainfall at Lumshnong is 2415.3mm. 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 PM_{10}, $PM_{2.5}$, SO_2, 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**	**$PM_{2.5}$**	**PM_{10}**	**SO_2**	**NOx**
Core zone	A1	Mine Site	MAX				
			MIN				
			AVERAGE				
			95 PERCENTILE				
Buffer zone	A2	Plant Site	MAX				
			MIN				
			AVERAGE				
			95 PERCENTILE				
	A3	Chiehruphi	MAX				
			MIN				
			AVERAGE				
			95 PERCENTILE				
	A4	Nongsning	MAX				
			MIN				
			AVERAGE				
			95 PERCENTILE				
	A5	Musniang	MAX				
			MIN				
			AVERAGE				
			95 PERCENTILE				
	A6	Umswang	MAX				
			MIN				
			AVERAGE				
			95 PERCENTILE				

Zone	Station Code	Station	Value of	$PM_{2.5}$	PM_{10}	SO_2	NOx
	A7	Umladoh	MAX				
			MIN				
			AVERAGE				
			95 PERCENTILE				
	A8	Wahiajer	MAX				
			MIN				
			AVERAGE				
			95 PERCENTILE				

The vehicular movements are the main noise source during the study period. The noise level data are varying from 45.2 to 67.3 dBA in the day time and in the night it varies from 40.3 to 45.6 dBA. The noise level of the area is within the prescribed limit.

The annual ground water recharge is 8.079 Ham. The depth to water level in summer from 233 below ground level. 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	6.8	6.5	6.7	6.4
Colour	---	Colourless	Colourless	Colourless	Colourless	Colourless
Odour	----	Odourless	Odourless	Odourless	Odourless	Odourless
Total solid	mg/1	----	239	227	234	230
Total suspended solid	mg/1	----	16	12	14	12
TDS	mg/1	1500	223	215	220	218
Oil and Grease	µg/l	----	0.03	0.05	0.03	0.06
Dissolve oxygen	Mg/l	----	5.3	6.5	5.5	6.4
Total kjeldahl nitrogen as N	mg/1	----	5.2	4.5	4.6	4.5
Ammoniacal nitrogen as N	mg/1	50	0.75	0.60	0.65	0.72
Free ammonia as NH_3	mg/1	----	<0.1	<0.1	<0.1	<0.1
BOD	mg/1	3	0.3	0.5	0.7	0.9
Arsenic as As	mg/1	0.2	<0.01	<0.01	<0.01	<0.01
Mercury as Hg	mg/1	----	<0.005	<0.005	<0.005	<0.005
Lead as Pb	mg/1	0.1	<0.005	<0.005	<0.005	<0.005
Total chromium as Cr	mg/1	2.0	<0.1	<0.1	<0.1	<0.1
Hexavalent Chromium as Cr	mg/1	0.05	<0.01	<0.01	<0.01	<0.01
Copper as Cu	mg/1	3.0	<0.02	<0.02	<0.02	<0.02
Cadmium as Cd	mg/1	0.01	<0.002	<0.002	<0.002	<0.002
Zinc as Zn	mg/1	5	<0.002	<0.002	<0.002	<0.002
Selenium as Se	mg/1	0.05	<0.005	<0.005	<0.005	<0.005
Nickel as Ni	mg/1	3.0	<0.01	<0.01	<0.01	<0.01
Boron as B	mg/1	2.0	<0.05	<0.05	<0.05	<0.05

Parameter	Unit	Standard	Surface Water Samples			
			SW_1	SW_2	SW_3	SW_4
Cyanide as CN	mg/1	0.05	<0.01	<0.01	<0.01	<0.01
Chloride as Cl	mg/1	600	25	26	27	24
Nitrate as NO_3	mg/1	50	0.6	0.5	0.8	0.5
Flouride as F	mg/1	1.5	<0.1	<0.1	<0.1	<0.1
Dissolved PO_4	mg/1	5.0	0.5	0.3	0.5	0.7
Sulphate as SO_4	mg/1	400	13	18	15	18
Sulphide as S	mg/1	2.0	0.6	0.7	0.4	0.5
Iron as Fe	mg/1	5.0	0.5	0.7	0.4	0.5
Silica as SiO_2	mg/1	----	<0.01	<0.01	<0.01	<0.01
Phenolic compound	mg/1	0.005	<0.0001	<0.0001	<0.0001	<0.0001
Residual pesticide	mg/1	Absent	Absent	Absent	Absent	Absent
Sodium Percentage	mg/1	60	<0.05	<0.05	<0.05	<0.05
Calcium as Ca	mg/1	74	20	24	28	25
Magnesium as Mg	mg/1	32	7	9	6	10
Total hardness	mg/1	298	77	74.6	93	139
Coliform cells/100ml	MPN	BDL	Absent	Absent	Absent	Absent

Standard : IS 3025, Class – A, Inland Surface Water
ND: Not detected
Surface water sampling stations:- S1: Plant Site S2-Chiehruphi S3-Nongsining S4-Musiang

Result of Surface Water Samples Analysis

Parameter	Unit	Standard	Surface Water Samples		
			W_5	W_6	W_7
pH	---	6.5 - 8.5	6.8	6.9	6.7
Colour	---	Colourless	Colourless	Colourless	Colourless
Odour	----	Odourless	Odourless	Odourless	Odourless
Total solid	mg/1	----	254	221	214
Total suspended solid	mg/1	----	15	15	14
TDS	mg/1	1500	239	206	200
Oil and Grease	µg/l	----	0.03	0.05	0.07
Dissolve oxygen	Mg/l	----	4.9	5.1	4.6
Total kjeldahl nitrogen as N	mg/1	----	3.3	3.9	3.5
Ammoniacal nitrogen as N	mg/1	50	0.60	0.63	0.75
Free ammonia as NH_3	mg/1	----	<0.1	<0.1	<0.1
BOD	mg/1	3	0.1	0.1	0.2
Arsenic as As	mg/1	0.2	<0.01	<0.01	<0.01
Mercury as Hg	mg/1	----	<0.005	<0.005	<0.005
Lead as Pb	mg/1	0.1	<0.005	<0.005	<0.005
Total chromium as Cr	mg/1	2.0	<0.1	<0.1	<0.1
Hexavalent Chromium as Cr	mg/1	0.05	<0.01	<0.01	<0.01
Copper as Cu	mg/1	3.0	<0.02	<0.02	<0.02
Cadmium as Cd	mg/1	0.01	<0.002	<0.002	<0.002
Zinc as Zn	mg/1	5	<0.002	<0.002	<0.002
Selenium as Se	mg/1	0.05	<0.005	<0.005	<0.005
Nickel as Ni	mg/1	3.0	<0.01	<0.01	<0.01
Boron as B	mg/1	2.0	<0.05	<0.05	<0.05
Cyanide as CN	mg/1	0.05	<0.01	<0.01	<0.01
Chloride as Cl	mg/1	600	25	23	25
Nitrate as NO_3	mg/1	50	0.5	0.7	0.9
Flouride as F	mg/1	1.5	<0.1	<0.1	<0.1
Dissolved PO_4	mg/1	5.0	0.2	0.1	0.3
Sulphate as SO_4	mg/1	400	14	13	10
Sulphide as S	mg/1	2.0	0.5	0.4	0.5
Iron as Fe	mg/1	5.0	0.5	0.7	0.5
Silica as SiO_2	mg/1	----	<0.01	<0.01	<0.01
Phenolic compound	mg/1	0.005	<0.0001	<0.0001	<0.0001
Residual pesticide	mg/1	Absent	Absent	Absent	Absent
Sodium Percentage	mg/1	60	<0.05	<0.05	<0.05
Calcium as Ca	mg/1	74	25	30	25
Magnesium as Mg	mg/1	32	12	5	4.5
Total hardness	mg/1	298	108	85	80
Coliform cells/100ml	MPN	BDL	Absent	Absent	Absent

Standard : IS 3025, Class – A, Inland Surface Water
ND: Not detected
Surface water sampling stations:- S5: Umswang S6-Umladoh S7-Wajiaher

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 impact 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 155 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)	Thangskai/ East Jaintia hills	33.45 Waste land

Proposed Land Pattern (Area in Ha.)				
Sl. No.	**Features**	**Planned period**	**Beyond planned period**	**Total**
1	Mining	16.08	14.88	30.96
2	Roads	0.17	---	0.17
3	Magazine	---	---	---
4	Green Belt	2.32	14.88	2.32
	Total	**18.57**	**14.88**	**33.45**

Post-operational Land use

					Area in Ha.
Land use	**Plantation**	**Water Body**	**Public Use**	**Undisturbed**	**Total**
Mining	30.96	--	--	--	30.96
Road and Infrastructure	0.17	--	--	--	0.17
Green Belt	2.32	--	--	--	2.32
Total	**33.45**	**--**	**--**	**--**	**33.45**

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	2.0	5000			--	--	--	--	2.0	5000
5th	2.32	5800			--	--	--	--	2.32	5800
Ultimate	2.32	5800	31.13	77800	--	--	--	--	33.45	83600

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 habitational 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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