EXECUTIVE SUMMARY

FOR OBTAINING ENVIRONMENTAL CLEARANCE

(Category - B1, under item 1 (a), as per EIA Notification 14th September' 2006 and its subsequent amendments till date)

FOR

"UMTYRA LIMESTONE & CLAY DEPOSIT"

Location: Umtyra, Village: Chiehruphi, Sub Post Office Chiehruphi, P.S. Lumshnong, District: East Jaintia Hills, Meghalaya

Production Capacity: - Limestone 3,58,369 TPA, Production Associated (Clay) 1,21,909 TPA, OB as Sandstone 67,622 TPA & as Sandy Soil 47,279 TPA

Area: - 6.7892 Ha

Details of ToR	:	**Issued from SEIAA, Meghalaya**
Baseline data Generation	:	**December 2022 to February 2023 (Winter Season)**
Project Cost	:	**Rs. 804.5 Lacs**

PROMOTER

M/s Goldstone Cements Limited

Musiang Lamare (Old), District- East Jaintia Hills, Meghalaya

ENVIRONMENTAL CONSULTANT

Gaurang Environmental Solutions Pvt. Ltd.

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NABET Accreditation: NABET/EIA/2023/ RA0192 (Rev.01)

EXECUTIVE SUMMARY

11.0 INTRODUCTION

The proposed project "Umtyra Limestone and Clay Deposit" is situated at Umtyra, Village: Chiehruphi, Sub Post Office Chiehruphie, P.S. Lumshnong, District: East Jaintia Hills, Meghalaya. The total lease area of the project is 6.7892 Ha. The mining activity will be carried out by open cast method (Fully-mechanized).

The Mining and Geology Department, Government of Meghalaya granted the lease area of 6.7892 hectare for the mining of mineral Limestone and Clay in the favour of M/s Goldstone Cements Limited vide order no. MG. 72/2022/242 dated Shillong the 28th Sept., 2022. The proposed project is situated at Umtyra, Village: Chiehruphi, Sub Post Office Chiehruphie, P.S. Lumshnong, District: East Jaintia Hills, Meghalaya. The proposed production capacity of Limestone @ 358369 TPA (max), Production Associated (Clay) @ 121909 TPA (max), OB as Sandstone @ 67,622 TPA (max) & as Sandy Soil @47279 TPA (max) and mineable mineral for limestone mineral is about 4554065 Tonnes and for clay is 3,96253 Tonnes. The proposed mining operations will be carried out by open cast method (fully mechanized).

11.0.1 LOCATION OF LEASE AREA

The proposed project "Umtyra Limestone and Clay Deposit" is situated at Umtyra, Village: Chiehruphi, Sub Post Office Chiehruphie, P.S. Lumshnong, District: East Jaintia Hills (Meghalaya).

11.0.2 DETAIL OF MINING LEASE

S. No.	Particulars	Details
1.	Name of Project	Umtyra Limestone and Clay Deposit
2.	Location	Umtyra, Village: Chiehruphi, Sub Post Office Chiehruphie, P.S. Lumshnong, District: East Jaintia Hills (Meghalaya)
3.	Lease Area	6.7892 Ha.
4.	Land Type	Private
5.	Latitude & Longitude	25°12'0.02"N to 25°12'12.46"N and 92°21'21.39"E to 92°21'35.72" E
6.	Seismic Zone	Zone – V

11.1 PROJECT DESCRIPTION

The Mining and Geology Department, Government of Meghalaya authorised the grant of the lease area of 6.7892 hectare for the mining of mineral Limestone and Clay in the favour of M/s Goldstone Cements Limited vide order no. MG. 72/2022/242 dated Shillong the 28th Sept., 2022. The proposed project is situated at Umtyra, Village: Chiehruphi, Sub Post Office Chiehruphie, P.S. Lumshnong, District: East Jaintia Hills, Meghalaya. The proposed production capacity of Limestone @ 358369 TPA (max), Production Associated (Clay) @ 121909 TPA (max), OB as Sandstone @ 67,622 TPA (max) & as Sandy Soil @47279 TPA (max) and mineable mineral for limestone mineral is about 4554065 Tonnes and for clay is 3,96253 Tonnes. The proposed mining operations will be carried out by open cast method (fully mechanized).

11.1.1 GEOLOGY

11.1.1.1 Local Geology

The lease area can be said as a tract of land covered by soil and alluvium. Rock exposures are abundant along the NNE- SSW/SW parts of the prospect. The rocks exposed in the prospecting license area apparently belong to the Shella Limestone Formation under Jaintia Group. In Umtyra (6.7892 Ha.) prospect, the rocks members include a conformable package of sandstone and limestone with occasional shale band and shaly coal seams/lenses. So there would be an admixture of clastic - non-clasticfacies in the making of the stratigraphic sequence. The general trend of the formations is N-S, NNW-SSE to NW-SE with very shallow (3º to 10º) to sub-horizontal dips to the East.

Table 11.1: local stratigraphic succession in the prospective as follows:

A	Sandy Soil/ Alluvium with loose weathered sandstone and sandstone boulders. Avg. thickness 1.50 m
B	Sandy Clay/Clayey weathered material with loose fragile sandstone in most of the time it is recovered as sludge. Avg. thickness 4.07 m
C	Umlatadoh Member: It comprises 4 lithounits. Maximum & minimum thickness encountered in borehole is 37.18 m & 18.35 m respectively and Avg. thickness is 26.16 m
	Upper Sandstone (SST04)

	Upper Limestone (LST03) Upper middle Sandstone (SST03) occasionally calcareous with thin interbands of grey to dark greyish shale, siltstone.
	Middle Limestone (LST02)
D	Lakadong Sandstone Member: Avg. thickness is 18.17 m
	Lower middle Sandstone (SST02) interbedded with shale and shaly coal seams
E	Lakadong Limestone Member: Encountered thickness is 46.80-53.86 m
	Lower Limestone (LST01) with thin interbands of greyish calcareous sandstone
F	Therria Sandstone Member: Encountered thickness is 14.95 m still continuing.
	Lower Sandstone (SST01)
Basement not seen	

11.1.1.2 Physiography

The topography of the lease area is undulating and rugged terrain. Highest elevation is 771 mRL and lowest is 745 mRL.

11.1.2 GEOLOGICAL AND MINEABLE RESERVES

Limestone						
Classification	**Code**	**Quantity**			**Grade**	
A. Mineral Reserve		**Forest**	**Non-Forest**	**Total**	**Forest**	**Non-Forest**
		--	Limestone	Limestone	**--**	--
1. Proved Mineral Reserve (A)	111	0	--	-	**--**	--
2. Probable Mineral Reserve (A)	121	0	4554065	4554065	**--**	CaO 48.91 MgO 1.37 SiO2 2.85
3. Probable Mineral Reserve (A)	122	0	--	--	**--**	**--**
B. Remaining Resources		0	--	--	--	**---**
1. Feasibility Mineral Resource (B)	211	0	--	--	**---**	--
2. Prefeasibility Mineral Resource (B)	221	0	3962619.76	3962619.76	**--**	CaO 48.89 MgO 1.39 SiO2 3.09
3. Prefeasibility Mineral Resource (B)	222	0	**---**		**---**	**--**

4. Measured Mineral Resource (B)	331	0	---	---	---	--
5. Indicated Mineral Resource (B)	332	0	---	---	---	--
6. Inferred Mineral Resource (B)	333	0	---	---	---	--
7. Reconnaissance Mineral Resource (B)	334	0	---	---	---	--
Total Mineral Resources (A+B) (121 + 221)		0	**8516685.08**	**8516685.08**	---	--

Clay							
Classification	**Code**	**Quantity**			**Grade**		
A. Mineral Reserve		**Forest**	**Non-Forest**	**Total**	**Forest**	**Non-Forest**	
		0	Clay	Clay	---	--	
1. Proved Mineral Reserve (A)	111	0	--	--	---	--	
2. Probable Mineral Reserve (A)	121	0	396253.36	396253.36	-	SiO2	66.7
						CaO	2.36
						MgO	0.49
3. Probable Mineral Reserve (A)	122	0	--	--	---	--	
B. Remaining Resources		0	--	--	---	--	
1. Feasibility Mineral Resource (B)	211	0	--	--	---	--	
2. Prefeasibility Mineral Resource (B)	221	0	27537.84	27537.84	--	SiO2	66.35
						CaO	2.38
						MgO	0.50
3. Prefeasibility Mineral Resource (B)	222	0	---	---	---	--	
4. Measured Mineral Resource (B)	331	0	---	---	---	--	
5. Indicated Mineral Resource (B)	332	0	---	---	---	--	
6. Inferred Mineral Resource (B)	333	0	---	---	---	--	
7. Reconnaissance Mineral Resource (B)	334	0	---	---	---	--	
Total Mineral Resources (A+B) (121 + 221)		0	**423791.2**	**423791.2**		---	

11.1.3 MINING

The mining will be done by open cast method of mining. The salient features of mode of working as per approved Mining Plan with PMCP are:-

- It is an open cast fully mechanized mining with drilling and blasting.
- The bench height and width will be kept 6m.
- The blast holes are proposed to be drilled in staggered pattern with 3.5 m spacing and 2.75 m burden for 6 m bench height and drilling parameters shall vary depending on variable bench height. Nitrate Mixture and Emulsion cast boosters are proposed to be used for blasting, Non-electric Initiation (NONEL) is proposed for bottom initiation to reduce ground vibrations.
- Drilling (115 mm dia holes) shall be done by DTH drill.
- During the mining, the bench slope will be kept 45°.
- The blasted limestone will be loaded and transported to 250 TPH crusher at cement plant (in name of M/s Goldstone Cements Ltd.).
- The limestone produced from the Umtyra Limestone and Clay Deposit shall be used for clinker manufacturing plant of GSCL (Goldstone Cements Ltd.).
- The loading will be from pits or from stocks.

11.1.4 PRODUCTION DETAILS

The year wise development of mines for five year will progress as per the table below:-

Table 11.2: Production Details

Year	Limestone ROM (Tonnes)	Production associated (Clay) (Tonnes) A	OB (Tonnes) B		Waste (Tonnes) {A+B}
			As sandy soil	As Sandstone	
1st	203189.61	121908.59	47279.1592	67622.1428	114901.32
2nd	345709.82	49144.73	26230.507	15492.66295	41723.15
3rd	358369.01	81000.78	17682.7756	18625.9669	36308.74
4th	314387.59	9931.91	5761.4308	680.2903	6441.72
5th	323284.06	16816.14	6865.612	16468.7411	23334.35
Total	**1544940.09**	**278802.15**	**103819.4846**	**118889.8041**	**222709.29**

Note: The maximum quantity (tonnes per annum) for the proposed production capacity has been taken from the proposed year wise development plan.

11.1.5 LAND USE PATTERN

Land use plan of the mine lease area to encompass pre-operational, operational and post–operational phases is given below:-

Table 11.3: Land Use Pattern

S. No.	Land Use Category	Pre-Operational (Ha.)	Operational (Ha.)	Post-Operational (Ha.)
1	Top Soil Dump	--	--	--
2	Overburden Dump	--	1.100	1.100
3	Pit & Quarry Area	--	4.000	4.000
4	Road	--	0.220	0.220
5	Infrastructure	--	--	--
6	Afforestation	--	0.960	0.960
7	Mineral Storage	--	--	--
8	Waste/Sub – grade stack yard	--	--	--
9	Area Under utility services	--	0.50	0.50
10	Undisturbed Area	6.7892	0.0092	0.0092
Total		**6.7892**	6.7892	6.7892

11.2 DESCRIPTION OF THE ENVIRONMENT

For monitoring the environmental parameters like meteorology, air, water, soil and noise quality, the monitoring stations have been established at eight locations in the study area. The baseline data has been collected in the winter season (December, 2022 to February, 2023). The detail of the sampling locations is given in below:-

Table 11.4: Sampling Location

Sr. no.	Sampling Location	Distance (Km)	Direction	Components
1	Mine site	--	--	Air, Water, Noise, Soil

2	Khliehriat Lumshnong	1.8	ENE	Air, Water, Noise, Soil
3	Thangskai	1.9	ESE	Air, Water, Noise, Soil
4	Lumshnong	3.1	SW	Air, Water, Noise, Soil
5	Umlong	4.0	SW	Air, Water, Noise, Soil
6	$25^0$11'45.96" N $92^0$20'45.32" E	1.3	SW	Air, Water, Noise, Soil
7	Near to Black tiger Cement	0.8	NW	Air, Water, Noise, Soil
8	$25^0$13'15.68" N $92^0$21'10.69" E	0.2	NW	Air, Water, Noise, Soil

11.2.1 LAND ENVIRONMENT

11.2.1.1 Soil Quality

Soil samples were collected at eight representative sampling locations. The soil analysis results are given below:-

Table 1.5: Soil Analysis

pH	:	6.56 to 7.65
Soil Conductivity	:	276.21 to 427 µmhos/cm
Total Nitrogen (N)	:	149 kg/ha. to 310 kg/ha.
Phosphorus as P	:	42.44 kg/ha to 58 kg/ha.
Potassium as K	:	174-270 (kg/ha.)

11.2.2 WATER ENVIRONMENT

Eight ground water samples have been considered in the study area. The analysis results are presented below:-

Table 11.6: Water Quality Status

S.No.	Parameter	Units	Requirement (Desirable Limits)	Permissible Limits in the Absence of Alternate Source	Mine Site	Khliehriat Lumshnong	Thangskai	Lumshnong	Umlong	$25^0$11' 45.96" N $92^0$20' 49.32" E	Near to Black Tiger Cement	$25^0$13'15.68" N $92^0$21'10.69" E
Organoleptic & Physical Parameters												
1.	Colour	Hazen Unit	5	15	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2.	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	Taste	-	Agreeable	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4.	Turbidity	NTU	1	5	<1.0	<1.0	<1	<1	<1.0	<1.0	<1	<1
5.	pH value	-	6.5-8.5	-	7.48	7.18	6.93	7.22	7.54	7.16	7.35	6.98
6	Total Dissolve Solid (TDS)	mg/l	500	2000	325.0	380.0	260.0	319.0	389.2	321.0	402.0	241.9
General Properties												
7	Aluminum (as Al)	mg/l	0.03	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
8	Total Ammonia	mg/l	0.5	No Relaxation	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
9	Anionic surface Detergents(as MBAS)	mg/l	0.2	1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
10	Barium (as Ba)	mg/l	0.7	No Relaxation	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
11	Boron (as B)	mg/l	0.5	2.4	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
12	Calcium(as Ca)	mg/l	75	200	65.27	56.82	52.39	58.20	56.95	56.95	54.32	61.47
13	Chloramines (as Cl2)	mg/l	4.0	No Relaxation	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
14	Chloride (as Cl)	mg/l	250	1000	16.26	14.39	13.82	16.84	15.73	14.62	14.69	13.95
15	Copper (as Cu)	mg/l	0.05	1.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
16	Fluoride(as F)	mg/l	1.0	1.5	0.29	0.30	0.28	0.33	0.38	0.31	0.28	0.32
17	Free Residual Chlorine	mg/l	0.2	1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
18	Iron (as Fe)	mg/l	1.0	No Relaxation	0.128	0.121	0.120	0.129	0.129	0.124	0.132	0.129
19	Magnesium (as mg)	mg/l	30	100	3.92	4.06	3.65	4.08	3.84	3.79	4.10	4.18
20	Manganese (as Mn)	mg/l	0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mineral Oil	mg/l	0.5	No Relaxation	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

22	Nitrate (as NO_3)	mg/l	45	No Relaxation	0.33	0.31	0.30	0.32	0.32	0.31	0.30	0.32
23	Selenium (as Se)	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Silver (as Ag)	mg/l	0.1	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
25	Sulphate (as SO_4)	mg/l	200	400	25.81	23.92	22.87	28.14	26.75	24.65	26.82	26.83
26	Sulphide(as H_2S)	mg/l	0.05	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Alkalinity(as Ca CO_3)	mg/l	200	600	162.0	176.0	179.0	196.0	201.0	194.0	187.0	187.0
28	Total Hardness (as $CaCO_3$)	mg/l	200	600	154.0	168.0	161.0	178.0	174.0	167.0	164.0	165.0
29	Zinc (as Zn)	mg/l	5	15	0.132	0.154	0.142	0.161	0.162	0.159	0.151	0.148
Parameters Concerning Toxic Substances												
30	Cadmium (as Cd)	mg/l	0.003	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
31	Cyanide (as CN)	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Phenol	mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Lead (as Pb)	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
34	Mercury (as Hg)	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
35	Molybdenum (Mo)	mg/l	0.07	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
36	Nickel (as Ni)	mg/l	0.02	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Poly nuclear Aromatic	mg/l	0.0001	No Relaxation	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
38	Poly chlorinated biphenyl	mg/l	0.0005	No Relaxation	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Microbiological Parameter												
39	Escherichia coli	Absent/100ml			Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
40	Coliform Bacteria	Absent/100ml			Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

11.2.3 AIR ENVIRONMENT

To assess the baseline status of the air quality in the study area systematic ambient air quality monitoring has been carried out for criteria pollutants (PM_{10}, $PM_{2.5}$, NO_X, SO_2 and CO) at eight representative ambient air quality monitoring stations.

11.2.3.1 Ambient Air Quality

Ambient air quality monitoring has been carried out with a frequency of two days a week at eight locations covering one complete season i.e. December 2022 to February 2023. The summary of these results for all the locations is given below. These are compared with the standards prescribed by Central Pollution Control Board (CPCB) for rural and residential zone.

Table 11.7: Ambient Air Quality Status

S. No.	Sampling Location		Parameters				
			PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_x (As NO_2) ($\mu g/m^3$)	CO (mg/m^3)
1.	Mine Site	Min	28.70	18.65	3.94	6.31	0.18
		Max	66.30	29.44	14.23	18.55	0.70
		Avg.	57.10	23.18	9.45	13.83	0.55
		98th% ile	66.16	29.35	14.22	18.13	0.68
2.	Khliehriat Lumshnong	Min	28.44	17.45	11.76	16.85	0.16
		Max	66.80	30.96	14.75	19.5	0.77
		Avg.	45.20	21.77	12.85	17.50	0.41
		98th% ile	66.34	30.34	14.53	19.21	0.72
3.	Thangskai	Min	28.20	17.24	11.55	15.67	0.15
		Max	69.20	31.14	13.88	18.36	0.84
		Avg.	42.79	21.93	12.55	16.78	0.41
		98th% ile	65.57	29.51	13.83	18.31	0.84
4.	Lumshnong	Min	30.52	16.64	9.23	15.62	0.28
		Max	56.30	26.65	18.56	20.31	0.59
		Avg.	46.30	19.94	13.87	18.74	0.43
		98th% ile	55.89	26.64	17.74	20.17	0.59

5.	Umlong	Min	33.45	16.66	6.35	8.25	0.24
		Max	53.47	25.52	9.98	14.65	0.55
		Avg.	41.86	20.68	8.39	11.22	0.37
		98th% ile	52.23	24.91	9.98	14.65	0.53
6.	$25^0$11'45.96" N $92^0$20'49.32" E	Min	30.99	16.76	5.19	8.26	0.24
		Max	59.63	28.65	10.90	17.85	0.68
		Avg.	44.14	20.29	7.34	11.46	0.42
		98th% ile	59.16	27.73	10.89	17.39	0.68
7.	Near to Black Tiger Cement	Min	28.70	18.65	8.14	11.25	0.39
		Max	66.30	29.63	66.30	29.44	0.58
		Avg.	53.42	25.69	23.09	16.09	0.47
		98th% ile	66.16	29.56	65.65	26.60	0.58
8.	$25^0$13'15.68" N $92^0$21'10.69" E	Min	38.14	26.20	7.59	10.52	0.28
		Max	59.24	38.86	12.12	18.21	0.47
		Avg.	44.59	28.62	8.86	11.74	0.37
		98th% ile	56.59	35.03	11.66	15.57	0.44
NAAQ STANDARDS			**100**	**60**	**80**	**80**	**2**

11.2.4 NOISE ENVIRONMENT

The noise monitoring has been conducted for determination of noise levels at eight locations in the study area. The noise levels at each location were recorded for 24 hrs. The results obtained were compared with the national standards and were found to be within the standards. The collected data are:-

Table 11.8: Ambient Noise Level Status

Location	Date of Sampling	Day Time (6.00 AM to 10.0PM)	Night Time (10.00 PM to 6.00 AM)
Mine Site	08.12.2022	57.6	43.0
Khliehriat Lumshnong	24.12.2022	51.4	39.8
Thangskai	05.12.2022	50.1	41.2
Lumshnong	04.01.2023	53.5	42.6
Umlong	18.01.2023	54.2	40.4

25^{0}11’45.96” N 92^{0}20’49.32”	23.01.2023	56.4	43.1
Near to Black Tiger Cemen	01.02.2023	52.3	37.6
25^{0}13’15.68” N 92^{0}21’10.69”	04.02.2023	52.8	38.8
Standards			
Category of Area/ Zone		Day Time	Night Time
Industrial Area		75	70
Commercial Area		65	55
Residential Area		55	45
Silence Zone		50	40

11.2.5 SOCIO-ECONOMIC ENVIRONMENT

The study area includes the 17 Villages of Meghalaya within 10 km of area from mine periphery.

Table 11.9: Demography Profile of the Study Area

S. No.	Particulars		Details
1.	No. of Villages		17
2.	Total Population		11278
	a.	Male	5582
	b.	Female	5696
3.	No. of Households		1913
4.	No. of Literates		4999
	a.	Male	2245
	b.	Female	2754
5.	Main Workers		3001
	a.	Male	1847
	b.	Female	1043
6.	Marginal Workers		1071
	a.	Male	535
	b.	Female	536
7.	Non-workers		6765
	a.	Male	2950
	b.	Female	3815

(Source: Census, 2011)

11.2.6 BIOLOGICAL ENVIRONMENT

Buffer Zone
Flora
Climber – 19 Specie
Herb – 40 Species
Shrubs - 70 Species
Tree – 74 Species
Fauna
Amphibian – 17 Species
Fish - 16 Species
Avifauna – 92 Species
Butterflies – 28 Species
Mammals – 27 Species

11.3 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

The summary of anticipated adverse environmental impacts due to the existing mine and mitigation measures are given below:-

Impact	Mitigation Measures
Land Environment	
Land will be degraded due to mining and dumping of waste	➢ The total excavated area is about 4.00 ha. which will be converted into water reservoir, this may help in recharging the surrounding ground water table. It is proposed to develop green belt on the 7.5m safety zone over 0.961 ha. with 2402 saplings. The extent of impact will however; be confined within lease area only.
Water Environment	
Discharge of effluents water from the mine. Intersection of ground water table during mining operations.	There will be no discharge of effluent from the mine. As per the approved Mining Plan along with PMCP, ultimate pit level (704 mRL) will be above the ground water table and hence it will not be intersected.
Air Environment	

➢ Dust will be generated mainly during excavation, loading & unloading activities. ➢ Gaseous pollutants will by generated mostly by the traffic.	➢ It will be ensured that all the vehicles plying in the working zone are properly tuned and maintained to keep emissions within the permissible limits. ➢ At loading & unloading points and transportation routes, arrangement for water sprinkling will be made to minimize dust generation. ➢ In order to predict changes in the air quality, AERMOD version 8.8.0 model was used. The maximum predicted ground level concentrations of particulate matter PM_{10} & $PM_{2.5,}$ NOx, CO from the different mining activities for the study period (Winter Season) were observed to be 0.05576 µg/m^3 & 0.034 µg/$m^{3,}$ 0.00408 µg/m^3, 0.000025 mg/m^3 respectively. ➢ The resultant will remain within the National Ambient Air Quality Standards for industrial/ residential areas.
Noise Environment	
➢ Noise due to mining activities. ➢ Noise due to vehicular movement.	➢ The noise levels from all these sources are periodical and restricted to particular operation. ➢ Blasting will be carried out in day time and to minimize the impact of noise and vibration delayed blasting technique will be used for the proposed project. ➢ The noise measurement data indicated that present noise levels in the study area is within the permissible limits of National Ambient Noise Quality Standards. ➢ Thus, due to natural attenuation effects by proper green belt/ maintenance of machines etc., the impact of noise levels will be minimal.
Socio-Economic Environment	

➢ Employment generation ➢ Health impacts ➢ Education Facilities	➢ The mining activity puts negligible change in the socio economic profile. ➢ No displacement (0) is proposed due to proposed mine. ➢ Approx. 78 local workers will get employment opportunities along with periodical training to generate local skills.
	➢ New patterns of indirect employment/ income will generate. ➢ Regular health Check up camp. ➢ Assistance to schools and scholarship to children will be provided.
Biological Environment	

➢ Impact on biodiversity ➢ Impact on threatened species	➢ The mining activity will have insignificant effect on the existing flora and fauna. The purpose of the project itself is to save the flora around the project area. ➢ The existing vegetation within the mining area includes trees and shrubs vegetation. They will not be disturbed due to the mining activity. So, the impact on the vegetation is very less. ➢ The transportation of waste may create dust pollution which may create loss of biodiversity of the area. ➢ Dust in atmosphere, contributed by mining and associated activities, when deposited on the leaves of the plants in the surrounding areas may retard their growth. ➢ The growth of vegetation in and around the complexes. Noise and vibrations due to blasting and operation of the machines drive away the wild animals and birds from the nearby nests. ➢ The cluster area and its buffer zone are devoid of any eco sensitive area. So the impact on the biodiversity and wild life is minimal. ➢ Green belt will be developed along the individual lease boundary which will act as a pollution barrier for the biological environment. ➢ There is the proposal for plantation along the haul road of individual lease and also along the connecting road. ➢ The blasting, drilling and transportation will be carried out during the day time only minimizing the impact on the wild fauna movement. ➢ All the necessary pollution control measures will be undertaken by the lessee to minimize the impact on the surrounding environment.

11.4 ENVIRONMENTAL MONITORING PROGRAMME

11.4.1 AIR

Air quality monitoring will be carried out as per norms of SPCB and CPCB.

11.4.2 WATER

Regular monitoring of ground water quality will be carried out at suitable locations. Water samples will be collected four times in a year i.e. Pre - Monsoon, Monsoon, Post - Monsoon and Winter.

11.4.3 NOISE

Noise level will be recorded periodically at mine site near operating machines during day and

night time.

11.4.4 HEALTH AND SANITATION

Periodical medical checkup of workers is being done and medical facility provided. Toilets and urinals will be provided near the mine site. Drinking water will be made available to the workers.

11.5 ADDITIONAL STUDIES

11.5.1 PUBLIC HEARING

Public hearing will be conducted as per the guidelines of EIA Notification14th September, 2006 and its subsequent amendments.

11.5.2 RISK ASSESSMENT & MANAGEMENT

Risk analysis is the systematic study of uncertainties and risks encountered in various areas. Risk analysts seek to identify the risks involved in mining operations, to understand how and when they arise, and estimate the impact (financial or otherwise) of adverse outcomes. It also defines and analyzes the dangers to individuals, businesses and government agencies posed by potential natural and human-caused adverse events.

However, there are various factors, which can create unsafe working conditions/ hazards in mining of Boulder Stone (Minor minerals). The following types of hazards are identified during the Stone mining operations:-

1. Accident during mineral loading, transportation and dumping
2. Accident due to vehicular movement
3. Inundation/ Flooding

Following procedure will be followed for effective management of any disaster in the mine.

Step 1: Identification of Disaster risk.

Step 2: Identification of persons at risk

Step 3: Removal of Hazard

Step 4: Evaluation of the risk

Step 5: Control measures to be taken

Step 6: Maintain Assessment records

Step 7: Review

11.6 PROJECT BENEFITS

The demand of Limestone and Clay has been rising in the state as a result of rising in industrial

activities and development of the existing project aims to fulfill the supply of Limestone and Clay. The capacity of mine is Limestone @ 358369 TPA (max), Production Associated (Clay) @ 121909 TPA (max), OB as Sandstone @ 67,622 TPA (max) & as Sandy Soil @47279 TPA (max) aiming to fill the demand – supply gap.

This proposed mining project will generate direct and indirect employment. Economy of the area will get a boost and there will be overall growth of the region in terms of education, health, training, awareness, transport, automobile, industry, and infrastructure. The standard of living accordingly will also get an upliftment on the positive side. Plantation will be carried out as social forestry programme in villages, school and the areas allocated by the Panchayat/ State authorities to improve environment of its surrounding area.

11.7 ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan (EMP) aims at the reservation of ecological system by considering in – built pollution abatement facilities at the mine site. Some of the major criteria governing the environmental measures will be adopted.

11.7.1 LAND USE MANAGEMENT

The following reclamation plan will be adopted in this mine.

1) At the end of life of mine, total excavated area will be of 5.804 ha.
2) Greenbelt is proposed to develop over an area of 0.985 ha.

11.7.2 WATER POLLUTION MANAGEMENT

Some of the control measures adopted for controlling water pollution are as follows:-

- Based on results from monitoring corrective regulatory measures will be taken.
- Measurement of water level fluctuations to assess impact of mining activity on the water table depletion in close proximity of dug wells and bore wells.
- Regular monitoring and analysis of water samples at strategic locations will be carried out to monitor the water quality.
- Domestic waste water will be channelized into septic tank followed by soak pit.

11.7.3 AIR POLLUTION MANAGEMENT

Following mitigation measures are envisaged:-

- The speed of the vehicles will be maintained uniform.
- Regular pollution checks and certification of vehicles will be done.
- Limited number of mine-related vehicle will be maintained on the public roadways to reduce the traffic to minimize impacts on local people.

- The loaded vehicles will be covered with tarpaulin.
- Over loading will be avoided and free board will be left in the loaded trucks to prevent spillage.
- The roads will be maintained.
- Regular cleaning will be done to reduce the chances of road dust to become airborne.
- Water sprinkling will be done on a fixed stretch of paved road.
- Natural barriers will be developed along the roadside to control the dispersion of dust particles.
- Speed breakers will be constructed to restrict the speed of transporting vehicles. However, limiting of vehicular speed will be adopted.
- Regular monitoring and analysis will be carried out through collection of air samples from strategic monitoring sites. If the parameters go beyond the permissible tolerance limits, corrective regulation measure will be taken.

11.7.4 NOISE POLLUTION MANAGEMENT

The following control measures are to be undertaken to bring down the noise levels:-

- Noisy activities will be scheduled at normal working hours (daytime hours) to the extent possible when the environment is least sensitive to noise impact.
- Regular inspection and maintenance of vehicles and equipment will be performed to ensure efficiency and worn parts will be replaced.
- The vehicles will be maintained in good condition and overloading will not be done.
- Speed limits will be enforced in relation to road conditions and on-route communities.
- Noise monitoring will be conducted on a regular basis to determine compliance with noise criteria.
- Personal Protective Equipments i.e., earmuffs and earplugs will be provided to workers, working in high noise areas.
- Periodical medical checkup will be organized for all workers to check any noise related health problems.
- Operational noise level status will be displayed on machines to identify the extent of noise level and to control the exposure times at which worker are exposed to higher noise levels.

11.7.5 OCCUPATIONAL HEALTH AND SAFETY

- To avoid any adverse effect on the health of the workers due to dust, noise etc. extensive measures has to be adapted related to safety aspect.
- Regular maintenance and testing all the tools & equipments as per manufacturer's guidelines.

- Provision of personal protective equipment to the workers working in the mine.
- Periodical Medical Examination of all workers by medical specialists will be conducted.
- Awareness program will be organized for workers.

11.7.6 SOCIO-ECONOMIC MANAGEMENT

- Environmental Officer will be responsible to take care the performance of mine on environmental issues.
- Approx. 78 local workers will be directly and about 5-10 will be indirectly employed.
- Employment opportunities along with periodical training to generate local skills.
- Local employment will be ensured. On the job training to local people will be given and periodically upgraded.
- Regular health camps will be carried out.

11.7.7 BIOLOGICAL MANAGEMENT

No adverse impact & no genetic diversity loss are anticipated from the mining activity. However due care & extensive plantation activity will be undertaken to reduce impact from the activity.

11.8 CONCLUSION

EIA study was performed as per the approved ToR. Various environmental attributes were studied relating with aspects of mining activities. The related impacts were identified and evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and accordingly fund was allocated. The EMP has been dynamic, flexible and subject to periodic review.

The project will increase the revenue of the State Govt. as well as it will help in the social upliftment of the local people. The greenbelt development programme will help in increasing the green cover in the nearby areas. Thus, the project is not likely to affect the environment or adjacent ecosystem adversely. The Management will be responsible for the project review of EMP and its implementation to ensure that the EMP remains effective and appropriate. Thus, the proper steps will be taken to accomplish all the goals mentioned in the EMP and the project will bring the positive impact in the study area.

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