

# **KRISHNA MINES**

**EXECUTIVE SUMMARY OF  
ENVIRONMENTAL IMPACT ASSESSMENT AND  
ENVIRONMENTAL MANAGEMENT PLAN FOR  
RAMAYANPATTI LIMESTONE MINE (12.12 HA.)**

**Located at**

**Ramayanpatti Village  
Tirunelveli Taluk  
Tirunelveli District**

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Prepared by

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## 1. INTRODUCTION

Ramayanpatti Limestone Mine located in Tirunelveli District of Tamilnadu, spread over an area of 12.12 Ha, belongs to Krishna Mines. The mine is supplying limestone to M/s. India Cements Limited cement plant which is situated at a distance of 8 km at Sankar Nagar towards west.

The mine was opened on 30.06.1958 and is being operated under the Mining Lease vide Proceedings No.8480/MM/4/2002 dated 11.06.2004 over an extent of 31.092 Ha of Patta land and G.O.M.S. No.115 dated 22.12.2003 over and extent of 12.12 Ha of Poromboke Land.

Both the mining lease is being worked continuously as they are adjacent to each other.

According to guidelines of the Ministry of Environment and Forest for **existing mining projects**, an Environment Impact Assessment Study has been undertaken. For this purpose, the present scenario of all aspects of environment in the premises and surroundings (upto 10 km radius called study area or buffer Zone) of Ramayanpatti mine have been evaluated. The seasonal data viz., post monsoon of the year 2008 have been generated for back ground assessment of the present environment. With these data the Environmental Impact Assessment has been prepared for the existing mining activities.

### **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 in general an undulating terrain, with the gradual increase in the gradient from the southern side to the northern side. There is a small hillock on the northern side. There is no natural water course passing through this area. However, as a precaution an earthen bund has been formed on the northern side to prevent rain water flow inside the mine pit. The mine is flanked both on eastern side and western side by the mines of M/s. The India Cements Limited. The adjacent lands on the southern side dry lands are seen due to meager rainfall in this area and rocky nature of the terrain. The mining lease area, surrounding the limestone deposit is contoured and the maximum elevation of the area is 91 m above M.S.L and the minimum elevation is 81 m above M.S.L. Refer Surface plan.

Besides this are no important surface features such as public monuments, place of interest etc., within 5 Km radius of the mining lease area.

The climatic conditions including temperature variations, wind direction and velocity, rainfall and humidity are governed by regional factors viz. monsoons and depressions. As such the mining and other allied activities will not tend to influence the climate.

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### **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 at source, 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 2.2 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 Tamirabarani flowing on the South East and southern side of the study area. One sample was collected from Tamirabarani 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.

## 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 Mining area was found to contain about 290 mg/l of total dissolved solids which is beyond permissible limits as per IS 10500: 1991 of drinking water specification. In places like Manur and Sethuramaputhur (well water), the total dissolved solids were found to be 4640 and 624 mg/l respectively. Surface water collected from the Tamirabarani River, which contains 185 mg/l dissolved solids. In other places, especially Abishegapatti and Talaiyuthu water was found to contain dissolved solids of 512 mg/l and 586 mg/l respectively, 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 utilise ground water. It was found that ground water shows no sign of contamination.

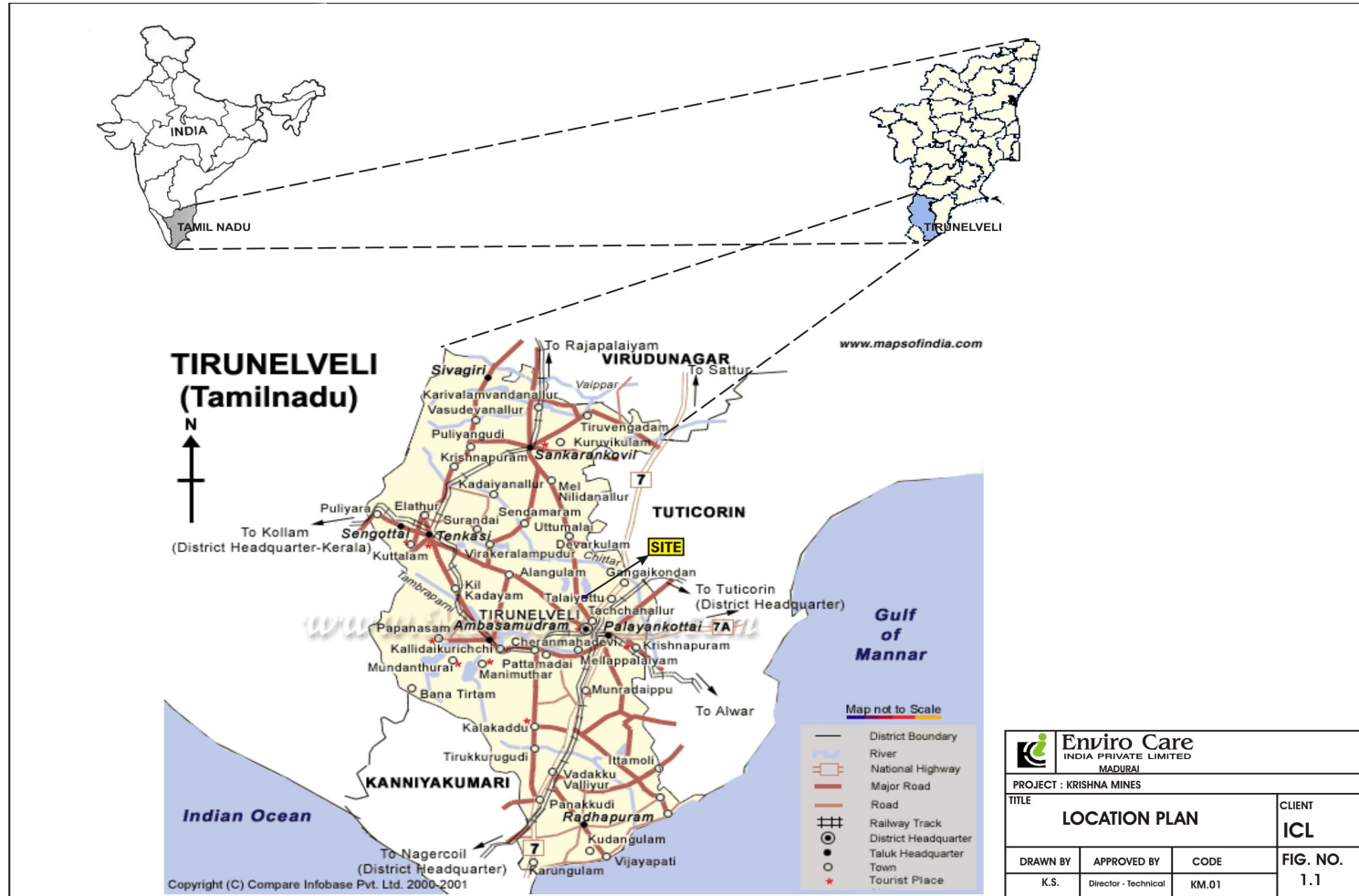
## 2.5 Air Quality and noise levels

Air quality was studied at eight locations spread over the study area including the mine site. Micrometeorological parameters were also recorded at site. It is found that suspended particulate mater (SPM) or air borne dust at the mine (core zone) and village around (buffer zone) were  $138 \mu\text{g}/\text{m}^3$  and  $106 \mu\text{g}/\text{m}^3$  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<sub>x</sub> and SO<sub>2</sub> 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). The noise level recorded around the site is given in the Table 3.14 in REIA report. 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/ State	Taluk	Village	Total Area – 12.12 Ha.				Land Category
			Under Mining & dumps	Roads & Builtup Area	Green belt	Undistur bed Area	
Tirunelveli/ Tamil Nadu	Tirunel veli	Ramayan patti	6.88	0.30	0.25	4.68	Waste land

### Buffer Zone

The total area of buffer zone falls in two taluks (Tirunelveli & Palaynkottai) of Tirunelveli district. 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
Cultivable 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
<b>TOTAL</b>	<b>6470.28</b>	<b>100</b>

## 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, 27 villages have been studied. As per the census 1991, the total population of the villages is 85448 over an area of about 78.5 sq.km, hence having a density of 6159 per sq. km. The main workers constitute 37%, marginal workers 3.0% and non-workers constitute



60.0%. Out of the main workers, cultivators and agricultural labour constitute 18% while only 19% 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. SO<sub>2</sub>, NO<sub>x</sub> 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. Krishna Mines is presently using about 26.5 m<sup>3</sup>/day of water for all operations including green belt development within the mine area. (Water required for sprinkling on Haul roads is 10 m<sup>3</sup>/day, Greenbelt 0.5 m<sup>3</sup>/day and domestic consumption 16 m<sup>3</sup>/day, totaling 26.5m<sup>3</sup>/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 4.8 m<sup>3</sup>/day will be generated which will be treated in a suitable septic tank of size 3 x 3 x 4.5 m followed by dispersion trench of size 1 x1 x 3 m.

#### **3.4 Land degradation**

Mining lease area is 12.12 Ha. Out of this, a total of 6.88 Ha. Will be used for mining and related activities, 0.25 ha. Will be used for tree plantation. The remaining 4.68 Hectare will be undisturbed land.

The wastes generated during mining are dumped at specified dump sites. 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. 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 Karumapurathanur 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 115 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.

The management has conducted during this year a study on Blast induced Vibration, Air over pressure, Fly rock and optimum charge & blasting pattern for controlled blasting for this mine, the permission has been obtained from the Directorate General of Mines Safety to carryout blasting within 100 m of building not belonging to the owner of the mine, through the National Institute of Rock Mechanics, Kolar Gold Fields, Karnataka.



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 house holds is displaced or required to be rehabilitated. Mining will result in loss of waste land only. This land is already in possession with Krishna 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.

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#### 4. 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:

##### **Land degradation control measures**

The limestone deposits are narrow in the lease area and extend depth wise, the minerable depth being 50 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. However, it is planned to mine out 40-50 m long part on the western end and 20-40 m long part of the eastern side having shallower deposit within 2 - 3 years and refilling the same thereafter. This covers a total area of about 6.88 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 sites. 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 250 trees were planted in an area of 0.15 ha every year.

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



## **Air Pollution control measures**

As already discussed in Chapter – 4, the ground level concentration of SPM, SO<sub>2</sub>, CO and NO<sub>x</sub> 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.

## **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.

### **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 adapted 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 115 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.

### **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.

### **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. ENVIRONMENTAL CONTROL AND MONITORING ORGANIZATION**

An appropriate team is 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.45 lakhs and recurring expenditure during the stage of production is Rs.7.3 lakhs per year.

## **6. 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 Krishna Mines,**

**Manager (Operations)**