

EXECUTIVE SUMMARY

“Umsangat Limestone Deposit - II”

At

***Musiang Lamare (Old), Khliehriat Taluk,
East Jaintia hills District, Meghalaya***

Extent: 9.16 Ha.

Proposed Capacity: 10,00,798 tonnes/annum

of

M/s. GOLDSTONE CEMENTS LIMITED

***Musiang Lamare (Old) village, Khliehriat,
East Jaintia hills district, Meghalaya state-793200.***

Prepared By

NABET/EIA/2124/RA 0231-REV.02



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Executive Summary

1.0 INTRODUCTION

M/s. Goldstone Cements Limited (GSCL), has notified for a Umsangat Limestone Deposit-II over an extent of 22.63 Acres (9.16 Ha) of Non-Forest Land in Umsangat, Musiang Lamare (Old) Village, East Jaintia District, Meghalaya State. This lease area is notified by Mining & Geology, Government of Meghalaya, vide letter No. 81/2022/131, dated 23.12.2022.

The said lease is having an approved mining plan for the maximum production of 1000798.40 tonnes/annum (in the fifth year of mining plan period) as approved by Indian Bureau of Mines, Guwahati vide Letter No. MCDR-MP/8/2024-GUH-IBM_RO_GUH Dated:16.08.2024.

As per the EIA notification of Ministry of Environment Forests and Climate Change, Government of India (MoEF&CC), dated 14th September, 2006, and subsequent as amended from time to time, this mining project falls under category 'B1' project, activity 1(a) of EIA Notification, an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) is required for obtaining Environmental clearance based on Terms of Reference (TOR) as approved by the State level Environment Impact Assessment Authority (SEIAA) – Meghalaya.

Further to assess the impact on environment, it is necessary to ascertain present status of environment prevailing at the project site and proposed Mining and operation including identification and Assessment of impact on the environment. Keeping these points and statutory requirement in view, this Environment Impact Assessment Report (EIA) and Environmental Management Plan (EMP) has been prepared. The Environmental Study has been carried out within 10 km radius from the mine area for the period of March 2024 to May 2024 (Summer Season).

2.0 PROJECT DESCRIPTION

Table.No.1 Project Details

Sl. No	Item	Details
1	Name of the project	Umsangat limestone deposit-II of M/s. Goldstone Cements Limited (GSCL)
2	Project Location	Village – Musiang Lamare (Old) Taluk – Khliehriat District – East Jaintia Hills State - Meghalaya
3	Nature of Project	Mining of Limestone
4	Extent of the Lease Area	9.16 Ha. (22.63 Acres)
5	Proposed Production Capacity	The maximum production of RoM per

		annum shall be 1000798.40 tonnes/annum and waste quantity of 596869.80 tonnes/annum.
6	Category of Project	B1
7	Land Type	Non- Forest Land
8	Topo sheet	83C/8
9	Coordinates Latitude Longitude	N 25°11'16.59" to N 25°11'31.06" E 92°20'17.51" to E 92°20'33.34"
10	New / Expansion / Modernization	New
11	Importance of Project	This mining project is located in the rich resource limestone area and shall have positive impact on socio-economics. The limestone of this area is used for making of Cement production and it will be consumed in Goldstone Plant.
Environmental Setting Details (With approximate aerial distance and direction from the mining lease boundary)		
12	Nearest Village	Umlong is located at distance of 2.7 km Southwest from the lease area.
13	Nearest City	Khliehriat is located at distance of 24.0 km Northeast from the lease area.
14	Nearest National Highway	NH-06 (Shillong to Aizawl) is located at distance of 5.1 km East from the mining lease area.
15	Nearest Railway Station, Airport, Sea port	Nearest railway station Badarpur Railway Station is at a distance of 90 km. Nearest airport is Guwahati Lokapriya Gopinath Bordoi international Airport is located at a distance of 124 km from said mine. Pandu sea port is located at a distance of 218 km from said mine.
16	Interstate Boundary	16.35 km (Meghalaya – Assam) Northeast from the mining lease area.
17	Archeological Places,	Chieh ruphi Presbyterian – 3.53 km from the proposed mining lease area.
18	National Park, Wild Life Sanctuary, Wild Life Corridors, Biosphere Reserves, Migratory routes for Birds. Reserved / Protected Forest with in 10km radius study area	Narpuh Wildlife Sanctuary is at a distance of 7.44 km Southeast from the mining lease area. ESZ of Narpuh Wildlife Sanctuary is at a distance of 6.24 km from lease area. Narpuh Reserve Forest is located 10.88 km in SE direction.
19	Water bodies with in 10km radius.	The Umkhar River is at distance of 2.35 kms west from the mine lease area and Seasonal nallah is at 0.050 km from the boundary periphery.

20	Seismic Zone	Zone – V [as per IS 1893 (Part-I): 2002]
Cost Details		
21	Total Project Cost	1237.48 lakhs
22	Cost of Environmental Protection Measures (Recurring cost)	12.60 lakhs

MINING DETAILS

Sl.No.	Particulars	Details
1	Method of Mining	Opencast Mining by Mechanized Method
2	Limestone Production Capacity	Max 1000798.40 tonnes/annum
3	Total Mineable Reserves	8090800.97 tonnes
4	Total waste generation till the end of Life of Mine	4322215 tonnes
5	Life of Mine	21 years
6	Bench Height	9m
7	Bench Width	9m
8	Elevation Range	Highest elevation is 712 mRL Lowest elevation is 643mRL
9	General Ground Level	625m AMSL
10	Ground water table	50-70m BGL
11	Ultimate working depth	30m
12	Overall pit slope	45 ⁰

3.0 GEOLOGY:**3.1 TOPOGRAPHY:**

This limestone mine is rugged and mountainous. The highest elevation in this area is 860mRL and the lowest elevation is 190mRL.

The slopes are trending towards Eastern as well as northern side. The height in the ML area is about 18m from general ground level.

3.2 REGIONAL GEOLOGY:

The Leasehold is a part of the Meghalaya shelf, an extension of the Bengal Basin. The regional stratigraphic sequence in the region.

Group	Formation	AGE	Rock-type
Barail Group		Oligocene	Sandstone and shale
Jaintia Group	Kopili formation	Upper Eocene	Alternation of shales and sandstones with bands of calcareous sandstone and shale.
	Shella Formation (Sylhet Limestone)	Middle Eocene	Prang Fossiliferous Limestone Nurpuh Sandstone
		Lower Eocene to Upper Paleocene	Umlatdoh limestone Lakadong Sandstone Lakadong Limestone
	Theria Formation	Lower Paleocene	Upper Hard Sandstone Lower Limestone and Calcareous Sandstone.
Mahadek/Langpur Formation		Upper Cretaceous	Sandstone, Limestone, Shale, Boulder bed,

3.3 LOCAL GEOLOGY:

The geological makeup of the prospecting area falls within the Kopili and Shella formations of the Jaintia group, situated on the Meghalaya Shelf. Notably, there's a single band of exposed limestone in the area. The sandstone layer, situated above the Prang limestone, varies in thickness from 1.50 to 35.00 meters and showcases colors ranging from pale white to yellow-brown, reddish-yellow, or reddish-brown. It primarily consists of medium-grained soft sandstone, occasionally varying in grain size from fine to coarse. At its uppermost part, it tends to weather into a fragile state similar to sludge. Moreover, there are additional layers within the Prang Limestone, including 2 to 3-meter-thick

sandstone band and 1-meter-thick shale band. Exploration data suggests that the limestone band's thickness ranges from 43.00 to 114.50 meters. These deposits are characterized as extensive, uninterrupted, horizontally layered or gently dipping, with minimal geological disturbance, abundant surface exposures, and consistent quality.

3.4 GEOLOGICAL RESERVES

The total estimated geological resources of Limestone in this area are 14759734.00 tonnes.

The details are given in the Table 2 below:

Table No - 2: GEOLOGICAL RESERVES

MEASURED MINERAL RESOURCES (331) OF PROSPECTING LICENCE AREA (9.16Ha.) OF M/s. GOLDSTONE CEMENTS LIMITED				
Sections	Sectional influence in (m)	LIMESTONE		
		Sectional area in (m ²)	Volume in (m ³)	Qty @ 2.66 t/m ³ B.D with 90% Rec. in Tonnes
1 - 1'	90	8873	798570	2124196
2 - 2'	90	11780	1060200	2820132
2A - 2'	73.5	3836	281946	749976
3 - 3'	95	20076	1907220	5073205
4 - 4'	75	14028	1052100	2798586
5 - 5'	74	6064	448736	1193638
Total				14759734

3.5 Mineral Reserves:

The total Mineral reserves of limestone in this mine area 8090800.97 tonnes. The mineral reserves of limestone are estimated out of indicated resources after deleting the rock blocked in the 7.5m safety barrier. The reserves have been estimated using cross sections drawn at an interval of 101m depending upon the limestone availability & shape of the lease. From the cross-sectional area of limestone zone, volumes are arrived using the cross-sectional interval. The recovery of limestone is considered as 90%.

3.6 MINING:

The proposal is made for the opencast mechanized method. It is proposed to produce maximum quantity of 1000798.40 tonnes/annum Limestone from this mining in the V-year of plan period. Four benches shall be developed during this plan period along the strike of the ore body. The height of the bench shall be maintained to 9m with the width of 9m. The individual bench slope shall be 80° to 90°, whereas the ultimate bench slope shall be 45°.

The mode of working will be mechanized opencast mining method. The operations involved are.

- The benches in Limestone and overburden are made at 9 mts height.
- The width of working bench will always be more than 9 meters.
- Drilling and blasting shall be done by Hydraulic Drill.
- The excavator shall be used for excavation.
- The mine workings will strictly follow the provisions of MMR 1961 and related statute.
- Regular face sampling, exploration data and experience of personnel ensures excellent quality control and best conservation practice.
- The ROM shall be delivered to the crushing and screening plant for processing.
- The A mud bund will be constructed all along the edge of the road as a protection wall. The height of the bund shall be 0.3 to 0.5 m.
- Roads and ramps are provided at proper gradient and width, 1 in 16 maintains on haulage road.

It is proposed to produce maximum 1000798.40 tonnes of RoM from this Mining in the V-year plan period. An open cast, mechanized mine method, will be adopted to operate the area. The Mine is planned out in such a way by taking advantage of the geological structures especially the major sets of joints. The height of the bench shall be maintained to 9m with the width of 9m. The bench slope shall be maintained to 45°.

Initially drilling by pneumatic jack hammers (hole diameter-33mm) shall be done at appropriate intervals (20-30 cms) to the desired depth. Smooth blasting is affected by using gun powder. The loose joints can be split by feather and wedges. If the joints are tight, as we go deep, the methodology will change accordingly.

PROPOSED PRODUCTION:

The recovery of limestone in this Mining is around 90%. The year wise proposed development and production in tonnes is given in the Table No – 3

Table No.3: -Proposed Production & Development

Year	Waste/ Mineral rejects (Tonnes)	RoM (Tonnes)			Ore to over burden ratio
		ROM Total	Saleable	Subgrade/ Mineral rejects	
1	596869.80	300460.30	300460.30	0.00	0.50
2	145828.80	500598.70	500598.70	0.00	3.43
3	240944.70	750771.70	750771.70	0.00	3.12

4	577472.70	750758.40	750758.40	0.00	1.30
5	112545.00	1000798.40	1000798.40	0.00	8.89
Total	1673661.0	3303387.50	3303387.50	0.00	1.97

3.6.1 MINEABLE RESERVES AND ANTICIPATED LIFE OF THE MINE:

The total mineable reserves in the lease area are 8090800.97 tonnes. It is proposed to produce 3303387.50 tonnes of limestone from this area in this plan period. The left-over material shall be produced at later stage; hence the life of the mine is 21 years.

Around 1673661.0 tonnes of waste shall be generated during the plan period. This waste is hard in nature. The generated waste during Mining shall be utilized for strengthening of existing approach roads to the mine. The waste also can be transported to the nearby crushers after obtaining due permission as well as permit from the Department of Mines & Geology. The waste generated during Mining shall be loaded to tippers by excavator and dumped at the 2.75 Ha area earmarked for dumping.

3.8 DRILLING & BLASTING:

Maximum limestone handling 1000798.40 tonnes and maximum waste handling is 596869.80 tonnes. Entire area requires drilling and blasting. Hydraulic drilling shall be done by using parameters like 3.0m X 4.5m burden and spacing and 10m depth of 115mm dia.

3.9 EMPLOYMENT POTENTIAL:

The man power required shall employed from the local areas. The drivers / truck Operators also shall be engaged from local areas. Hence influx of population from Outside is not anticipated. Others shall be employed through contractor.

Table No.4: -Employment Potential

Sl. No	Particulars	No's
1	Skilled	50
2	Semi-Skilled	11
4	Un-skilled	5
	Total	66

3.10 SITE SERVICES:

As at present there is no any site services exist, now it is proposed a small office, rest shelter, first aid room and urinal shall be constructed at the entrance of the lease area.

4.0 LAND USE:

The ultimate land use plan, the land proposed to be degraded due to Mining and other allied activities at the end of Plan Period is given in Table No.5.

Table No.5: -Land use at the end of Plan period & Conceptual Plan

Sl. No	Particulars	Present Land Use (Acres.)	Land Use at the end of Plan Period (Acres.)	Land Use at the end of conceptual Period (Acres.)
1	Area for Mining	0.00	4.55	8.05
2	Area for Roads	0.42	0.20	0.00
3	Area for Greenbelt	0.00	1.11	1.11
4	Overburden/Waste Dumping	0.00	2.75	0.00
5	Others (Garland drain & Retaining wall)	0.00	0.23	0.00
6	Unused area	8.74	0.32	0.00
Total		9.16	9.16	9.16

5.0 NATIONAL SANCTUARY/ ARCHAEOLOGICAL IMPORTANCE SITES/ INTERSTATE BOUNDARY WITHIN 10 KMS RADIUS?

Narpuh Wildlife Sanctuary is at a distance of 7.44 km Southeast from the mining lease area. ESZ of Narpuh Wildlife Sanctuary is at a distance of 6.24 km from lease area. Narpuh Reserve Forest is located 10.88 km in SE direction. The Archeological Place Chiehruphi Presbyterian is at distance of 2.52 km from the proposed mining lease area.

6.0 PUBLIC BUILDINGS, PLACES OF WORKSHIP AND MONUMENTS :

There are no buildings and monuments of historic importance within the ML area. However, Church is available in every village of the study area which have its own significance and importance as per the people's belief.

7.0 COST OF THE PROJECT:

Considering the fluctuating market scenario and present domestic market conditions of the products, the cost of the project estimated to be 1237.48 lakhs.

8.0 ENVIRONMENTAL STUDIES:

The Environmental Monitoring studies were carried out during March 2024 to May 2024 (Summer Season). The environmental studies were carried out in Core zone and buffer zone of 10 kms radius for Meteorological data, Air, Water, Noise, Soil, Flora, Fauna etc.,

8.1 METEOROLOGY:

8.1.1 Temperature

On perusal of last 10 years temperature data reveals that the highest temperature is 30.00°C during the peak summer season & maintains the maximum temperature for a week. The summary of the 3 months study period (March 2024 to May 2024) temperature data is given in the Table No.6.

Table No.6: - Monthly Maximum & Minimum Temperature

Month	Temperature in °C		
	Min.	Max.	Avg.
March-2024	10.6	27.9	19.6
April-2024	17.1	29.3	23.3
May-2024	17.4	35.1	24.4

The perusal of mean monthly temperature data shows that lowest & highest temperature of 10.6°C and 35.1°C respectively were observed in the month of March 2024 to May 2024.

8.1.2 Relative Humidity

The morning and evening relative humidity data collected during the study period is shows that the highest humidity is 99% in March, April and May-2024 and lowest humidity is 34% in March-2024. The values of different month for the study period are given in the below Table No.7.

Table No.7: - Monthly maximum & Minimum Relative Humidity

Month	Relative Humidity in %		
	Min.	Max.	Avg.
March-2024	34	99	76.9
April-2024	42	99	84.6
May-2024	49	99	84.0

8.1.3 Rainfall

The summary of the rainfall data of month wise is given in the Table No.8.

Table No.8: - Monthly Rainfall 2024

Year	Rainfall (mm)
March-2024	106.3
April-2024	250.8
May-2024	532.1

The Maximum is 532.1mm rainfall in the month of May-24 and minimum rainfall of 106.3mm is observed in the month of March-2024.

8.1.4 Wind Velocity & Direction

Predominant Wind directions during this period were from the SW to NE sector. Wind speeds during this period were varying between 6.2-27.8 kmph. Percentage frequencies of wind in 16 directions have been computed from the recorded data of winter season during the study period to plot wind rose diagram. The maximum wind speed is 27.8 km/h during study period. For the month of March, April & May 2024 flow vector is predominantly towards SW to NE.

Table No.9: - Monthly wind speed and direction 2024

Month	Wind Speed in Km/hr.		Predominant wind Direction
	Min.	Max.	
March-2024	16.5	7.2	SW to NE
April-2024	16.3	7.3	SW to NE
May-2024	27.8	6.2	SSW to NNE

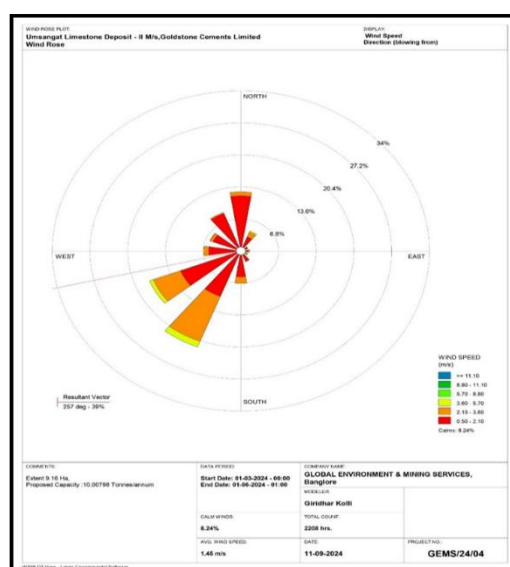


Fig: 1 Windrose Diagram of March 2024 to May 2024

8.2 AIR ENVIRONMENT:

Ambient air quality of the study area has been assessed through a network of nine (9) monitoring stations, out of these 9 stations, two were set up in core zone, while the rest were outside the mining lease in buffer zone and within a radius of 10 km.

Concentrations of PM₁₀, PM_{2.5}, SO₂ and NO_x are mainly contributed due to vehicular traffic and local activities. The following is the summary of Ambient Air quality in the study area.

Table No.10: -Summary of Ambient Air Quality ($\mu\text{g}/\text{m}^3$)

Station Code	Locations	24 hrs average contribution ($\mu\text{g}/\text{m}^3$)							
		PM ₁₀		PM _{2.5}		SO ₂		NO _x	
		Min	Max	Min	Max	Min	Max	Min	Max

A1	Core zone	32.56	62.15	12.54	23.56	5.11	12.50	7.12	15.10
A2	Downwind side	36.45	65.45	13.71	29.82	3.84	15.19	4.12	17.28
A3	Umlong	34.18	66.25	7.83	24.62	3.13	13.91	3.78	16.13
A4	Umrasiang	31.68	68.84	8.10	21.55	2.40	12.17	4.89	14.08
A5	Mynkre	41.48	69.82	11.88	21.94	3.36	13.10	4.25	14.08
A6	Thangskai	40.31	67.82	13.48	27.80	2.76	12.87	4.37	12.49
A7	Lumshnong	38.41	66.59	11.16	20.59	4.17	13.24	4.69	13.32
A8	Chieh ruphi	31.87	61.41	9.48	19.50	6.34	12.50	7.20	13.16
A9	Brishyrnot	30.15	67.12	8.21	22.53	3.36	13.03	5.19	13.11

In general, Mining activity contributes to pollution of air due to working of mining equipment and transportation. Since the mine is proposed to work by fully mechanized means, there is pollution to the air. However, the ambient air quality results area well within the standards and lead is Below Detectable Limits.

CONTROL MEASURES

Following measures shall be adopted to mitigate air pollution generated due to the Mining activities:

- In mining activities, the only source of gaseous emissions is from diesel engines, other vehicles and equipments.
- Blasting of explosive results in increase of oxides of nitrogen in the air, which gets diluted by the wind. Blasting with optimum use of explosive energy will help in reducing the above emissions.
- The emissions from diesel engines of the machinery could be visible as smoke or invisible gases such as Sulphur Dioxide, Oxides of Nitrogen and un-burnt. Hydrocarbons due to incomplete combustion of fuel. The reasons may be quality of fuel, improper operation of the engine, etc.
- Proper maintenance of machines improves combustion process and brings the reduction in pollution. The effect of these gases will be limited to the surrounding of the equipment in operation only and will not affect the nearby community.

8.2.3 AIR EMISSION AND DISPERSION MODELING

Source dispersion analysis is assumed based on AERMOD View™ model (Lakes Environmental Software). This model enables analysis with respect to Particulate Matter PM₁₀ & PM_{2.5} given results are simple to understand graphical format. Modeled pollutant concentrations for operations phase scenario is given in below shown Table No.11.

Table No.11: - Air Quality Predictions (March-2024 to May-2024)

Station No	Station Name	Baseline Max Value	Predicted GLC	Cumulative Concentrations
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		PM 10	PM2.5	PM 10	PM2.5	PM 10	PM2.5
AAQ1	Core Zone	62.15	23.56	0.022	0.011	62.172	23.567
AAQ2	Downwind Direction	65.45	29.82	0.776	0.383	66.226	30.202
AAQ3	Umlong	66.25	24.62	0.142	0.066	66.394	24.691
AAQ4	Umrasiang	68.84	21.55	0.007	0.003	68.847	21.549
AAQ5	Mynkre	69.82	21.94	0.013	0.006	69.836	21.947
AAQ6	Thangskai	67.82	27.80	0.056	0.026	67.877	27.826
AAQ7	Lumshnong	66.59	20.59	0.058	0.027	66.647	20.613
AAQ8	Cheiruphi	61.41	19.50	0.008	0.004	61.415	19.505
AAQ9	Brishyrnot	67.12	22.53	0.017	0.008	67.137	22.541

8.3 NOISE QUALITY

Noise levels in the proposed mine will be produced due to movement of vehicles for transportation of Limestone. But the pronounced effect of noise is felt only near the active working area. Since the proposed Mine will adopt opencast mechanized method for mining, there will not be much impact on the surrounding villages due to the mining operations.

Noise pollution in Mining area is mainly due to noise generation from the moving of machinery & Transportation. The noise level may increase in core zone due to drilling and Mining operations. Since this mine is worked by means of opencast mechanized, the noise levels are monitored as per the norms laid down by the governing agencies. The results are shown in the following Table No.12.

Table No.12: -Summary of the Noise Level

Sl. No	Location	Environmental Setting*	Average Day Noise level (dBA)			Average Night Noise level (dBA)			Day time (6.0 am to 10.0 pm)	Night time (10.00 pm to 6.00 am)
			Mar-2024	Apr-2024	May-2024	Mar-2024	Apr-2024	May-2024	Standard (Leq in dBA)	Standard (Leq in dBA)
Core Zone										
1	Core Zone	Industrial area	48.51	43.52	48.64	37.75	37.24	37.64	75	70
2	Guest house		48.92	43.37	52.93	43.11	34.14	38.35	75	70
Buffer Zone										
3	Umlong	Residential area	43.84	44.77	48.50	40.87	34.94	41.04	55	45
4	Umrasiang		43.10	43.69	48.11	38.94	38.87	40.02	55	45
5	Musiang lamare (Old)		42.48	42.92	43.77	37.32	37.35	42.25	55	45
6	Thangskai		42.68	43.32	42.80	38.48	35.80	38.48	55	45
7	Mynkre		49.51	47.26	52.94	42.10	44.58	39.17	55	45
8	Cheiruphi		49.43	49.71	49.85	38.22	38.18	39.84	55	45

9	Brishyrnot		51.82	51.89	52.40	41.62	41.65	41.17	55	45
10	Lumshnong		52.90	51.90	53.87	42.40	40.98	42.82	55	45

Ambient noise levels were measured at 10 locations around the Mine site. the highest noise level is (Ld/n = 61.8 dB (A), which can be attributed to local prevailing environment (Traffic and Mining activities). However, the recorded noise levels at all locations found well within the industrial zone limits (75 dB (A)). In villages the levels are found well within the permissible residential limits (55 dB (A)).

8.3.2 NOISE CONTROL MEASURES

Noise levels will be kept within acceptable limits by:

- Use of sharp drilling bits, delivery of compressed air at optimal pressure and proper maintenance of compressor, drilling machine, jack hammers and tipper trucks. Particular attention should be given to the silencers and mufflers.
- Ear muffs or other protective devices shall be provided to the staff working in high noise prone areas and Provisions of rotation of workers to minimize exposure time shall be envisaged.
- Limiting the speed of empty haulage vehicles/tippers to a moderate level to prevent undue noise.
- A green belt shall be developed all around the lease boundary to minimize propagation of noise.
- Regular monitoring of noise pressure level shall be done inside and outside the Mine lease area.

8.4 WATER ENVIRONMENT

13 water samples were collected from different locations. Two (2) Ground water samples and Eleven (11) surface water samples collected from the study area showed compliance of all parameters with the drinking water standard of IS 10500.

Table No.13: -Summary of the Water Analysis Results (Ground water & Surface Water)

Sl. No	Parameters	Unit	RESULTS Summer Season (Mar-2024 to May-2024)		Standards	
			GW1	GW2	Acceptable	Permissible
1	pH	-	7.31	7.82	6.5	8.5
2	Total Dissolved Solids	mg/l	204	290	500	2000
3	Total Alkalinity as CaCO ₃	mg/l	160.38	184	200	600

4	Total Hardness as CaCO ₃	mg/l	187.46	196	200	600
5	Calcium as Ca	mg/l	64.43	57.17	75	200
6	Magnesium as Mg	mg/l	6.39	21.16	30	100
7	Chlorides as Cl	mg/l	11.98	14.7	250	1000
8	Sulphates as SO ₄	mg/l	15.16	41.14	200	400
9	Nitrates as NO ₃	mg/l	3.56	6.19	45	NR
10	Fluorides as F	mg/l	0.48	0.1	1.0	1.5
11	Iron as Fe	mg/l	0.12	0.2	0.3	NR

GW1- Mynkre (Near Goldstone guest house)

GW2- Lumshnong (Divine word secondary school)

Sl. No	Parameters	Unit	RESULTS Summer Season (March-2024 to May-2024)										
			SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	SW10	SW11
1	pH	-	7.4	7.4	6.55	6.14	8.3	5.72	6.06	7.18	6.54	8.01	7.7
2	Total Dissolved Solids	mg/l	191	184	760	82	210	93.2	144	163	124	210	293
3	Dissolved Oxygen (DO)	mg/l	5.1	6.4	4.9	5.5	6.5	5.7	4.9	5.2	4.8	5.6	7.2
4	Total Alkalinity as CaCO ₃	mg/l	41.63	41.62	23.76	40.58	112.86	31.34	65.34	20.82	31.24	95.04	114.42
5	Total Hardness as CaCO ₃	mg/l	47.53	153.01	49.44	47.46	160.68	56	133.9	162	66.43	189.52	170
6	Calcium as Ca	mg/l	16.3	40.83	16.32	16.37	53.85	16.3	40.8	12.3	12.28	61.2	48.94
7	Magnesium as Mg	mg/l	1.84	12.6	2.29	1.59	6.33	3.71	7.75	31.89	8.68	8.87	11.58
8	Chlorides as Cl	mg/l	24.6	19.81	13.82	14.7	12.9	19.73	14.74	24.6	19.72	15.66	24.6
9	Sulphates as SO ₄	mg/l	17.03	76.3	18.56	18.69	51.56	20.97	24.65	80.64	53.5	44.32	41.08
10	Nitrates as NO ₃	mg/l	3.56	6.3	2.11	3.19	4.32	3.15	5.32	5.4	5.93	5.89	3.17
11	Fluorides as F	mg/l	0.89	0.25	0.35	0.71	0.45	0.6	0.52	0.6	0.03	0.61	0.1
12	Iron as Fe	mg/l	0.14	0.14	0.09	0.12	0.1	0.1	0.12	0.15	0.16	0.11	0.1

SW1- upstream surface water

SW2- Downstream surface water

SW3- Musiang lamare (Old) Tap water

SW4- Musiang lamare (New) Tap water

SW5- Umlong surface water

SW6- Musiang lamare surface water (Nallah)

SW7- Chiehruphi

SW8- Brishyrnot

SW9- Thangskai

SW10- Lumshnong

8.4.1 Observation of Ground Water & Surface water:

Analysis results of ground water in winter season the following: -

- pH varied from 7.31 to 7.82
- Total hardness varied from 187.46 mg/l to 196 mg/l
- Total dissolved solids varied from 204 mg/l to 290 mg/l

Analysis results of Surface water in winter season reveal the following:

- pH varied from 5.72 to 8.3
- Total Hardness varied from 47.44 mg/l to 189.52 mg/l
- Total dissolved solids varied from 82 mg/l to 760 mg/l

8.4.2 Impacts on Water Environment

There is no seasonal nallah within the leasehold area. The seasonal nallah could be seen outside the leasehold area towards eastern side of the lease. The rainwater draining from the slopes and the slopes in the study area carries the silt and pebbles, which ultimately settles at the plateau area and in the water pond.

The rain water flow, which enters in the waste dump area, causes waste dump erosion. The garland drains at the higher elevation shall divert the entry of water flow away from the dump. The steep dumping slope causes the rolling of the waste material from dump. A retaining wall shall be constructed at the foot of the dump to arrest rolling down of the waste material.

8.4.3 Water Control Measures

Adequate control measures are being adopted to check not only the wash-off from soil erosion but also uncontrolled flow of Mine water. The measures to be adopted are:

- During rains, water will precipitate within the mine and in the vicinity, to arrest the velocity of rain water flow and settling of heavy particles sufficient gully checks to check any silt flowing along with the surface run-off in the valleys shall be provided.
- Construction of catch drains and settling tanks around dumps for channelization of rainwater and to prevent siltation/sedimentation.
- A green belt shall be developed all along the lease boundary in 7.5 m safety barrier with good root bearing species. A garland drain shall be constructed all along the lease boundary to divert the rain water into the working pit.
- No stored water will be released directly to streams/nallah.
- Construction, maintenance and cleaning of Check dams and gully plugs across the seasonal nallah.

There is no toxic element in the mined-out material, which may contaminate ground/surface water. It is, therefore, apparent that there will not be any impact of mining on the surface water regime.

9.0 LAND ENVIRONMENT

The present Land use/ Land cover map for the proposed project activity is prepared by latest satellite image. The limestone mine is a new mine, the present land use in the core zone (lease area) is given in the shown below Table No.14.

Table No.14: -Land use Pattern

Sl. No	Particulars	Present Land Use (Acres.)	Land Use at the end of Plan Period (Acres.)	Land Use at the end of conceptual Period (Acres.)
1	Area for Mining	0.00	4.55	8.05
2	Area for Roads	0.42	0.20	0.00
3	Area for Greenbelt	0.00	1.11	1.11
4	Overburden/Waste Dumping	0.00	2.75	0.00
5	Others (Garland drain & Retaining wall)	0.00	0.23	0.00
6	Unused area	8.74	0.32	0.00
Total		9.16	9.16	9.16

9.1 Soil Quality

Seven (7) Soil samples were collected for analysis. Soil samples reveal that there is not much variation in chemical composition. Soils are mostly loamy sand in texture. The soil analysis data indicate that the pH values range from 7.2 to 9.3. Soil pH plays an important role in the availability of nutrients. Soil microbial activity as well as solubility of metal ions is also dependent on pH.

Table No.15: -Chemical Properties of Soil

Sl No	Parameters	Unit	Results						
			S1	S2	S3	S4	S5	S6	S7
1	pH	-	7.51	7.21	8.34	7.11	8.52	9.51	9.28
2	Electrical Conductivity	µS/cm	90	76	114	64	95	69.47	168
3	Chloride	mg/kg	180.3	145.43	107.62	54.22	17.95	73.49	35.8
4	Sodium Absorption Ratio	meq/l	0.22	0.32	0.15	0.18	0.26	0.35	0.38
5	Moisture Content	%	2.26	1.15	2.15	1.92	1.85	1.62	1.75
6	Available Sodium	mg/kg	167.2	81.9	14.38	195.84	216	104.2	149.5
7	Available Potassium	mg/kg	152.08	102.83	69.3	171.3	78.64	82.49	108.6
8	Available Phosphor	kg/ha	23.21	35.82	39.2	30.28	410.47	149.63	29.4
9	Organic Matter	%	115.2	174.2	135.2	158.6	4.21	1.28	5.29

Locations: S1: Chieh ruphi
S2: Thangskai
S3: Lumshnong
S4: Core zone

S5: Umlong,
S6: Musiang lamare
S7: Mynkre

9.3 Solid Waste Management

During the mine plan period, overburden waste material generation shall be 1673661.0 Tonnes. The waste material comprises weathered sandstone having density of 2.45 tonnes/m³ respectively. Total waste volume during plan period is 6,83,126.93 m³ (1673661.0 tonnes) which is generated during in first to fifth year plan period. Overburden waste will be dumped as temporary waste dump (TWD-1) in earmarked area of 2.75 Ha with height of 20.00m in terracing manner during the plan period. During second year, 0.79 Ha area (TWD-2) 4 terrace of maximum 10 m height is planned having a repose angle of 28 degree.

The waste material generated during mining operations will not be allowed to be mixed with non-saleable sub-grade mineral.

- Retaining and protective walls at the bottom of the dumps would be constructed.
- The generated topsoil shall be utilized for strengthen of approach roads & Greenbelt development during the mining operations.
- Garland drains shall be made along the bottom of the dump for collecting drain water and also for the regulating the water flow from the mine. The water from garland drain shall be released in the silt settling tank (SST) and later to the rain water harvesting pond (RWHP). The overflow from the RWHP shall be diverted to the natural course of rain water.
- The non-mineralized zone and open areas shall be planted with suitable local trees.

10.0 FLORA AND FAUNA

The area boasts diverse flora and fauna, with dense forests comprising pine, bamboo, and various endemic plant species. The rich biodiversity includes animals such as elephants, leopards, and a variety of bird species, making it a haven for nature enthusiasts.

Because of scanty rainfall, the vegetation cover is rather sparse except for a few valleys. The vegetation type can be classified as - the South Indian Tropical Moist Deciduous Forests and a few elements of the Deciduous Teak forests are evidenced. No adverse impact is envisaged on the existing flora, as there will be no deforestation by mining operation.

As the animals, especially vertebrates and the winged invertebrates move from place to place in search of food, shelter, mate or other biological needs. There is a

nominal in the study area whereas there are no wild life habitats, wetlands or IBAs. As such there are no occurrence of any Rare or Endangered or Endemic or Threatened (REET) species within the core and buffer zone. There are no Sanctuaries, National Parks, Tiger Reserve or Biosphere Reserve or Elephant Corridor or other protected areas within 10 km of radius from core zone.

Among the mammals, only squirrels, mongoose, rats, and rabbits were seen but rarely during the survey. Monkeys were also rare. Among the reptiles, lizards, garden lizards were very common. No snakes or monitor lizard was seen during the survey. The amphibians were also rare. There were no resident birds other than Crows, parrots, doves, and Sparrows, swifts, quails and mynas.

10.1 Disasters Management.

Limestone mines is a simple mining and there is hardly any risk in mining. However, as a precautionary measure if any disaster occurs within the mining area, the first aid committee of the mines consisting of following member will immediately handle the situation and if required victims will be shifted to the primary health center.

The working is carried out at shallow depth so heavy blasting is not required so no risk assessment or disaster management is required. High risk factors such as Earthquakes, Landslide, Subsidence, Flood, Fire etc are neither encountered nor anticipated during proposed five years plan period. As such, emergency plan for quick evacuation, protective measures are not proposed. Also, no local habitant exists as the working area is far away from the locality.

10.2 Plantation Program

Plantation will be developed in the mining lease area as per plantation program. These activities help to improve the floral cover of the area. The greenery and plantation development will eventually attract micro fauna, birds etc., in the area. Assistance will be taken from local forest department in selection of species of plants so that green coverage could improve very fast.

The land requirement for the proposed plant is 9.16 Ha, out of that 0.62 ha land allocated for green belt and plantation. also, plantation will be done all along the haulage road and outside the mine area.

Table No.16: - Plantation area and No of plants proposed

Description	Particular
Total land available for green belt (Ha)	0.62
No. of samplings per acre	2000
Total no. of trees will be developed in the given area	1,280
Expected rate of survival	80%

The following table shows the year wise development of the afforestation in greenbelt as well as other proposed plantation area.

Table No.17: -Schedule of afforestation

Sl No.	Year	Plantation area	No of plants
		Greenbelt	
1	2024-25	0.12	240
2	2025-26	0.12	240
3	2026-27	0.13	240
4	2027-28	0.12	320
5	2028-29	0.13	240
Total		0.62	1,280

Total 1,280 Nos. with shrubs and trees are suggested in 0.62 Ha of green belt area. These trees will be planted in about different rows at the rate >2000 trees/acres. The interspaces will be planted with grasses, bushes and hedges with the plants of medicinal value. Short trees (<10 m height) will be planted in the first rows (towards plant side) of the green belt. The tall trees (>10 m height) will be planted in the outer row (away from plant side).

11.0 SOCIO-ECONOMIC BENEFITS

Apart from the various environmental protection measures, the company is conscious of its corporate social responsibility and as any good corporate citizen, it is undertaking the following works in the surrounding areas of the mine.

In order to enhance the contribution of mining industry and share a greater responsibility not only towards its employees but also for the community residing around lease area. Hence, it is considered necessary to provide minimum facilities to the surrounding villages for their better living standards.

It is proposed that the socio-economic development work in the nearby area will be carried out by the mine management to strengthen the basic infrastructural needs of the villagers like education, medical, drinking water for human beings and animals, road

network, plantation, rain water harvesting etc. Direct employment will be generated due to mining operations and preference would be given to the nearby villagers as per their qualification/experience, indirect self-employment will be generated due to the proposed mining project. M/s. Goldstones Cements Limited has proposed to provide financial assistance of Rs 5.0 Lakhs for the development of social infrastructure of the area.

It proposes to taken up the following CSR activities listed below:

- Assistance to Educational institutions located in the Taluk by way of providing “Teaching aids, Books & Periodicals”.
- Scholarships for the best outstanding students.
- Health care camps arrangements and distribution of medicines freely organizing occupational health camps through trained doctors.
- Employment oriented training to youth.
- The following training programs shall be conducted for 25 girl students for nearby villagers. Every year the training programme will be conducted.
- Computer training programmes for SSLC passed candidates
- Tailoring training
- Fashion designing for SSLC passed/failed candidates

Agricultural Improvement

The locals in the area shall be benefited by following social program. Help in arranging in association with nearby agricultural department for soil testing and technical inputs for increasing yield.

12.0 FINANCIAL IMPLICATIONS

The below table give overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

Table No.18: - Cost of Environmental Protection Measures

Sl. No.	Particulars	Cost (Lakh Rs.)
I	Pollution Control	
1.1	Air Pollution (dust suppression along road water sprinklers)	6.00
1.2	Plantation & Maintenance	12.00
1.3	Environment Monitoring (Air, Water, Noise & Soil Monitoring)	6.50
1.4	Construction & Maintenance of Settling Tank, Garland Drains etc.	3.00
1.5	Personal Protective Equipment (Helmets, Safety Shoes, Dust	2.50

	Masks, Ear Plugs etc)	
1.6	Provision of fencing around mine pit	8.25
1.7	CER activity as prescribed by SEAC	24.75
	Total	63.00

13.0 CONCLUSION

The said project is not going to have any serious negative impacts on the environment, where as it shall improve the socioeconomics of the people involved in the project and staying nearby. This Mining project is very important project for the development of this backward area.

Hence, it can be summarized that the development of *M/s Goldstone cement limited* will have a positive impact on the socio-economic of the area and lead to sustainable development of the region.
