

**M/S. SOUTH INDIA MINES & MINERALS INDUSTRIES
LIMITED**

**EXECUTIVE SUMMARY OF
ENVIRONMENTAL IMPACT ASSESSMENT AND
ENVIRONMENTAL MANAGEMENT PLAN FOR
NELLAITHIRUTHU LIMESTONE MINE (19.48 HA.)**

Located at

**Pallikottai village
Tirunelveli Taluk
Tirunelveli District**

Prepared by

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1. INTRODUCTION

The south India Mines and Minerals Industries Limited is located in S. F. Nos. 7-17, Pallikottai village, Tirunelveli Taluk and Tirunelveli District. The Mine was opened on 1.4.1970 and is being operated under the mining lease vide G.O.Ms.No 1584 dated 10.1.1970 over an extent of 19.48 Ha. of patta land after the expiry of Mining lease period it was further renewed vide G.O.Ms.No. 591 dated 29.10.92. Production capacity of this Mine stone is 54.5 T/day it will be supplied to the surrounding lime based industries.

According to guidelines of the Ministry of Environment and Forest for the **mining projects**, the present scenario of all aspects of environment within 10km radius of the study area of Nellaithiruthu limestone mine have been evaluated and incorporated in the Environmental Impact Assessment report.

The objectives of the study are:

- To establish the present environmental scenario
- To prepare a detailed action plan for implementation of mitigative measures.
- To suggest preventive-and mitigative measures to minimize adverse impacts and to maximize beneficial impacts.
- To anticipate the impacts of existing project, minimize adverse impacts and to maximize beneficial impacts.
- To suggest a monitoring programme to evaluate the effectiveness of mitigative measures
- To suggest the formation of a core group responsible for implementation of environmental control and protective measures and monitoring of such implementation.
- To suggest a feedback mechanism enabling to make mid course corrections
- To prepare a capital cost for Environmental monitoring and Environmental Management Plan.

2. PRESENT ENVIRONMENTAL SCENARIO

2.1 Topography, drainage and climate

The Mining lease area is almost flat terrain on the southern side with a gradual raise in contours on the northern side. There is a small hillock on the northern side. The area is rocky terrain with quartzite boulders occurring all around and scattered. There is no natural water course passing through this area. The area experiences very scanty rain even during monsoon period. There is no forest land in and around the area. The vegetation is mainly xerophytes like cactus, Zizphus jujube (Common Jujube) and no other trees are found to be grown in this area.

The area is either a catchment area or watershed nor does have any river or nalla emanating from here. The river Chittar is flowing 0.5 km north of the lease area. There are some small water bodies occurring here and there around this area. They area of seasonal and dry almost through out the year.

2.2 Ecology

The lease area does not present a picture of natural species of vegetation due to cultivation. The generation of fugitive dust and airborne dust are controlled by sprinkling water, settling of dust



over the crop land or vegetation is also minimized over the surrounding buffer zone.

The reserve Forests at Talaiyuthu situated at a distance of over 4.0 km is degrade having a density of less than 0.3 and it is in the form of scrub land with xerophytic shrubs and trees, which could withstand the existing harsh climatic conditions. Hence no perceptible effect is anticipated by the proposed mine operations.

2.3 Hydrological Condition

a. Surface water

Surface Water flow is confined to river Chittar flowing on the North side of the study area. One sample was collected from Chittar River.

b. Ground Water

Since ground water drawn from hand pumps, open wells and water supply systems at selected towns are the main sources for domestic use, seven locations were selected for sampling.

2.4 Quality of Water

Total hardness of the water within the study area is considered to be under desirable limit. It can be used for drinking if the dissolved solids are not high and if the iron present in them is less than 1 ppm. The ground water at Selianallur was found to contain about 1438 mg/l of total dissolved solids which is above permissible limits as per IS 10500: 1991 of drinking water specification. In places like Pirancheri and Pillayarkulam (open well water), the total dissolved solids were found to be 600 and 1432 mg/l respectively. In other places, especially Thiruthurai (bore well) water was found to contain dissolved solids of 1470 mg/l, not suitable for drinking purpose.

Water is considered to be suitable for drinking wherever the dissolved solids are not high. The iron content was found to be negligible in all the samples. People in these areas utilize ground water. It was found that ground water shows no sign of contamination.

2.5 Air Quality and noise levels

Air quality was studied at five locations spread over the study area including the mine site. Micrometeorological parameters were also recorded at site. It is found that suspended particulate matter (SPM) or air borne dust at the mine (core zone) and village around (buffer zone) were $135.0\mu\text{g}/\text{m}^3$ and $109.0\mu\text{g}/\text{m}^3$ respectively against the permissible values of $500\mu\text{g}/\text{m}^3$ and $200\mu\text{g}/\text{m}^3$ for these areas. The concentration of NO_x and SO_2 are, negligible.

Background noise levels were measured in and around the site using Bruel and Kjaer 2230 sound level meter along with octave filter 1625. This instrument satisfies IEC recommendations (651). During the observation it was found that the noise level was well within the permissible limit.



LOCATION MAP



2.6 Land use pattern Mining lease area

The land use pattern in the mining lease area is given in the following table. The land is an uncultivable waste land.

LAND USE PATTERN OF MINING LEASE AREA

District	Taluk	Village	Area in hectare (19.48 Hec.)					Classification
			Mine Area	Road	Green Belt	Dump Area	unutilized	
Tirunelveli	Tirunelveli	Pallikottai	1.72	0.02	0.04	1.38	16.32	Patta
Total			19.48					

Buffer Zone

Detailed break up of land use pattern in buffer zone based on 2001 Census records, is given below.

LAND USE DETAILS OF BUFFER ZONE (10 km radius)

LAND USE	AREA (Ha.)	% OF TOTAL AREA
Irrigated	1378.17	21.3
Unirrigated	879.96	13.6
Culturable waste	1087.01	16.8
Area not available for cultivation	879.96	13.6
Forest	1371.70	21.2
R.F. Forest	873.49	13.5
TOTAL	6470.28	100

2.7 Socio – economic conditions

There is no habitation or settlement of people within the core zone, hence no displacement of persons is involved in the mining activity.

In buffer zone of the study area, 28 villages have been studied. As per the senses 1991, the total population of the villages is 152808 over an area of pf 31400 sq.km, hence, having a density of 4.86 per sq.km. The main workers constitute 50.04%, marginal workers 6.02% and non-workers constitute 43.94%. Out of the main workers, cultivators and agricultural labour constitute 54.08% while only 2.63% are in house-hold industry. This shows that the major sources of income of the local population are agriculture.

2.8 Places of religious/historical/architectural importance

There are no places of historical/tourism/religious importance in either core zone or study area. However, there are local places of worship at some villages.



3. ENVIRONMENTAL IMPACT ANALYSIS

3.1 Air quality

The air pollutants level at present is within the permissible limits for rural and residential areas. The mining operations like drilling, blasting, loading and transportation will increase the pollution load, particularly SPM but marginally, since water sprinkling being done at all the source of dust generation.

There is also no marked increase in other pollutants viz. SO₂, NO_x and CO, due to the limited extent of mining. It is well below the National Ambient Air Quality Standards prescribed by the Central Pollution Control Board (CPCB).

3.2 Water resource

Water for drinking purposes is received from factory – RO system and for sprinkling, rain water collected in mine pit is used. The South India Mine is presently using about 12.8 m³/day of water for all operations including green belt development within the mine area. (Water required for sprinkling on Haul roads is 10 m³/day, Greenbelt 1.4 m³/day and domestic consumption 1.4 m³/day, totaling 12.8m³/day).

3.3 Water Quality

Lime stone excavated from the mines will be directly used for cement manufacturing. Mineral beneficiation process is not envisaged in the mine due to direct usage in the process. Due to this reason, no tailings or process wastes will be generated from the mines.

There is no trade effluent generation from this mine. Only domestic sewage to the tune of 1.2 m³/day will be generated which will be discharged into septic tank followed by dispersion trench.

3.4 Land degradation

Mining lease area is 19.48 Ha. Out of this, a total of 3.12 Ha. will be used for mining and related activities, 0.04 ha. Will be used for tree plantation. The remaining area about 16.32 Ha. will be undisturbed land.

The wastes generated during mining are dumped at specified dump site which is available on eastern side of the mining lease area. The dump slopes are being maintained at less than the angle of repose and further stabilized by tree plantation. The garland drains are being made and in addition, peripheral bunds with boulders are also constructed.

The reclaimed and afforested areas will be protected from cattle menace, soil erosion, plant diseases etc. Plants will be protected from diseases by the application of proper pesticides. Soil working, manuring etc. will be done whenever necessary. Fencing and proper watch and ward may be provided depending upon the area.

3.5 Noise level and ground vibration

Since the application of drilling, blasting, haulage / transportation will be to a very limited extent; increase in ambient noise level will also be very marginal. Certain amount of ground vibration is anticipated due to drilling, blasting and haulage operations will not affect any surface structures during the operation. The noise level is found to be well within the Damage risk criteria for hearing loss, occupational safety and health administration (OSHA) and the **Ambient Noise level standards as per EPA notification GSR 1063 (E) dt. 16.12.1989.**

As stated in the para 3.9, National institute of Rock Mechanics, KGF has conducted a detailed study on Ground vibration at Nellaithiruthu Limestone Mine. The recommendations given by National Institute of Rock Mechanics, KGF indicating the maximum charge per delay for the corresponding distances as given below will be followed in this mine.

**RECOMMENDED MAXIMUM EXPLOSIVE CHARGE PER DELAY**

Distance (m)	Maximum charge per delay (Kg)
50	5
75	12
100	21
125 and beyond	30

It is also recommended that the hydraulic drills of 32 to 45 mm diameter can be continued for bench blasting, and free faces should be maintained properly for satisfactory breakage and reduced ground vibration. The same recommendations are followed to minimize ground vibration.

Based on the above factors, regular monitoring of ground vibration is done with minimate instrument and the vibration levels are found to be within safe limits.

3.6 Socio – economic impact

No households is displaced or required to be rehabilitated. Mining will result in loss of waste land only. This land is already in possession with South India Mines. The service sector may raise some employment of local people.

There is a dedicated road to the plant from the mines for the transportation of lime stone. It crosses the public road only at two places without causing any problem in public traffic.

4.0 ENVIRONMENTAL MANAGEMENT PLAN

In order to mitigate the environmental impact due to mining and its allied activities, a comprehensive environmental management plan (EMP) has been formulated. All the likely parameters that will be affected by mining have been addressed and these are briefly mentioned in the following paragraphs:

4.1 Land degradation control measures

The limestone deposits are narrow in the lease area and extend depth wise, the minerable depth being 90 m. The pit remains in operation over almost entire area during the life of the mine. This does not allow the normal practice of phase wise excavation and reclamation by refilling of mined out area with the waste generated during later periods. There are three reject dumps available on the eastern side of the mining lease area with 140, 220 and 130 long 60, 50 and 80 width respectively. This covers a total area of about 1.38 hectares. The mine will be refilled with waste material partly and the rest of the area will be left out as water body.

The terrain is rocky without much top soil cover. Moreover, no soil cover area is further required for mining. Hence top soil generation and preservation area not involved.

During mining activities, the rain water which will be accumulated in the pit will be dewatered and the same will be used for agriculture down fields. At the end of the mining operations, it is proposed to leave the excavated area as reservoir for water after providing suitable protective embankment around. This water body will be helpful in supporting agriculture in future.

The wastes generated during mining are dumped at specified dump site which is available on the eastern side of the mining lease area. The dump slopes would be maintained less than the angle of repose and further stabilized by tree plantation. There is a proposal for digging garland drains and peripheral bunds with boulders to prevent solid flow to surrounding lower level areas.

The company has taken up tree plantation programmes from the beginning. A total of 300 trees were planted in an area of 0.04 ha. within the lease area. It is further planned to plant 300 more trees over 0.04 ha. within the lease.



The species recommended for plantation include Vambo, Teak, tamarind, Vagha, Karuvel, etc, as well as several shrubs and grasses.

4.2 Air Pollution control measures

The ground level concentration of SPM, SO₂, CO and NO_x are well within limits. However, efforts are necessary to contain the dust generation at source for improvement of environmental conditions, as given below.

- Dust extraction system provided in drill machines.
- The cuttings will be wetted by wet drilling wherever possible.
- Using sharpened drill bits with efficient flushing system.
- Dust suppression on mine working areas, haul roads and the road leading to the factory for limestone transport by periodical water sprinkling. This is of highest importance.
- Proper maintenance of all earthmoving and transport equipments / vehicles for control of gaseous emissions.

4.3 Control measures for water pollution

Since the major cause of surface water pollution during the opencast mining activities in this mine is the wash off from the freshly excavated areas and fresh outside/inside dumps, the programme to prevent water pollution, therefore, shall focus on controlling wash off from these areas. Since the annual rainfall is low in these areas, wash off it will be very much limited. Further the analysis of water from various points like nalas, wells and rivers presented earlier reveals that all the parameters are well below the limits prescribed by CPCB. Still in order to prevent degradation and to maintain the quality as prescribed by MOEF, adequate control measures are required to check the wash off from the freshly excavated areas and soil erosion from dumps.

Control measures to be adopted are:

- The peripheral bunds will help in such a way that the soil is not carried away by storm water.
- A water gradient of about 1 in 100 shall be kept at every bench towards inside of the bench to prevent formation of gullies in the bench slopes which cause serious erosion.
- Stabilization of bund slope to prevent erosion.
- To prevent surface and ground water contamination by oil/grease, leak proof containers shall be used for storage and transportation of oil/grease. In the store also, the container containing oil/grease shall be kept in empty, safe open container of higher volume than the containers to avoid oil/grease spillage on the ground. The floors of the areas wherever oil/grease is handled shall be kept effectively impervious. Any wash off from the oil/grease handling area or workshop shall be drained through impervious drains, collected in specially constructed pit and treated appropriately before releasing it into the natural drains.

As the area receives very poor rainfall the water table is very low. However, during the rainy season, the rain water collected in the mine will be dewatered and it will be used for plantation and other works. There is no natural spring and stream course in the locality.

4.4 Control measures for noise level and ground vibration

The noise level monitoring carried out in and around the mine has revealed that the ambient noise levels are well within the prescribed limits.

The levels of ground vibration and noise are best controlled by techniques called controlled blasting practice by minimizing explosive charges per delay during blasting. As described under para 4.6, the recommendations of The National Institute of Rock Mechanics shall be followed strictly.

Further, the Management is adopted to improved methods of drilling and blasting as stated below, keeping in mind the hard nature of limestone and close interrelations of pegmatite and Calcgneiss rocks

- Drilling of 32 – 45 mm dia holes for blasting.



- Charging the holes with minimum explosives just to dis-lodge the strata with cracks developed.
- Sizing of rock blocks by using a rock-breaker selectively and separate loading of limestone and waste rocks.

This method has ensured economy on consumption of explosives and optimal removal of waste resulting in better quality control of lime stone produce. It will also help in minimizing the generation of dust as well as vibration and noise level due to blasting. These methods are highly recommended, since they are site specific, and more environment friendly.

The drilling pattern and charging of explosives will be as per the recommendations of the NIRM, and as such, the practice to be followed will ensure minimum ground vibration and noise level.

Tree plantation around the working areas will act as noise barrier. Regular preventive maintenance of machinery and transport vehicles. Particularly the noise generating parts will help in controlling noise levels and emissions. Introduction of air silencers of suitable type which can modulate the noise of engines can be tried.

Ear muffs should be given to those who work with noise levels around 90 dB(A) at source and wearing of the ear muffs should be ensured.

4.5 Socio-economic condition

As no habitation is going to be effected by the project, no rehabilitation package is necessary for resettlement of people. The amenities created for project employees will also be available for the inhabitants of adjoining villages. Job opportunities will be much limited with in the project but avenues for marketing of day-to-day material for the project employees, service industries, and various other activities around the project will tend to raise the standards of living of local population.

4.6 Places of religious/historical/architectural importance

Since there are no important historical or religious structures in the study area, there will be no impact and therefore, no control measures are required.

5.0 ENVIRONMENTAL CONTROL AND MONITORING ORGANIZATION

An appropriate team with existing and is proposed to be continued to take care of pollution monitoring aspects and implementation of control measures. A schedule has been spelt out for periodical monitoring. The total investment on environmental improvement works is envisaged as Rs.43.5 lakhs and recurring expenditure during the stage of production is Rs.7.3 lakh per year.

6.0 DISASTER MANAGEMENT PLAN

Appropriate disaster management plan has been spelt out in the EIA/EMP to take care of the following:

- Risk of inundation
- Disaster due to failure of pit slope
- Disaster due to failure of dump slopes
- Danger due to storage of explosives

Hence, no danger of any kinds is anticipated.

For South India Mines and Minerals Limited,

Manager (Operations)