

# **EXECUTIVE SUMMARY**



## Executive Summary

### **Introduction**

The proposed project is for mining of limestone at village Aniali, taluka – Ranavav, District Porbandar, Gujarat, categorized under category “B” 1 (a) (mining lease area < 50 hectare) - {Mining of Minerals} as the lease area is 16.21 ha. However due to the presence of Barda Wildlife Sanctuary within 10 km radius of the mine lease area , the project is categorized as Category “A” and will be considered at MoEF, New Delhi

### **Project Location**

The mining lease of Limestone mine is categorized as Government waste land. State Government has granted the Lease for mining of Limestone in 1986. The geographical location of the lease area is as under:-

<b>PARTICULARS</b>	<b>DETAILS</b>
Location	Aniali Limestone Mining Lease
Village	Aniali
Survey No.	207/ part
Taluka	Ranavav
District	Porbandar
State	Gujarat
Total Mine Lease area	16.21 Hectare

### **Project Importance**

The products of TCL’s Mithapur plant, especially soda ash, are a vital input for a number of basic industries such as glass, pulp and paper, chemicals and detergents, besides others. Consequently, this project aims at keeping many of the key industries within the country well supplied with an essential raw material. Cement, another product of TCL, also dependent on limestone inputs, is a key input to the infrastructure development of India.

## **Project description**

### **General**

The proposed project is for opencast mining of limestone by mechanized means. The project will include of mining, screening, crushing and transportation of limestone to TCL's Chemical Complex and Cement Plant at Mithapur.

### **Mineral Reserves, proposed rate of production & life of mine**

<b>Geological Reserves</b>	0.503 Million Tons
<b>Mineable Reserves</b>	0.465 Million Tons
<b>Proposed production per year</b>	0.093 Million Tons
<b>Proposed total life of mine</b>	5 years

### **Method of Mining**

#### ***Primary mining:***

Primary mining is done by conventional drilling & blasting (using explosives) as per the guidelines of Directorate General of Mines Safety, Dhanbad as well as Indian Bureau of Mines, Udaipur.

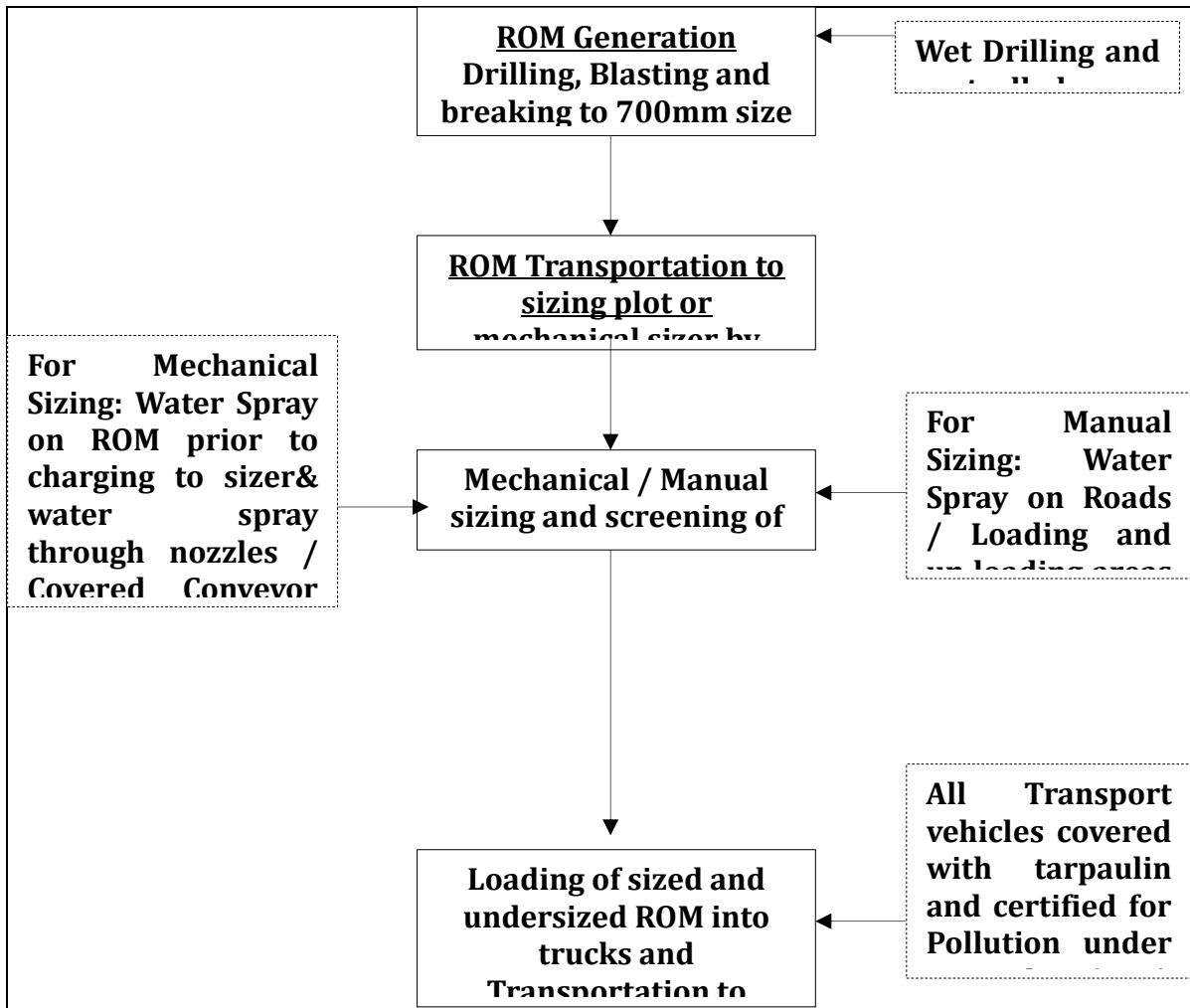
Blasted material (ROM) is loaded into tippers and shifted to a nearby sizing yard outside the leasehold area where sizing of limestone is done manually using contract labourers.

Alternately in the event of Labourer shortage, a mobile sizer & screening equipment will be deployed at Aniali 21.04 Ha Mine lease for sizing and screening of limestone.

### **Solid waste management**

The deposit of the lease area is horizontally bedded and totally outcropping. There is neither any overlying waste stratum nor any overburden. Hence, no overburden or mine reject generation is anticipated during the mining operations. After sizing, sized material will be transported to the chemicals complex at Mithapur.

**Mining process flow diagram with Pollution Control Measures:**



**Employment Potential**

The local labours shall be engaged for sizing of limestone and loading and handling of mineral in mining area, besides, watch and ward and plantation activity with proper maintenance. Assuming that one man on and average can size 2 to 3 tonnes of material per manday; the total manpower required for material handling and loading works out to 72. Beside this, TCL shall engage skilled and managerial staff to meet the statutory requirement under MMR 1961 and MCDR 1988. At present, the mine is not functional.

## **Water & wastewater management**

### **Water Source & Requirement**

The projected water requirements for the mine site are likely to be in the range of 30KLD. The major areas of water consumption are dust suppression (15.6 KLD), for domestic purposes (2.7 KLD) and green belt development (11.7 KLD).

### ***Storm Water***

The lease area is slightly sloppy hence no collection of surface water at site is envisaged during pre-operational stage. After commissioning of mining activities the rain water will get collected in the mined out pits and as a common practice is used for dust suppression and greenbelt development.

## **Post Mining Land use**

### **Afforestation Programme upto the end of Conceptual Plan**

The proposed mining to be carried out with opencast mining method and rest of area will be developed as green belt for creation of aesthetic environment suitable to local conditions. At the end of mining lease total 0.52 Ha area will be developed as green belt. The selection of species to be planted will be done with criteria like local, speedy growing & fruit bearing in nature.

### **Rain Water storage/ Harvesting**

The mine will be worked as opencast mechanized method and mining operations will generate rainwater storage pits at the end of mining. The total estimated area of pits will be 13.01 Hectare with ultimate depth of 7.75 meters. The shallow pit will cater water storage of 1,008,275 KL of water at site for green belt development and dust suppression.

## **Description of the environment**

The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering March, April & May 2013 with CPCB guidelines. Environmental data has been collected with reference to proposed mine for:-

- a) Land
- b) Water
- c) Air
- d) Noise
- e) Biological
- f) Socio-economic status

## **Land Environment**

### **Land Use/ Land Cover**

The existing land use pattern of the study area of 10 km radius from mine boundary based on the latest satellite imagery is given below:

#### **Land use pattern of the study area**

S. No.	Land Category	Area (Sq KM)	% land cover
1	Agricultural land	208.32	66.28
2	Forest land	36.23	11.53
3	Built-up area	2.83	0.90
4	Water body	2.74	0.87
5	Waste land	19.88	6.33
6	Other areas	44.29	14.09
TOTAL		<b>314.29</b>	<b>100</b>

## **SOIL CHARACTERISTICS**

The soil survey was carried out to assess the soil characteristics of the area. For studying soil quality of the region 5 samples were collected to assess the existing soil conditions in and around the area. Monitoring data shows that the texture of soil at all locations is Sandy Loam. The monitoring sites have sand ranging from 70% to 76% in soil samples. Silt content varies from 18% to 22%, while Clay content varies from 6% to 8% in the soil samples.

## Water Environment

### *Ground water Quality*

The value of pH ranges from 7.54 to 7.78, indicating that water is slightly alkaline in the study area. Maximum Conductivity observed is 3256  $\mu\text{mhos/cm}$  at Bordi village, whereas minimum conductivity was observed at Aniali Village as 1352  $\mu\text{mhos/cm}$ . Total hardness of ground water ranges from 402 to 1126 mg/l. The observed values of Chloride vary from 465 mg/l at Aniali village to 1077 mg/l at Bordi village. The ground water quality is in general poor (brackish to saline) at deeper levels at mostly all locations.

### *Surface water Quality*

The physico-chemical characteristics of Surface water are found within the limits, prescribed by CPCB. The surface water quality is in general poor (brackish to saline) at mostly all locations.

## Air Environment

### **Site Specific Meteorology**

Site specific meteorology during the study period was recorded by an automated weather station. Site specific meteorological data of the study area reveals that predominantly wind is blowing from the west direction accounting approximately 34% of the total wind followed by SW and SSW contributing 16% to 11% respectively. Calm winds are only 0.63% of the total value. Average wind speed during the study period is 2.89 m/s.

### *Ambient Air Quality Results*

#### PARTICULATE MATTER 10 (PM<sub>10</sub>):

The maximum value for PM<sub>10</sub> is observed, as 68 $\mu\text{g/m}^3$  at Bordi village while 24 hours applicable limit is 100 $\mu\text{g/m}^3$  for industrial and mixed use areas. The area observes PM<sub>10</sub> in the range of 42-68  $\mu\text{g/m}^3$  with the lowest concentration recorded near Naliadhar RF.

#### PARTICULATE MATTER 2.5 (PM<sub>2.5</sub>):

The maximum value for PM<sub>2.5</sub> observed is, 38  $\mu\text{g/m}^3$  at Bordi village while 24 hours applicable limit is 60  $\mu\text{g/m}^3$  for industrial and mixed use areas. The PM<sub>2.5</sub> value of 21 to 38  $\mu\text{g/m}^3$  is the lowest concentration recorded near Naliadhar RF.

#### SULPHUR DIOXIDE (SO<sub>2</sub>):



The maximum value for SO<sub>2</sub> is observed, as 15 µg/m<sup>3</sup> at Bordi village, while 24 hours applicable limit is of 80 µg/m<sup>3</sup> for residential, industrial and other areas. Highest average value of SO<sub>2</sub> is 11.8µg/m<sup>3</sup>. All the villages have observed value well under the prescribed limit.

#### NITROGENOXIDES:

The maximum value for NO<sub>x</sub> is observed, as 26 µg/m<sup>3</sup> at Bordi village, while 24 hours applicable limit is of 80 µg/m<sup>3</sup> for residential, industrial and other areas. Highest average value of NO<sub>x</sub> is 22.3 at µg/m<sup>3</sup>. The area observes NO<sub>x</sub> well below the prescribed range.

### **Noise Environment**

The sampling locations for noise are confined to residential, commercial and sensitive areas; however, no industrial area is present within the 10 km radius of the project site. 10 sampling locations were selected for the sampling of noise

#### **Noise Quality**

It can be observed from the monitored noise data that the noise levels ranges from 41.6 to 66.3 dB (A) during daytime and 36.6 to 58.9 dB (A) during night time.

### **Biological Environment**

#### **Taxonomic status of Plant species:**

Taxa	Core Zone	Buffer Zone	Study area
Family	17	49	49
Genera	23	109	109
Species	24	133	133
Percentage (%)	14.35	100	100

#### **Life form Status of Plant species:**

S.No.	Life Forms	Core Zone	Buffer Zone	Study Area	Relative %
1	Climber	0	5	5	2.39
2	Grass	4	22	22	10.53

3	Herb	10	69	69	33.01
4	Sedge	0	4	4	1.91
5	Shrub	5	23	23	11.00
6	Small trees	4	23	23	11.00
7	Straggling shrub	0	3	3	1.43
8	Tree	3	43	43	20.57
9	Twiner	1	5	5	2.39
10	Under Shrubs	3	12	12	5.74
<b>TOTAL</b>		<b>30</b>	209	209	100

### Status of Fauna

#### TAXONOMIC STATUS-AMPHIBIANS:

During the study period only three species of amphibians were reported from the study area. They belong to three genus under single family. Within buffer zone the area falling inside the sanctuary had these species. Due to the absence of perennial water resources within the core zone resulted no amphibian species within the proposed mine lease area.

#### TAXONOMICAL STATUS – REPTILES:

Status of Reptiles in the study area shows moderate species richness with overall 10 species belonging to 08 genera and 05 families. Core zone area identifies only two reptilian species. However all 10 species were reported from the buffer zone. *Hemidactylus flaviviridi*, *Calotes versicolor*, *Mabuyacarinata*, *Mabuyamacularia*, is some common reptiles of the area.

#### STATUS OF AVIFAUNA

The study area of the Aniali limestone mine (16.21 ha) covering both the core and buffer zone represents a total of 21 bird species under 21 genera. Out of these 21 species, 05 were reported from the core area during the survey.

#### STATUS OF MAMMALS

Status of mammalian fauna in the study area shows moderate level of species richness with overall 11 species under 11 genera and 10 families. The core zone shows comparatively less no of species richness than the buffer area. It has six species under six genera and six families.

#### **WILDLIFE CORRIDORS/ ELEPHANT CORRIDORS:**

The mine lease of Aniali (16.21 ha) is at the distance of 3.92 Km from Barda WLS in South- east direction. Naliyadhar Forest reserve is in South- west to the lease area. These RFs are isolated from sanctuary due to agricultural fields and human habitats and are not connected through any forest corridors. Hence no wildlife or elephant corridors are observed in the study area or passing through the lease area.

#### **Location details of WLS & Reserve forest w.r.t. mine lease area**

Sl. No	Name of the Reserved Forest	Location/direction	Distance from the mine lease
1	Barda wildlife sanctuary	North- west	3.92 KM
2	Naliyadhar Reserved Forest	West	0.11 KM

#### **Socio-Economic Environment**

An attempt has been made to assess the impact of the proposed Limestone mining project at village Aniali on Socio-economic aspect of the study area. The various attributes that have been taken into account are population composition, employment generation, occupational shift, household income, consumption pattern, ethnic issue and law & order problem.

Implementation of the Aniali Limestone Mine project will generate both direct and indirect employment. Besides, it will provide a check on existing system of mining operation. Mining operation will be legally valid and it will bring income to the state exchequer. The project will also provide impetus to industrialization of the area. At present agriculture is the main occupation of the people as more than half of the population depends on it. With the implementation of the proposed mining project the occupational pattern of the people in the area will change making more people engaged in mining based activities rather in agriculture. Thus there will be a gradual shifting of population from agriculture to mining and related activities.

**Anticipated environmental impacts & mitigation measures****Land Environment**

Land use pattern for preoperational, operational & conceptual stage of the mining as per approved mine plan for the proposed mine site is given below

**Land use pattern of the mine site (as per mine plan)**

Particulars	Aniali16.21 Ha Mine		
	Area (ha)		
	Preoperational phase	Operational Phase (after 5 Years)	Post Mining (Conceptual phase) at the end of Mine Life
Pits	9.54	13.01	13.01
Roads / Building	0.49	0.46	0.46
Plantation	0.02	0.52	0.52
Government Wasteland	6.16	2.22	2.22
<b>Total area</b>	<b>16.21</b>	<b>16.21</b>	<b>16.21</b>

As per the approved mine plan at conceptual stage most of the waste land i.e. a will be converted into rain water harvesting pit and green belt Hence impact due to change in land use is positive.

**Water Environment**

- As there is no river or nallah passing through the mine site, hence no impact is anticipated on the hydrological regime of the area due to mining activity.
- No natural course of water stream is interrupted or diverted due to mining activity; hence no impact on natural drain is anticipated.
- Impact on ground water is anticipated as there is provision of consuming ground water for the purpose of various mining activities. Total water demand to be met by ground water is 30 KLD. Tata chemicals Ltd. has already taken clearance from CGWA for the requisite amount of 30 KLD.

- At the end of mine life excavated pit will be converted into a water reservoir. This will help in recharging the ground water table. As the mineral is non-toxic so contamination of ground water due to leaching is not anticipated.

### Air Environment

In order to predict the particulate emissions, Aermid Cloud an interface based on ISCST<sub>3</sub> - FDM model was used to predict changes in air quality i.e., maximum ground level concentration (GLC's) of PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>x</sub> & NO<sub>x</sub> due to the proposed mining activity. The inputs required for the model is:

- Hourly meteorological data
- Source data
- Receptor data
- Programme control parameters

GLC's obtained at various locations for the study period are well within the CPCB standards (dated 18th November, 2009).

### Mitigation Measures

- Drilling:** - To control fugitive dust at source, wet drilling will be provided.
- Blasting:** - Establish time of blasting to suit the local conditions. Avoid blasting i.e., when temperature inversion is likely to occur and strong wind blows towards residential areas.
- Haul Road:** - The long life WBM (Water Bound Macadam) haul roads will be constructed and maintained for traffic movement.
- Transport:** - The speed of dumpers/ trucks on haul road will be controlled as increased speed increases dust emissions. Overloading of transport vehicles will be avoided. The trucks/ tippers will have sufficient free board. Spillage of ore on public roads will be cleared immediately and vehicles will ply in safe speed.
- Green Belt:** - Planting of trees all along main mine haul road and regular grading of haul roads will be practiced to prevent the generation of dust due to movement of dumpers/trucks. Green belt of adequate width will be developed around the lease area. Plantation will also be done in dumping area, mineral stockyard.

## Noise Environment

In order to predict the noise propagation within the study area, Dhvani-Pro model Based on CPCB algorithm and standards was used to predict changes in Noise quality due to the proposed mining activity. Attenuation due to Green Belt has been taken to be 4.9 dB (A). The inputs required for the model are:

- Source data
- Receptor data
- Attenuation factor

Results of the predicted noise quality at different locations are well within prescribed standards

### *Prediction of Ground vibration*

Vibration due to explosion has been modeled using USBM empirical equation for maximum explosive quantity charged per delay. The modeling results obtained are in ppv (mm/sec) versus distance in meter. PPV at nearest location from mine is given below. The ppv obtained at nearest village is 0.03 mm/sec. By comparing the results with specified limit the nearest structure will not get affected due to blasting.

### Mitigation Measures

- MAINTENANCE OF MACHINERY:** - Good and regular maintenance of machinery will be ensured to keep the noise generated at minimum. The vehicles operating will be maintained and provided with good silencers. All machines will be used at optimum capacity.
- TRAINED OPERATORS:** - Only trained operators will be allowed to operate machines.
- VEGETATION:** Plantation of trees around haul roads will be done to reduce the noise.
- HEARING PROTECTION:** Equipment like ear-muffs, ear-plugs, etc. are commonly used devices for hearing protection. Workers and operators working at drilling sites will be provided with earmuffs.
- BLASTING:** -Blasting will be avoided in the morning and evening hours, on foggy days, at night time and at times of high wind velocity and low cloud cover.
- DRILLING:** - Drilling will be carried out with the help of sharp drill bits.

## Biological Environment

The proposed works are sited within the area which has been subject to existing mine lease granted in 1986. The proposed works will however, result in the removal of some scattered bushes of Babool and thorny species. Although impacts on key habitat elements will occur on a local scale, but on a regional scale they would not be critical for the life cycle needs of the species observed or expected. Moreover the successive reclamation of mined out areas, following completion of mining activities, will replace habitat resources for fauna species in this locality over a longer time. Existing roads will be used; new roads will not be constructed to reduce impact on flora.

Wild life is not commonly found in the plains outside the Naliyadhar forest and its immediate environs because of lack of vegetal cover, busy vehicular traffic on the roads and mining activity in the surrounding region. Except domestic animals, wild animals commonly observed are reptiles, fox, hares and some birds.

## Mitigation Measures

Keeping all this in mind the mitigations have been suggested under environmental management plan. With the above understanding of the role of plant species as bio-filter to control air pollution, appropriate plant species (mainly tree species) have been suggested conceding the area/site requirements and needed performance of specific species.

## Socio-Economic Environment

The socio-economic impacts of mining are many. Impacts of a mine project may be positive or Negative. The adverse impacts attribute to physical displacement due to land acquisition, which is followed by loss of livelihood, mental agony, changes in social structure, and risk to food security etc. People are also directly affected due to pollution. Social Impact Assessment (SIA) is a process of analysis, monitoring and managing the social consequences of a project. Study on Socio-economic status has already been carried out using primary socio-economic survey for generating the baseline data of Socio-economic status.

## Anticipated Impact

From the primary Socio-economic survey & through secondary data available from established literature and census data 2001 & 2011, it is found that there would be positive impact on Socio-economic condition of the nearby area.

## **Environment Monitoring Programme**

Regular monitoring programme of the environmental parameters is essential to take into account the changes in the environmental quality. The objectives of monitoring are to:-

- Verify effectiveness of planning decisions;
- Measure effectiveness of operational procedures;
- Conform statutory and corporate compliance; and
- Identify unexpected changes.
- Monitoring of Environmental parameters as per Monitoring schedule

## **Environmental Management Plan**

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 Limestone 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.