# CHAPTER -X

# Environmental Management Plan

## 10.0 INTRODUCTION

The environmental management plan consists of a set of mitigation, management, monitoring and institutional measures to be taken during implementation and operation of the project, to eliminate adverse environmental impacts or reduce them to acceptable levels. The present environmental management plan addresses, the components of environment, which are likely to be affected by the different operations in a Sand Stone mine.

The Objectives of EMP are:

- Overall conservation of environment.
- Minimization of waste generation and pollution.
- Judicious use of natural resources and water.
- Safety, welfare and good health of the work force and populace.
- Ensure effective operation of all control measures.
- Vigilance against probable disasters and accidents.
- Monitoring of cumulative and long term impacts.
- Ensure effective operation of all control measures

**Environment Management System**

**Environment Cell**

Company has well established Environmental Management System which is headed by General Manager- Safety, Health & Environment. Company has implemented online Legal Compliance management system with well-defined compliance owners. The system generates Email alerts for meeting compliances and has inbuilt escalation mechanism to keep the senior management informed on compliance updates.

**Table: Environment Monitoring Cell**

| S. No. | Designation | Proposed responsibility |
|---|---|---|
| 1. | Owner/Head Environment | Overall responsibility for environment management and decision making for all environmental issues |
| 2. | Manager – Environment Management System | Overall in-charge of operation of environment management facilities;<br>Ensuring legal compliance by properly undertaking activities as laid down by various regulatory agencies from time to time and interacting with the same |
| 3. | Skilled Trained Site Workers & Unskilled Labours | Secondary responsibility for implementing the environment management & ensure the implementations. |

## 10.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

| IMPACT AREA | PROBABLE IMPACTS | PROBABLE SOURCE | MITIGATION MEASURES | REMARKS |
|---|---|---|---|---|
| **LAND USE** | Change in land use pattern | • Site preparation<br>• Excavation<br>• Construction of approach and haulage road.<br>• Drilling & Blasting.<br>• Disposal of overburden/ waste etc. | • At any point of time, area under reclamation should be kept at minimum by ensuring simultaneous reclamation of land along with mining activity to reduce the time gap between land reclamation and mitigation.<br>• The scheme of Plantation has been proposed all along the approach road of lease area & will be made accordingly. The selection of plant species will be based on the local soil conditions. Post plantation care like watering and protection from grazing will be done by proving tree guard / fencing.<br>• The top soil shall be scraped manually and send to the plantation site directly.<br>• Number of access roads to mining site should be kept minimum.<br>• Stockpiling of stone shall be avoided.<br>• There shall be no waste generated during the mining as all the ROM shall be used in making aggregates. | • The existing land form is hilly barren terrain there is no forest land in the lease area, the land use is waste land and ownership is owned by state government.<br>• There is no agriculture in the vicinity of lease area so mining will not have any impact on agricultural pattern.<br>• Aesthetic environment will also be not affected as the mine lease area is waste land (rocky terrain) with some bushes only. |
| **IMPACT AREA** | **PROBABLE IMPACTS** | **PROBABLE SOURCE** | **MITIGATION MEASURES** | **REMARKS** |

| | | | | |
|---|---|---|---|---|
| **AIR QUALITY** | Probable contamination of air with dust and exhaust gases of the vehicle transporting stone and by drilling, blasting operations. | The dust generated from mining activities is the primary source of air pollution. The emission sources include excavation and mining of stone, drilling, sizing and transportation within the project area.<br>Negligible amount of auto exhaust emissions also expected to be found in the core zone because of vehicular activities arising due to transportation of limestone and waste by dumpers and Excavators.<br>• NOx generated from blasting<br>• Storage of Mineral | • As the primary concern in air quality is emanated dust to dust suppression system mainly water spraying is to be done in and around mining area.<br>• Use proper drill bits for drilling holes and wet drilling method to reduce dust generation at source.<br>• Loading of mineral should be done at optimum height so as to reduce the dust below.<br>• Overloading will be prevented. The trucks and trolley after loading will be covered by suitable cover.<br>• Timely maintenance of vehicle used for transportation of mineral shall be ensured.<br>• Green belt along the available area & haulage roads shall minimize the impact. | Spreading of dust particles shall be negligible as the dust shall be suppressed at source. However, plantation all along lease boundary & haulage roads shall act as dust arrester & sink hole for suspended particles. |

| WATER QUALITY | | | | |
|---|---|---|---|---|
| **IMPACT AREA** | **PROBABLE IMPACTS** | **PROBABLE SOURCE** | **MITIGATION MEASURES** | **REMARKS** |
| **SURFACE WATER** | Change in quality as well as quantity. | • Waste generated due to mining.<br>• Due to runoff water from the rain.<br>• Due to disposal of waste by labors.<br>• Due to washing of vehicles used in transportation<br>• Due to disposal of excreta.<br>• Due to leakage of oil and greases from vehicle and machinery used. | • Waste shall not be generated as all the quantity of ROM shall be used in making aggregates.<br>• Massive plantation in and around lease area and haulage road.<br>• Rainwater accumulated in worked out pit will be collected and will be used for dust suppression and green belt development.<br>• Retaining wall & Check dam construction all along slope.<br>• Drains all along road side.<br>• No open air defecation shall be allowed mobile toilets shall be provided to labours for defecation.<br>• Throwing of waste or item in nearby water bodies should be strictly prohibited.<br>• Proper maintenance of vehicle used in transportation. | Mining will be done above the water table in leased area which is waste land and there is no river or surface water exists within this area. However, composition of granitic rock merely reacts with surface water as it contaminates the run-off water during rains. |
| **IMPACT AREA** | **PROBABLE IMPACTS** | **PROBABLE SOURCE** | **MITIGATION MEASURES** | **REMARKS** |
| **GROUND WATER** | Interception, diversion, contamination and wastage of ground water | • Digging and excavation.<br>• Piling of overburden. | • Regular monitoring of ground water.<br>• Piling of overburden will be avoided<br>• Whenever the mining reaches the water table the leaseholder should dig a separate well in the lease area itself in which water from mining pit is disposed with objective of recharging water table by doing so there would be no storage of ground water. | No interception diversion or contamination of groundwater because Mining will be done above the water table in leased area. There is not any generation of toxic waste from mining site and ground water is not used for any mining activity Except, drinking purpose which shall be procure from nearby hand pump/ tube well.<br>Bottom of the excavated pit will act as recharge well to the ground water. |

| IMPACT AREA | PROBABLE IMPACTS | PROBABLE SOURCE | MITIGATION MEASURES | REMARKS |
|---|---|---|---|---|
| **NOISE QUALITY** | Increase in Noise level of the area which will affect the inhabitant residing nearby and there. | • Drilling & blasting<br>• Heavy earth moving machinery<br>• Due to vehicle used for transportation of excavated material<br>• Accumulation of labor in mining area, noise is created from their verbal communication and manual excavation. | • Drilling & Blasting shall be performed under the supervision of competent Blaster & Mines Manager with Optimum hole charge by using delay detonators & muffle blasting to minimizes nose impact & rock fly<br>• Care will be taken to produce minimum sound during loading of mineral.<br>• Minimum use of horn and provision of speed limit will be ensured.<br>• Timely maintenance of vehicles and their silencers to minimize sound and vibration. | Noise limit shall be within 90db limit during mining operation by using these mitigation norms. |
| **ECOLOGICAL /BIOLOGICAL** | Loss of flora and fauna residing there and nearby. | • Site preparation<br>• Excavation<br>• Construction of approach and haulage road<br>• Drilling | No measure loss has been noticed so no mitigation measure is proposed | Mining is done on mining lease area which is barren, unfertile. No wildlife of any sort is found within lease hold area. The fauna found in the area are of common variety and no endangered or threatened species are reported in the area. |
| **IMPACT AREA** | **PROBABLE IMPACTS** | **PROBABLE SOURCE** | **MITIGATION MEASURES** | **REMARKS** |

| | | | | |
|---|---|---|---|---|
| **OCCUPATIONAL HEALTH** | •Workers of area likely to get affected by respiratory or pulmonary diseases like bronchitis, silicosis and asthma fungal infection.<br>•Water related disease such as diarrhea, dysentery etc.<br>•Minor accidents such as cut and bone fracture. | • Due to emanation of dust, exhaust and noise from vehicle transport.<br>• Due to lack of personnel hygiene<br>• Due to lack of personal safety procedure | • First aid facility will be provided at mining site.<br>• Training of the worker regarding use of safety appliances and first aid.<br>• Every six month Periodical medical examination of all workers by experienced medical professional shall be ensured.<br>• Training shall also includes emergency response including location and proper use of emergency equipment, procedure for raising alarm and notifying contractor and proper response action for each foreseeable emergency situation.<br>• Use of helmets, safety shoes, ear plugs & masks and gloves shall be provided to workers. | |
| **DEMOGRAPHY/ SOCIO- ECONOMY** | Strain on existing amenities like housing, water sources and sanitation, medical and infrastructure Facilities. | Influx of employees as well as contractor's employee/laborers. | Only local peoples in limited numbers and residing in nearby area will be employed as man power. | No additional impacts |

Proper environmental management plan is proposed for "Sandstone" mining project to mitigate the impact during the mining operations.

**a.** Care will be taken that no labour camps will be allowed on mining site.

**b.** Care will be taken that no cooking, or burning of woods will be allowed in the adjoining area.

**c.** Prior to mining, short awareness program will be conducted for labours to make them aware to way of working.

**d.** If some causality or injury to animal occurs, it will be informed to forest department and proper treatment will be given.

**e.** No tree cutting, chopping, lumbering, uprooting of shrubs and herbs will be allowed.

**f.** Maintenance of roads will be done from time to time.

**g.** Corridor movement of wild mammals (If exists) will be avoided.

**h.** Care will be taken that noise produced during vehicles movement for carrying sandstone is within the permissible noise level.

**i.** No pilling of RBM material will be in adjoining area.

**j.** If wild animals are noticed crossing the mining site, they will not be disturbed or chased away, instead the labours will move away from their path.

**k.** The persons whose standing crops get destroyed/damaged by the wild animals can approach the DFO, who on investigation can allow a suitable compensation to be paid.

## 10.2 ENVIRONMENTAL MANAGEMENT PLAN IMPLEMENTATION

Environmental Management Plan serves no purpose if it is not implemented with true spirit. Some loopholes in the EMP can also be detected afterwards when it is implemented and monitored. Thus, an implementation and monitoring programme has to be prepared.

The major attributes of environment are not confined to the mining site alone. Implementation of proposed control measures and monitoring programme has an implication on the surrounding area as well as for the region. Therefore, mine management should strengthen the existing control measures as elaborated earlier in this report and monitor the efficacy of the control measures implemented within the mining area relating to the following specific areas for eco-friendly mining plan:

**a.** Collection of air and water samples at strategic locations with frequency suggested and by analyzing thereof. If the parameters exceed the permissible tolerance limits, corrective regulation measure will be taken.

**b.** Collection of soil samples at strategic locations once in every two years and analysis thereof with regard to deleterious constituents, if any.

**c.** Measurement of water level fluctuations in the nearby ponds, dug wells and bore wells.

**d.** Regular visual examination will be carried out to look for erosion of soil near the site. Any abnormal condition, if observed will be taken care of.

**e.** Measurement of noise levels at mine site, stationary and mobile sources, and adjacent villages will be done in every six months for the first two years and thereafter once a year.

**f.** Plantation/afforestation as should be done as per program i.e along the road sides and near civic amenities, which will be allotted by Government bodies as it is not feasible to plant trees near the mine lease area. Post plantation, the area will be regularly monitored in every

two years for evaluation of success rate. For selection of plant species local people should also be involved.

Mine management will be in regular touch with local surrounding villages to update the various developmental schemes made by them. They will also consider any immediate requirement, which could be taken care of in near future.

An Environmental Management Cell (EMC) is envisaged which will be responsible for monitoring EMP and its implementation. EMC members should meet periodically to assess the progress and analyze the data collected during the month. The EMC will function as per Fig. 6.1(Section VI).

EMC will be in regular touch with State Pollution Control Board and Indian Bureau of Mines and send them annual progress report. Any new regulations considered by State/Central Pollution Control Board for the industry will be taken care of by it.

### 10.3 PROPOSED SET UP

Keeping the utility of monitoring results in the implementation of the environmental management program in view, an organizational chart has been proposed, headed by General Manager as shown in Fig. 6.1(Section VI).

The said team will be responsible for:

**a.** Collecting water and air samples from surrounding area and work zone monitoring for pollutants.

**b.** Analyzing the water and air samples.

**c.** Implementing the control and protective measures.

**d.** Co-coordinating the environment related activities within the project as well as with outside agencies.

**e.** Collecting statistics of health of workers and population of surrounding villages.

**f.** Monitoring the progress of implementation of environmental management program.

**g.** The laboratory will be suitably equipped for sampling/testing for various environmental pollutants.

### 10.4 Environmental Monitoring Schedule

Monitoring of the post project environment is of importance and legal requirements. Regular monitoring of the environment helps in assessing the benefits of implementation of environment management plan. Proposed project will adopt an effective monitoring plan with proper schedule as a step forward to ensure better environment management practice.

This would be attained by collection of samples of water, stack emission, ambient air and work zone environment and analyzing the samples by various methods. Noise level would be monitored by at sensitive points of manufacturing areas, where the fugitive emission would be visibly more.

The ambient air quality may be monitoring at four locations, with one at the proposed project as the centre points and the remaining three at $120^0$ to each other in down wind direction.

The location would change with the season and the wind pattern.

The environmental monitoring must be done as per the schedule summarized in table below.

**Figure 10.1 Environment Monitoring Schedule**

| Environmental Component | Frequently of monitoring / Sampling | Parameter to be covered |
|---|---|---|
| Ambient Air Quality monitoring | Six monthly as per requirements | $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ and CO |
| Ambient Noise Level monitoring | Six monthly as per requirements | Day time & Night time noise level in dB(A) |
| Ground water/ Drinking water quality | Six monthly as per requirements | pH, Turbidity, Total, Dissolve Solids, Total hardness, calcium, Magnesium, Iron, Total residual free chlorine, Alkalinity, Coliform (MPN Value) & E. Coli. |
| Surface Water Quality | Six monthly as per requirements | pH, Turbidity, Total, Dissolve Solids, Total hardness, calcium, Magnesium, Iron, Total residual free chlorine, Alkalinity, Coliform (MPN Value) & E. Coli. |
| Soil Quality | Six monthly as per requirements | Soil texture, alkalinity, pH porosity, |

**Table 10.2 Environmental Budget**

| S. No. | Particulars | Details | Total Cost (Rs.) | |
|---|---|---|---|---|
| | | | Capital (Rs) | Recurring/Ys (Rs) |
| **1.** | Afforestation Nos of trees (@5 plants/ha)<br>Plantation on Haulage Road –240<br>Compensatory plantation – 5<br>Total = 245 | Rs 1000/Sap (including tree guard and maintenance etc.) | 2,45,000 | 60,000 |
| **2** | Water Demand for plantation (@ 1 lit/plant) | 0.245 KL | | 14,700 |
| **3.** | Dust Suppression on haulage road (0.60 km) @ 1.0 lit in 1 sqm. (2 time a day) | 7.2 KL | | 4,32,000 |
| **5.** | Portable toilets | | | 60,000 |
| 6. | Color coded Dust Bins as per MSW rule 2016 | | 10000 | 4,000 |
| 7. | Six monthly monitoring and compliance | | | 50,000 |
| **Total** | | | **2,55,000** | **6,20,700** |

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