

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

“Boulder Stone Mine”

Location: Village- Village-Syllai Madan, Laitkynsew, Laitlyngkot Khyrim Syiemship,
District- East Khasi Hills, State: Meghalaya

Production Capacity: - 4, 97,110 TPA of ROM (Boulder stone: 3, 97,690TPA &
Waste/Subgrade: 99,420TPA)

Area: - 4.99Ha; LOI issued in 2018

Lease Validity: - 30 Years



Details of ToR : Issued by SEIAA, Meghalaya vide letter no.
ML/SEIAA/MIN/EKH/81/2020/4/1346 dated 15th Dec, 2020

Baseline data Generation : December 2022 to February 2023(Winter Season)

Project Cost : Rs. 463.6804Lacs

PROMOTER

Shri Khrikshon Lyngkhoi

R/o: K.L.Complex, Demseiniong, Shillong,
East Khasi Hills, Meghalaya

ENVIRONMENTAL CONSULTANT

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NABET Accreditation: NABET/EIA/2023/ RA0192

(Rev.02)

May, 2023

EXECUTIVE SUMMARY

1.1 INTRODUCTION

The proposed project “Boulder Stone Mine” is situated at Syllai Madan, Laitkynsew, Laitlyngkot Khyrim Syiemship, District- East Khasi Hills, State: Meghalaya. The total lease area of the project is 4.99 Ha. The mining activity will be carried out by open cast semi-mechanized method.

The Letter of Intent has been sanctioned in favour of Shri Khrikshon Lyngkhoi vide letter no.KH/8/ML/Stone/69/ Dated 2018 by the Department of Forest and Environment, Office of the Divisional Forest Officer, Khasi Hills (T) Division, Shillong. The proposed mine is spread over an area of 4.99 ha. with mineable reserves of about 35,82,600Tonnes to produce 4, 97,110 TPA of ROM (Boulder stone: 3, 97,690 TPA & Waste/Subgrade: 99,420TPA).

1.1.1 LOCATION OF LEASE AREA

The proposed project “Boulder Stone Mine” is situated at Syllai Madan, Laitkynsew, Laitlyngkot Khyrim Syiemship, District- East Khasi Hills, State: Meghalaya.

1.1.2 DETAIL OF MINING LEASE

| S. No. | Particulars | Details |
|--------|-----------------|--|
| 1. | Name of Project | Boulder Stone Mine |
| 2. | Location | Syllai Madan, Laitkynsew, Laitlyngkot Khyrim Syiemship, District- East Khasi Hills, State: Meghalaya |
| 3. | Lease Area | 4.99 Ha. |
| 4. | Land Type | Private Land |
| 5. | Seismic Zone | Zone – V |

1.2 PROJECT DESCRIPTION

The Letter of Intent has been sanctioned in favour of Shri Khrikshon Lyngkhoi vide letter no.KH/8/ML/Stone/69/ Dated 2018 by the Department of Forest and Environment, Office of the Divisional Forest Officer, Khasi Hills (T) Division, Shillong. The proposed mine is spread over an area of 4.99 ha. with mineable reserves of about 35,82,600Tonnes

to produce 4, 97,110 TPA of ROM (Boulder stone: 3, 97,690 TPA & Waste/Subgrade: 99,420TPA).

The proposed mining operations will be carried out by open cast semi - mechanized method.

1.2.1 GEOLOGY

1.2.1.1 Local Geology

The succession of rocks in the lease area is as given below:-

Table 1.1: Local Geology

| Geological Age | Group Name | Formation Name | Rock Type |
|------------------------|----------------|------------------|------------------------------|
| Recent | Newer Alluvium | Unclassified | Sand, Silt and Clay |
| -----UNCONFIRMITY----- | | | |
| Eocene | Jaintia Group | Shella Formation | Calcareous Boulder Stonee |

1.2.1.2 Physiography

The topography of the lease area is hilly terrain. Highest elevation is 1785 mRL and lowest is 1765 mRL.

1.2.2 GEOLOGICAL AND MINEABLE RESERVES

| A) Total Mineral Reserves | UNFC Code | Boulder Stone (Tonnes) |
|---------------------------------|-----------|---------------------------|
| Proved Mineral Reserves | 111 | 16,44,400 |
| Probable Mineral Reserves | 121 & 122 | 19,38,200 |
| Total Mineable Reserves | | |
| B) Total Remaining Resources | | |
| Feasibility Mineral Resources | 211 | 2,90,190 |
| Pre-Feasible Mineral Resources | 221+222 | 8,30,630 |
| Measured mineral resources | 331 | |
| Indicated Mineral resources | 332 | |
| Inferred Mineral Resources | 333 | 9,22,940 |
| Reconnaissance mineral resource | 334 | |

1.2.3 MINING

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

- The mining will be carried out by open – cast semi-mechanized method.
- The bench height and width will be kept 6m.
- Total seven benches will be developed i.e. from Bench levels 1781 mRL (Top Bench), 1775 mRL, 1769 mRL, 1763 mRL, 1757 mRL, 1751mRL, 1745 mRL (lowest bench).
- The bench slope will be providing 85°.
- The loading will be from pits or from stocks.

1.2.4 PRODUCTION DETAILS

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

Table 1.2: Production Details

| Year | ROM (T) | Mineral Boulder Stone(T) | Waste/ sub-grade (T) |
|-----------------|------------------|--------------------------|----------------------|
| 1 st | 430320 | 344260 | 86060 |
| 2 nd | 430320 | 344260 | 86060 |
| 3 rd | 437580 | 350060 | 87520 |
| 4 th | 442200 | 353760 | 88440 |
| 5 th | 497110 | 397690 | 99420 |
| Total | 22,37,530 | 17,90,030 | 4,47,500 |

**Source:- Approved Mining Plan with PMCP*

1.2.5 LAND USE PATTERN

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

Table 1.3(a): Land Use Pattern

| S. No. | Land Use Category | Pre-Operational (Ha.) | Operational (Ha.) | Post-Operational (Ha.) |
|--------|-------------------|-----------------------|-------------------|------------------------|
| 1 | Top Soil Dump | -- | 0.01 | -- |
| 2 | Overburden Dump | -- | 0.15 | 0.15 |

| | | | | |
|------------------------------------|------------------------------|-------------|-------------|-------------|
| 3 | Pit & Quarry Area | -- | 3.95 | 4.35 |
| 4 | Road | -- | 0.05 | -- |
| 5 | Infrastructure/Plant/Crusher | -- | 0.40 | -- |
| 6 | Afforestation | -- | 0.30 | 0.40 |
| 7 | Mineral Storage | -- | -- | -- |
| 8 | Waste/Sub – grade stack yard | -- | -- | -- |
| 9 | Reclamation* | -- | -- | * |
| 10 | Undisturbed Area | 4.99 | 0.13 | 0.09 |
| Total | | 4.99 | 4.99 | 4.99 |
| <i>*Shown at table no. 2.6 (b)</i> | | | | |

Table 1.3 (b) : Reclamation

| Conceptual Land Degradation | Proposed Reclamation | |
|------------------------------------|-----------------------------|--|
| Area in Ha. | Area in Ha. | Measures |
| 4.90 | 0.55 | Green belt and afforestation of waste dump by plantation |
| | 3.45 | Bottom benches shall be converted for water storage |
| | 0.20 | Back-filling with waste & rejects and subsequent afforestation |

1.3 DESCRIPTION OF THE ENVIRONMENT

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

Table 1.4: Sampling Location

| Sampling Location | Distance (Km) | Direction | Components |
|--------------------------|----------------------|------------------|-------------------------|
| Mine Site | -- | -- | Air, Water, Noise, Soil |
| Pomlum | 1.3 | ENE | Air, Water, Noise, Soil |
| Mawkajem | 1.1 | ESE | Air, Water, Noise, Soil |
| Dymmlew | 2.7 | SSE | Air, Water, Noise, Soil |
| Umktieh | 2.7 | S | Air, Water, Noise, Soil |
| Lewmawlong | 2.0 | WNW | Air, Water, Noise, Soil |

| | | | |
|-----------|------|-----|-------------------------|
| Setthliew | 5.15 | NNW | Air, Water, Noise, Soil |
|-----------|------|-----|-------------------------|

1.3.1 LAND ENVIRONMENT

1.3.1.1 Soil Quality

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

| | | |
|--------------------|---|--------------------------|
| pH | : | 7.12 to 7.65 |
| Soil Conductivity | : | 364 to 427 μ mhos/cm |
| Total Nitrogen (N) | : | 161 kg/ha. to 360 kg/ha. |
| Phosphorus as P | : | 56 kg/ha to 59 kg/ha. |
| Potassium as K | : | 236.00-248.50 (mg/kg) |

1.3.2 WATER ENVIRONMENT

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

Table 1.6: Water Quality Status

| S.No. | Parameter | Units | Requirement (Desirable Limits). | Permissible Limits in the Absence of Alternate Source. | Mine Site | Pomlum | Mawkajem | Dymmiew | Umktieh | Lewmawiong | Setthliew |
|---|-------------------------------------|------------|---------------------------------|--|-----------|-----------|-----------|-----------|-----------|------------|-----------|
| Organoleptic & Physical Parameters | | | | | | | | | | | |
| 1. | Colour | Hazen Unit | 5 | 15 | <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 |
| 3. | Taste | - | Agreeable | - | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable |
| 4. | Turbidity | NTU | 1 | 5 | <1.0 | <1.0 | <1 | <1 | <1.0 | <1.0 | <1 |
| 5. | pH value | - | 6.5-8.5 | - | 7.54 | 7.16 | 7.35 | 6.98 | 7.48 | 7.18 | 6.93 |
| 6 | Total Dissolve Solid (TDS) | mg/l | 500 | 2000 | 389.2 | 321.0 | 402.0 | 241.9 | 325.0 | 380.0 | 260.0 |
| 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 |
| 8 | Total Ammonia | mg/l | 0.5 | No Relaxation | <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 |
| 10 | Barium (as Ba) | mg/l | 0.7 | No Relaxation | <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 |
| 12 | Calcium(as Ca) | mg/l | 75 | 200 | 56.95 | 56.95 | 54.32 | 61.47 | 65.27 | 56.82 | 52.39 |
| 13 | Chloramines (as Cl ₂) | mg/l | 4.0 | No Relaxation | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 14 | Chloride (as Cl) | mg/l | 250 | 1000 | 15.73 | 14.62 | 14.69 | 13.95 | 16.26 | 14.39 | 13.82 |
| 15 | Copper (as Cu) | mg/l | 0.05 | 1.5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| 16 | Fluoride(as F) | mg/l | 1.0 | 1.5 | 0.38 | 0.31 | 0.28 | 0.32 | 0.29 | 0.30 | 0.28 |
| 17 | Free Residual Chlorine | mg/l | 0.2 | 1.0 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| 18 | Iron (as Fe) | mg/l | 1.0 | No Relaxation | 0.129 | 0.124 | 0.132 | 0.129 | 0.128 | 0.121 | 0.120 |
| 19 | Magnesium (as mg) | mg/l | 30 | 100 | 3.84 | 3.79 | 4.10 | 4.18 | 3.92 | 4.06 | 3.65 |
| 20 | Manganese (as Mn) | mg/l | 0.1 | 0.3 | <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 |
| 22 | Nitrate (as NO ₃) | mg/l | 45 | No Relaxation | 0.32 | 0.31 | 0.30 | 0.32 | 0.33 | 0.31 | 0.30 |
| 23 | Selenium (as Se) | mg/l | 0.01 | No Relaxation | <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 |
| 25 | Sulphate (as SO ₄) | mg/l | 200 | 400 | 26.75 | 24.65 | 26.82 | 26.83 | 25.81 | 23.92 | 22.87 |
| 26 | Sulphide(as H ₂ S) | mg/l | 0.05 | No Relaxation | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

Project:- Boulder Stone Mine

Applicant:- Shri Khrikshon Lyngkhoi

Chapter – XI –Summary and Conclusion

| | | | | | | | | | | | |
|---|--|--------------|--------|---------------|---------|---------|---------|---------|---------|---------|---------|
| 27 | Alkalinity(as Ca CO ₃) | mg/l | 200 | 600 | 201.0 | 194.0 | 187.0 | 187.0 | 189.0 | 176.0 | 179.0 |
| 28 | Total Hardness (as CaCO ₃) | mg/l | 200 | 600 | 174.0 | 167.0 | 164.0 | 165.0 | 173.0 | 161.0 | 160.0 |
| 29 | Zinc (as Zn) | mg/l | 5 | 15 | 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 |
| 31 | Cyanide (as CN) | mg/l | 0.05 | No Relaxation | <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 |
| 33 | Lead (as Pb) | mg/l | 0.01 | No Relaxation | <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 |
| 35 | Molybdenum (Mo) | mg/l | 0.07 | No Relaxation | <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 |
| 37 | Poly nuclear Aromatic | mg/l | 0.0001 | No Relaxation | <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 |
| Microbiological Parameter | | | | | | | | | | | |
| 39 | Escherichia coli | Absent/100ml | | | Absent | Absent | Absent | Absent | Absent | Absent | Absent |
| 40 | Coliform Bacteria | Absent/100ml | | | Absent | Absent | Absent | Absent | Absent | Absent | Absent |

1.3.3 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 (PM₁₀, PM_{2.5}, NO_x, SO₂ and CO) at seven representative ambient air quality monitoring stations.

1.3.3.1 Ambient Air Quality

Ambient air quality monitoring has been carried out with a frequency of two days a week at seven 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 1.7: Ambient Air Quality Status

| S. No | Sampling Location | | Parameters | | | | |
|-------|-------------------|-----------|--|---|---|---|----------------------------|
| | | | PM ₁₀ (µg/m ³) | PM _{2.5} (µg/m ³) | SO ₂ (µg/m ³) | NO _x (µg/m ³) | CO (mg/m ³) |
| 1. | Mine Site | Min | 40.29 | 13.68 | 3.93 | 5.25 | 0.47 |
| | | Max | 57.14 | 20.92 | 6.18 | 8.29 | 0.59 |
| | | Avg. | 44.27 | 16.33 | 5.34 | 6.80 | 0.53 |
| | | 98th% ile | 55.35 | 20.57 | 6.11 | 8.26 | 0.59 |
| 2. | Pomlum | Min | 40.26 | 15.43 | 5.37 | 6.55 | 0.32 |
| | | Max | 54.36 | 22.43 | 7.67 | 8.69 | 0.92 |
| | | Avg. | 45.65 | 17.76 | 6.10 | 7.45 | 0.57 |
| | | 98th% ile | 53.38 | 22.06 | 7.64 | 8.64 | 0.90 |
| 3. | Mawkajem | Min | 32.58 | 13.79 | 4.8 | 6.14 | 0.45 |
| | | Max | 50.75 | 22.4 | 6.5 | 8.86 | 0.55 |
| | | Avg. | 41.31 | 17.29 | 5.63 | 7.45 | 0.51 |
| | | 98th% ile | 50.18 | 22.37 | 6.41 | 8.69 | 0.55 |
| 4. | Dymmiew | Min | 36.02 | 13.76 | 4.33 | 7.09 | 0.46 |
| | | Max | 49.15 | 20.84 | 8.44 | 12.64 | 0.79 |
| | | Avg. | 45.87 | 18.12 | 7.22 | 9.58 | 0.62 |
| | | 98th% ile | 48.92 | 20.40 | 8.43 | 12.64 | 0.78 |
| 5. | Umktieh | Min | 32.69 | 22.61 | 4.24 | 8.43 | 0.47 |
| | | Max | 48.69 | 27.54 | 8.14 | 10.46 | 0.82 |
| | | Avg. | 45.76 | 24.44 | 6.00 | 9.43 | 0.58 |
| | | 98th% ile | 48.58 | 27.17 | 7.72 | 10.46 | 0.81 |
| 6. | Lewmawiong | Min | 35.41 | 14.32 | 5.35 | 8.54 | 0.47 |
| | | Max | 45.02 | 21.38 | 7.89 | 10.98 | 0.85 |

| | | | | | | | |
|-----------------------|-----------|-----------|------------|-----------|-----------|-----------|----------|
| | | Avg. | 40.98 | 16.62 | 6.89 | 9.95 | 0.62 |
| | | 98th% ile | 44.61 | 21.22 | 7.89 | 10.98 | 0.82 |
| 7. | Setthliew | Min | 40.92 | 16.72 | 5.03 | 8.84 | 0.48 |
| | | Max | 53.4 | 23.84 | 7.54 | 10.9 | 0.92 |
| | | Avg. | 44.97 | 18.79 | 6.18 | 9.80 | 0.70 |
| | | 98th% ile | 51.48 | 23.38 | 7.51 | 10.89 | 0.89 |
| NAAQ STANDARDS | | | 100 | 60 | 80 | 80 | 2 |

1.3.4 NOISE ENVIRONMENT

The noise monitoring has been conducted for determination of noise levels at seven 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 1.8: 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 | 56.8 | 35.5 |
| Pomlum | 24.12.2022 | 51.4 | 38.1 |
| Mawkajem | 05.12.2022 | 52.6 | 40.5 |
| Dymmiew | 04.01.2023 | 50.0 | 35.6 |
| Umktieh | 18.01.2023 | 53.6 | 40.3 |
| Lewmawiong | 23.01.2023 | 54.8 | 42.0 |
| Setthliew | 01.02.2023 | 52.5 | 38.5 |
| 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 |

1.3.5 SOCIO-ECONOMIC ENVIRONMENT

The study area includes the 39 Villages SyllaiMadan, Laitkynsew, Sub Division- Pynursla, District- East Khasi Hills, Meghalaya within 10 km of area from mine periphery.

Table 1.9: Demography Profile of the Study Area

| S. No. | Particulars | Details |
|--------|-------------------|---------|
| 1. | No. of Villages | 37 |
| 2. | Total Population | 20767 |
| | a. Male | 10224 |
| | b. Female | 10543 |
| 3. | No. of Households | 4037 |
| 4. | No. of Literates | 12984 |
| | a. Male | 6180 |
| | b. Female | 6804 |
| 5. | Main Workers | 8908 |
| | a. Male | 4942 |
| | b. Female | 3966 |
| 6. | Marginal Workers | 815 |
| | a. Male | 322 |
| | b. Female | 493 |
| 7. | Non-workers | 11044 |
| | a. Male | 4960 |
| | b. Female | 6084 |

(Source: Census, 2011)

1.3.6 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 |

1.4 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 4.35 ha. out of which 3.45 ha. area (bottom benches) will be converted into water reservoir and rest 0.20 ha. (upper benches) will be backfilled and reclaimed and rehabilitated by plantation. 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 (1715 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 be generated mostly by the traffic. | <ul style="list-style-type: none"> ➤ 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 ground level concentrations of particulate matter PM₁₀ & PM_{2.5}, NO_x, CO from the different mining activities for the study period (Winter Season) were observed to be in permissible limit. ➤ The resultant will remain within the National Ambient Air Quality Standards for industrial/ residential areas. |
| Noise Environment | |
| ➤ Noise due to mining activities. | ➤ The noise levels from all these sources are periodical and restricted to particular operation. |

| | |
|--|--|
| <ul style="list-style-type: none"> ➤ Noise due to vehicular movement. | <ul style="list-style-type: none"> ➤ 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

| | |
|---|---|
| <ul style="list-style-type: none"> ➤ Employment generation ➤ Health impacts ➤ Education Facilities | <ul style="list-style-type: none"> ➤ The mining activity puts negligible change in the socio economic profile. ➤ No displacement (0) is proposed due to proposed mine. ➤ Approx. 67 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

| | |
|--|---|
| <ul style="list-style-type: none"> ➤ Impact on biodiversity ➤ Impact on threatened species | <ul style="list-style-type: none"> ➤ 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 |
|--|---|

- | | |
|--|---|
| | <p>which will act as a pollution barrier for the biological environment.</p> <ul style="list-style-type: none"> ➤ 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. |
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1.5 ENVIRONMENTAL MONITORING PROGRAMME

1.5.1 AIR

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

1.5.2 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.

1.5.3 NOISE

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

1.5.4 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.

1.6 ADDITIONAL STUDIES

1.6.1 PUBLIC HEARING

Public hearing will be conducted as per the guidelines of EIA Notification 14th September, 2006 and its subsequent amendments.

1.6.2 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

1.7 PROJECT BENEFITS

The demand of Boulder Stone 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 boulder Stone. The capacity of mine is 4, 97,110 TPA of ROM (Boulder stone: 3, 97,690 TPA & Waste/Subgrade: 99,420TPA) aiming to fill the demand – supply gap.

This boulder stone mining 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.

1.8 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.

1.8.1 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 4.35 ha.
- 2) Plantation is proposed over an area of 0.75 ha. out of which plantation will be done on backfilled area (0.20 ha.), Dump area (0.15 ha.) and un-worked area (0.40 ha.).

1.8.2 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.

1.8.3 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.

1.8.4 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.

1.8.5 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.

1.8.6 SOCIO-ECONOMIC MANAGEMENT

- Environmental Officer will be responsible to take care the performance of mine on environmental issues.
- Approx. 33 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.

1.8.7 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.

1.9 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.
