



# THE INDIA CEMENTS LIMITED., DALAVOI

## EXECUTIVE SUMMARY FOR ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN FOR PUDUPALAYAM LIMESTONE MINE AT PUDUPALAYAM VILLAGE, ARIYALUR DISTRICT, TAMIL NADU.

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**EXECUTIVE SUMMARY OF  
RAPID ENVIRONMENTAL IMPACT ASSESSMENT AND  
ENVIRONMENTAL MANAGEMENT PLAN OF PUDUPALAYAM  
LIMESTONE MINE AT PUDUPALAYAM VILLAGE, ARIYALUR  
DISTRICT, TAMIL NADU.**

**1.0 INTRODUCTION**

India cement Ltd (ICL) is planning to operate Pudupalayam limestone mine in Ariyalur District, of Tamilnadu with an annual production of 0.155 million tonnes in an area of 29.29.5 hectares.

**1.1 Background of ICL**

India Cement Ltd (ICL), a market Leader in the cement manufacture & a pioneer in scientific development of captive limestone mines, has established to its credit three cement plants in Tamilnadu at Sankar Nagar in Tirunelveli district, Sankari in Salem district and Dalavoi in Ariyalur District with a total output capacity of 2.65 million tonnes per annum & four in Andhra Pradesh at Chilamkur & Yerrakuntla in Cuddapah district, Vishnupuram in Nalagonda distict and Tandur at Ranga Reddy district with a total out put capacity of 4.1 million tones. The Dalavoi cement plant has so been depending on limestone available at Adanakurichi, Alathiyur, Manakkudayan and Periyakurichi Village.

ICL have recently purchased patta lands of about 72.39 acres (29.295 Ha)with mining lease from M/s Alagappa Cements Ltd. in Pudupalayam Village, Ariyalur District for which Transfer of mining lease has been granted by Government of Tamilnadu. ICL has prepared mine plan for the total 72.39 acres.

**1.2 Reasons for preparing the EIA/EMP**

M/s Alagappa Cements Ltd.had been granted a mining lease covering an extent of 163.80 acres by the Government of Tamilnadu vide G.O.No:27 dated 11.01.1989.It comprises two blocks consisting of 72.39 acres and 91.41 acres respectively. Due to uneconomic operating condition, the said company could not continue their manufacturing of cement with vertical shaft kiln and decided to sell their property including they mining lease with due approval from the Government. Accordingly they approached the Government for the disposal of a part of mining lease. Government of Tamilnadu after careful consideration gave consent for said proposal. ICL has purchased one block covering 72.39 acres and applied for transfer of mining lease.

On 04.08.2003 Government of Tamilnadu has granted transfer of mining lease covering 72.39 acres under Go.Ms.No.75 in favour of The India Cements Ltd. In the portion under the possession of M/s Alagappa Cements there was no operation whereas ICL continued its mining activity. The mining lease expires on 08.02.2009. Now the cement plant of ICL located at Dalavoi has enhanced its production, therefore more quantity of limestone required. Considering this company has proposed to increase the production in Go.Ms.No.75 covering 72.39 acres. A mining plan for the production of 1,54,800 tonnes per year of limestone has been

prepared and it is duly approved by the Indian Bureau of Mines (IBM) on 30.08.2004.

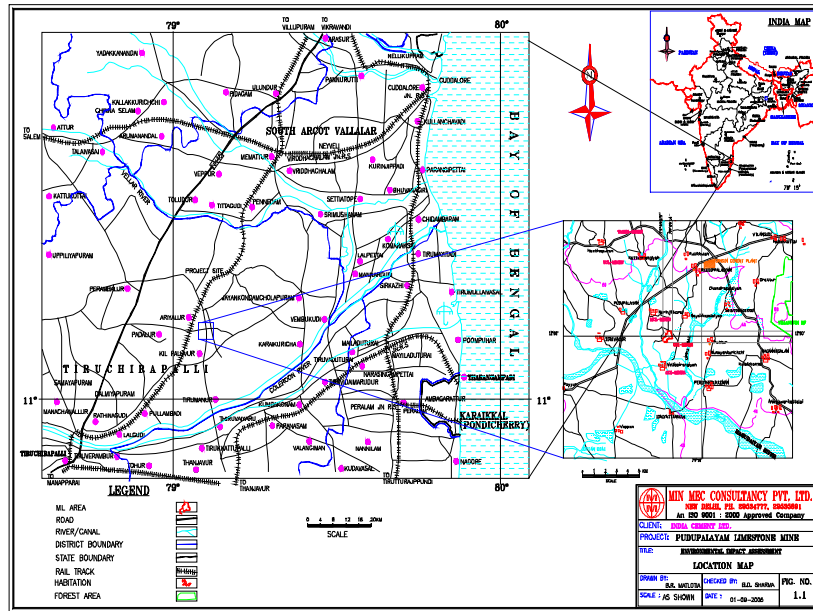
Under these circumstances, ICL has engaged Min Mec Consultancy Pvt Ltd. to prepare EIA/EMP report in accordance with the revised EIA Notification published in September 2006.

### **1.3 Objectives of the Study**

- Establishing present environmental scenario.
- Study of the future mining operation & anticipated impacts on the environment.
- On the basis of impact assessment, suggesting control measures to mitigate/reduce the adverse impact on the surrounding environment.
- To delineate environmental quality monitoring programme during the mining operation.

### **1.4 Location and communication**

The area falls in survey of India Toposheet 58 M/4 within East longitudes 79° 09' 05" to 79° 09' 14" and North Latitudes 11° 05' 03" to 11° 04' 51" as shown in Fig 1.1. The area is situated at a distance of 14 km from Ariyalur & lies 5 km from Jayankondam – Trichy State Highway. Ariyalur is the nearest railhead on Chennai-Tiruchirapalli Broad gauge line of Southern Railway, at distance of 14 km. Tiruchirapalli is the nearest Airport.



## 2.0 PROJECT DESCRIPTION

### 2.1 Local Geology

Limestone bearing area forms a part of Cauvery Basin measuring over 30,000 Sq. Kms and extending from Pondichery in the North & Gulf of Mannar in the South. The general strike of limestone formation is NNE to SSW with a low dip ranging from 4-8 degrees towards SSE. Borehole studies reveal the following stratigraphic details.

Clay soil  
Karkary Limestone  
Shell Limestone  
Siliceous Limestone  
Conglomerate/s st.

### 2.2 Mining Area

The total M.L. area envisaged for the environmental clearance is 29.295 hectares (Ha) and annual target production of 0.155 MT.

### 2.3 Reserves and Wastes

Based on the core recovery, 90% recovery factor of limestone is considered. The total mineable Reserves of this area is 1.27 million tonnes and waste is 0.50 million tonnes. The mineable reserves have been calculated leaving allowances for safety distances, haul roads and bench width.

The following constitute the waste rock.

- The overburden of loose clay soil and Kankar
- The waste mainly consists of topsoil, chert and marl.

### 2.4 Mining Scheme

The method of mining is mechanized with shovel - tipper combination and conventional drilling & blasting. The OB consists of loose clay soil with Kankar. Limestone in this area is sedimentary, well consolidated, medium to hard and it requires drilling & blasting with explosives. It is proposed to take 517 tonnes (max) of limestone per day.

**Overburden Excavation :-** The OB consists of loose clay soil with Kankar. It can be handled by hydraulic shovel with out drilling & blasting. It is utilised for forming the periphery bunds all along the ML area.

**Limestone Excavation :** - Limestone excavation requires drilling and blasting with explosives. The thickness of shell limestone ranges from 7-12 m. The average quality of shell limestone is 83% CaCO<sub>3</sub>. During the blasting the generated limestone will be 60% in the form of boulders and 40% in the form of fines.

**Loading and Transportation:** - After drilling & blasting the limestone can be removed by hydraulic shovel/loader onto tipper for transportation. The boulders (60%) and fines (40%) limestone have to be loaded to tippers of 10/20 T's capacity since the ROM of blasted material is + 83% of CaCO<sub>3</sub>.

## 2.5 Mine Development

The envisaged development for the next five years is as follows.

### YEARWISE DEVELOPEMNT QUANTITY (TONNE)

Year	Topsoil	Overburden	Total
I	55840	–	55840
II	–	7240	7240
III	17600	12288	29888
IV	12840	16240	29080
V	13672	35504	49176
<b>Total</b>	<b>44112</b>	<b>71272</b>	<b>171224</b>

## 2.6 Production Programme

### 2.6.1 Next five years production

#### YEAR WISE PRODUCTION QUANTITY (TONNE)

YEAR	LIMESTONE			TOPSOIL	OVERBURDEN	TOTAL WASTE	LST:WASTE RATIO
	ROM	REC.LST (90%)	ISR (10%)				
I	169000	152100	16900	55840	---	72740	1:0.48
II	168500	151650	16850	---	7240	24090	1:0.16
III	172030	154827	17203	17600	12288	47091	1:0.30
IV	169780	152802	16978	12840	16240	46058	1:0.30
V	167440	150696	16744	13672	35504	65920	1:0.44
<b>Total</b>	<b>846750</b>	<b>762075</b>	<b>84675</b>	<b>44112</b>	<b>71272</b>	<b>255899</b>	<b>1:0.33</b>

### 2.6.2 Future Production Planning

The total mineable Reserves of this area is 1.27 million tones. The proposed rate of production is as follows.

#### PROPOSED RATE OF PRODUCTION, IN TONNES

Year	Limestone	Total Waste
Upto 5 <sup>th</sup> year	762075	255899
6 <sup>th</sup> to 10 <sup>th</sup> year	303715	133840
11 <sup>th</sup> to 15 <sup>th</sup> year	210260	112406
<b>Total</b>	<b>1276050</b>	<b>502145</b>

The maximum production of limestone during 15 years of life of the mine will be in 3<sup>rd</sup> year 154827 T which is equivalent to 517 TPD

## 2.7 Waste Disposal

The waste material will be utilised for forming 5 m wide , 3 m high peripheral bund. The balance material will be dumped in western side over non-mineralised area

## 2.8 Site facilities.

A Mine Maintenance Department with necessary workshop facilities created at Adanakurichi mines will be utilized by this mine also. A suitable store will also be provided to take care of providing necessary consumables, spares and repair store items. A canteen, Rest Shelter, First Aid Station, Change Room will be provided near mine office. A permission for 45 KVA power already exists from state Electricity Board.

## 2.9 Equipment and Manpower

Mine will have one each of Hydraulic Shovel CK 90, water tanker, Dewatering Pump, Wagon Drill, Diesel compressor, D 50 Dozer, and 4 Tippers. A total of 13 person will require for operation.

## 3.0 PRESENT ENVIRONMENTAL SCENARIO

### 3.1 Topography, Drainage and Climate

The study area represents a part of coastal sedimentary plains & river basin. Except for minor undulations in the middle, the major part of the area is plain with gentle southerly slope, the highest elevation being 80 m RL in the north & lowest of 50 m RL towards middle, where the river Marudaiyar flows with marked meandering. The average elevation is around 40-60 m. The study area is drained by Marudaiyar river flowing south easterly and is a seasonal tributary to river Pennar, which flows towards east to the bay of Bengal ultimately.

The study area occupies warm climatic belt with moderate humidity and is devoid of hills. The coldest month is January, lowest mean temperature being 19.5°C. It is intensely warm during the months of May and June with mean maximum temperature of 39.8°C. The rainfall is mostly distributed between May to December, with an average precipitation of 825.6 mm.

### 3.2 Ecology

**Flora :** There is scarce natural vegetation within the ML area. The predominant species are small trees and bushes. The growth of natural flora is very limited. It is observed that *prosopis Juliflora* is a predominant species present on uncultivable waste land. Due to absence of any perennial surface water bodies, there is abundance of lotus and water lily in seasonal surface water bolies. *Azadirachta indica* and *Borassus flabelliform* have better adaptability among naturally growing species. The villages in study area are covered with cashew tree & coconut plantation. Plantation of fruit trees & decorative plants like Guava, Papaya, Banana, China rose, Coconut etc. are seen. Paddy is the main crop but pulses, Sugarcane & Groundnut are also grown is this area.

**Fauna :** No, wild life of Schedule I is found in the core zone. Jungle cat, Rhesus macaque, Indian fox etc. are found amongst mammals. Indian cobra and other common snakes are found amongst reptiles. Amongst aves, common peafowl is found besides other common birds.



### 3.3 Hydrological Condition

#### (a) Surface Water

Marudaiyar is the only river in the area.

#### (b) Ground Water

The occurrence & movement of ground water in the area is controlled by prevailing geomorphology. The limestone present in the study area belongs to Ariyalur group of cretaceous age which is the middle group of marine sediment in Ariyalur district.

The ground water in the study area generally occurs in the secondary porosity of limestone which lies at shallow depth. The annual replenishable groundwater resource is 68.71 MCM. The utilization of ground water by different competing users comes to 39.59 mcm

Water balance	29.12 mcm
Level of ground water development	57.62%

### 3.4 Water Quality

The chemical analysis result of the water sample taken from dugwells indicate that the ground water is feebly alkaline, The range of different elements present in ground water is as follows.

Sl.No.	Element	Desirable	Permissible	Range Present
1.	pH	6.5-8.5	6.5-8.5	7.4 - 7.8
2.	Total Hardness	300	600	148 – 656
3.	Iron	0.3	1.0	0.10 - 0.29
4.	Chloride	250	1000	32 – 1200
5.	Dissolved Solid	500	2000	325 – 2625
6.	Calcium	75	200	18-59
7.	Sulphate	200	400	7.8 – 223
8.	Fluoride	1	1.5	0.12 – 0.94
9.	Alkalinity	200	600	212 – 500

### 3.5 Ambient Air Quality and Noise Levels

The monitoring results of five ambient quality monitoring stations are given below

Stations	24 Hourly average concentration ( $\mu\text{g}/\text{m}^3$ )							
	RPM		SPM		SO <sub>2</sub>		NO <sub>x</sub>	
	Max.	98% ile	Max.	98% ile	Max.	98% ile	Max.	98% ile
<b>Core Zone</b>								
Pudupalayam(A1)	49	48	147	143	5.5	5.2	8.8	8.5
<b>Buffer Zone</b>								
Villangudi(A2)	65	65	196	196	7.1	7.0	11.1	11.0
Udaiyarvarthiyanur (A3)	65	64	195	191	5.2	5.1	7.9	7.8
Mallur(A4)	43	43	129	129	BDL	BDL	6.0	5.9
Arungal(A5)	29	29	97	97	BDL	BDL	BDL	BDL

The SPM levels are found to be well within limits of 200  $\mu\text{g}/\text{m}^3$  for rural and residential areas at all the locations while RPM was found to be less than 100

$\mu\text{g}/\text{m}^3$ .  $\text{SO}_2$  and  $\text{NO}_x$  values are much on the lower side. The noise level was well within the permissible limits the noise level at core zone was found to be 36.9 - 47.7 dB(A) and at the adjoining villages was between 37.9 – 43.6 dB (A).

### **3.6 Land use of Core Zone and Soil Characteristics.**

The core zone consists of 29.295 Ha which is mostly dry uncultivated land covered by grass & shrubs. Soil of the area is mildly alkaline with medium water holding capacity. Soil is gray to dark gray to loam calcareous.

### **3.7 Socio Economic Conditions**

There is no hamlet within core zone. In buffer zone of the study area 37 villages have been studied. The total population of the villages is 116722 over an area of 355.11 sq.km, the population density is 329 per Sq. km There are 28483 households in the study area. The main workers are 40%, 46% of main workers are cultivations while 38% are agriculture labour. House hold industries workers are 2%. About 31% of males and 19% of females are literates. The SC population is 20.2% and ST is 0.82% of total population.

### **3.8 Industries and Other Places of Importance**

There are 17 limestone mines and 4 cement plants within the study area. There is no such place within core zone or in the study area with historical/tourism/religious importance. There are two big temples of Kaliperumal Saghaimada at about 12 kms distance from ML area.

## **4.0 ANTICIPATED ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURES**

### **4.1 Air Quality**

The use of mining activity and transportation of limestone from mine to plant will increase. By Dispersion modeling method calculated incremental GLC ( $\mu\text{g}/\text{m}^3$ ) at 500 m from ML of SPM,  $\text{SO}_2$  and  $\text{NO}_x$ . will be 4.40, 0.09 and 0.17 respectively.

### **4.2 Water Resource**

As no surface water is proposed for utilization hence no impact on surface water regime is anticipated. The drinking need is  $2\text{m}^3/\text{day}$ , which is proposed to be extracted through one bore well. The anticipated mine seepage and rainwater would be  $358\text{ m}^3/\text{day}$ . There will be surplus water available ( $230\text{ m}^3/\text{day}$ ) for utilization elsewhere after fulfilling the entire water requirement of mine related activities ( $\text{Plantation } 28\text{ m}^3/\text{day} + \text{Sprinkling of } 100\text{ m}^3/\text{day} = 128$ ).

### **4.3 Water Quality**

There is no generation of effluents by mining or allied activities. The water pumped out from the peripheral borehole will not have any excessive turbidity. No chemical pollutants are expected from mine as there is no discharge of toxic materials at the surface or sub surface. The drinking water parameters are anticipated to remain well within the permissible limits of Indian Standards for Drinking Water (IS 10500 : 1991).

#### 4.4 Land use

Since the land degradation is restricted only to the mining area the reclamation strategy has been included in the Environmental Management Plan. The post mining land use of core zone shows that the area of total excavation is 13.0 Ha. Dumps will occupy 4.19.5 Ha. area. A part of the area covering 2.16 ha will be back filled and the remaining area of 10.84 Ha. left as water reservoir, which will act as storage tank.

#### 4.5 Ecological Factors

The ML area does not have any special plantation or agriculture. Therefore no adverse impact on ecology will take place. The proposed afforestation will improve the ecology & the reservoir created during post mining period will improve ecology further.

#### 4.6 Noise level and Ground Vibration

Since the mine will use the heavy earth moving & mining equipments like dozers, shovel etc. to a very limited extent and the ore will be transported by tippers, the increase in noise level is expected to be very marginal.

The work environment noise levels will remain within the criteria laid down by OSHA & the ambient air noise levels will be within National Standards in respect of Noise.

The actual level of vibration is expected to remain within limit. However, controlled blasting & safety measures can further reduce the vibration levels.

#### 4.7 Socio Economic Conditions

No household will be displaced therefore no rehabilitation would be needed. The local population gets an opportunity to get employment within skilled or unskilled category depending upon their eligibility within the company and also outside service industries, marketing of day to day needs etc.

### 5.0 ENVIRONMENTAL MONITORING PROGRAMME AND ENVIRONMENTAL MANAGEMENT PLAN

#### 5.1 Land Degradation Control Measures

Stage wise land use during mining & post mining is as follows.

Sl. No.	Land Use Category	Land Use Area in Ha is end of Years			
		1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	15 <sup>th</sup>
1	Excavation	3.475	6.545	11.300	13.000
2	Outside dump	0.770	3.040	4.195	4.195
3	Roads	0.650	0.650	0.650	0.650
4	Built up area	0.100	0.100	0.100	0.100
5	Green belt/plantation	0.150	0.850	0.850	1.970
6	Peripheral bund	1.610	1.160	1.610	1.610
7	Undisturbed area	22.540	16.550	10.580	8.890
	<b>Total</b>	<b>29.295</b>	<b>29.295</b>	<b>29.295</b>	<b>29.295</b>

It is proposed to excavate 13 ha area to mine 1.276 M.T. of limestone. The overburden both topsoil and waste shall be dumped over an area of 1.16 and 3.035 Ha land on western side. The waste generated during the first 5 years is required for construction of peripheral bund and the plantation. The top soil will be used for tree plantation and also to spread over the backfilled area to enable afforestation/biological reclamation.

Plantation acts like a buffer between the mine and the surroundings. About 8.26 ha of land will be utilised for plantation. Around 2500 trees will be planted per hectare.

## **5.2 Air pollution control Measures.**

The mining method adopted has inherent effect of controlling dust generation at source. Control measures like dust suppression at sources by water spray at face (before & after blasting), maintenance of transport vehicles to be leak proof. Periodic Check up & maintenance of drills & dust extraction devices will be done. Green belts to be developed around working areas and loading points. Dust masks will be provided to employees engaged at dust generation sources, loading/unloading points etc.

## **5.3 Control Measures for Surface and Ground Water Pollution.**

To prevent surface and ground water contamination, following control measures will be adopted.

The ground water in & around the mines & surface water during rains will be tested regularly and appropriate control measures adopted.

All stacking & loading areas, waste dumps will be provided with garland drains with baffles to prevent flow of wash offs to the natural streams.

Water pumped out from dewatering pumps will be used for mining consumption. All the mine water will be stored in the sump and from there it will be used for plantation & sprinkling purposes

After mine operation, water body is created in the mined out pit, which will act as water reservoir. It will help in improving the ecology & socio-economy by way of providing assumed irrigation and fishery.

## **5.4 Measure to Control Noise Pollution**

Provision & proper maintenance of green belt and periodical maintenance of noise generating machinery and transport vehicle helps in reducing noise level so that it does not exceed prescribed limits. Workers are provided protective devices like earmuffs/earplugs who work in noise generating areas.

## **5.5 Measures to improve Socio-Economics Condition of local people**

As no habitation is going to be affected by the project, no rehabilitation package is necessary for resettlement of people. Employment opportunities within and outside the project will tend to raise the standard of living of local population though, marginally.

## 6.0 ENVIRONMENTAL CONTROL AND MONITORING ORGANIZATION

To evaluate the effectiveness of environmental management programme, regular monitoring of important environmental parameters will be taken up. The total investment on environmental improvement works is envisaged as Rs 47.34 lakhs & recurring expenditure during the stage of production is Rs 17.12 lakhs per year.

The specific investment comes to Rs. 2.53 per tonne of limestone mined. The annual average output of clean limestone being 0.155 MT and environmental recurring cost is Rs 11.04/tonne of limestone production.

Keeping the utility of monitoring results in the implementation of the environmental management programme in view, an organisational set up has been proposed, headed by Sr.Vice President (Mfg).

## 7.0 PROJECT BENEFITS

The economic growth of the area in terms of employment generation, consumption behaviour and market-growth are expected outcome of the project. It is assumed that the generation of indirect employment would be multiple of direct employment. The significant positive impact on employment and occupation is envisaged on account of

- Better economic status of the community due to better earnings
- Higher inputs towards infrastructural facilities due to mine
- Enhancement of literacy due to educational facilities available in the area

The company shall earmark funds for social development and welfare measures in the surrounding villages. These measures shall include funding for:

- 1) Repair and improvement of existing schools
- 2) Repair and improvement of health centres
- 3) Repair and improvement of community centres, building such as Panchayat halls, Baratghars etc.
- 4) Awareness programs
- 5) Women welfare and child development programs
- 6) Medical camps
- 7) Competitions and prizes
- 8) Drinking water availability efforts
- 9) Rain water harvesting measures