

PRE-FEASIBILITY REPORT

(Structure based on MOEF's circular J-11013/41/2006-IA.II(I) dated 30.12.2010)

FOR PADHIARKA & DOLIYA LIMESTONE MINING LEASE AREA

**MINING LEASE AREA - 616.7254 HA.
R.O.M.- 1.5 MILLION TONNES PER ANNUM
OPEN CAST, MECHANISED MINING METHOD**

MAY, 2016
(ISSUE 01, REV 0)

OF

M/s NIRMA LIMITED,

NIRMA HOUSE,
ASHRAM ROAD-AHMEDABAD -380 009
GUJARAT STATE

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PRE-FEASIBILITY REPORT

1.0 EXECUTIVE SUMMARY

The salient features of the project are given below:

Project name	Padhiarka-Doliya Limestone Mining Lease Area Mineral :Limestone (Cement Grade)		
Project proponent	M/s Nirma Ltd.		
Villages in the ML area	Padhiarka and Doliya		
Total ML Area	616.7254 Ha		
Land ownership break up	(i) Forest Land - 0 ha (ii) Govt. Land - 269.2267 ha (iii) Pvt. Land - 347.4987 ha		
Reserves	GEOLOGICAL RESERVES AS PER UNFC CLASSIFICATION		
	Classification	Code	Quantity (million tonnes)
	Total Mineral Resources (A+B)		28.02
	A. Mineral Reserve:-		
	1. Proved Mineral Reserves	111	23.09
	2. Probable Mineral Reserves	121	4.93
	B. Remaining Resource:-		
	1. Reconnaissance Mineral Resource	334	7.99
	Mineable Reserves -28.02 Million Tonnes		
Grade	Mineral- 44.2% CaO and 0.69% MgO		
Rated capacity	1.5 MTPA (Limestone-Cement Grade)		
Life of the mine	19 years		
Ore to O.B. Ratio	1:0.12 average		
Method of Mining	Opencast Mechanized with both methods i.e. conventional and non-conventional mechanized mining method.		
Blasting	To maintain a bench height of 6 meters, drilling by 110 mm dia DTH drill machine will be started with using explosives like slurry emulsion and ANFO. Delay detonators or Nonel detonating fuse will be used since multi row system of firing will be carried out so as to reduce the ground vibration, noise, fly rock etc due to blasting.		
Site services	The site services like site office, fuel storage tank,		

	store, magazine, rest shelter, water tank etc. will be common for all the three applied mining leases of (i) Padhiyarka & Doliya, (ii) Gujarda, Dudheri & Dudhala and (iii) Vangar & Madhiya. Magazine will be in Gujarda, Dudheri & Dudhala mining lease while the crusher will be in mining lease of Padhiyarka & Doliya. The diesel storage will be in the cement plant.
Working days	300 days per annum, 2 shifts per day
Manpower	60
Transportation	The limestone will be crushed in a crusher in the lease area. Limestone will be transported by internal haul road from mine face to crusher and by conveyor from crusher to the Cement plant adjacent to the mine lease.
Expected cost of the project	Rs. 29 crores
Diversion	Seasonal nalas in the mine lease
Water requirement	41m ³ /day
Source of water	<ul style="list-style-type: none"> ➤ Narmada water pipeline for which tapping will be taken for the Company's cement plant. ➤ Rainwater collected in mines.
Power requirement	1.0 MW from State Electricity Board/ Captive Power Plant at Village Padhiarka, Taluka Mahuva, District Bhavnagar
Project cluster	Applied mining leases of (i) Padhiyarka & Doliya, (ii) Gujarda, Dudheri & Dudhala and (iii) Vangar & Madhiya and (iv) cement plant at Padhiarka village, Taluka: Mahuva, District Bhavnagar, Gujarat (as shown in Annexure 7 of Form 1)

2.0 INTRODUCTION

2.1 Identification of project and project proponent

M/s Nirma Ltd. (a Public Limited Company) is having its registered office at "Nirma House" on Ashram Road, Ahmedabad- 380 009, Gujarat. Nirma Ltd. is one of the leading soda ash producing company in India.

Nirma Ltd. is a part of the Nirma Group engaged in the business of consumer products like Soap, Detergent, Industrial products like Sulphuric acid, Oleum, Distilled Fatty acids, Linear Alkyl Benzene, Soda ash (Light & Dense), Salt, Caustic Soda and cement etc. This Group came in existence in the year 1980 and since then continuously expanding its wings for

increase in production capacities and diversification. It has overall about 15000 employee-base and annual turnover of around Rs. 7000 crores.

Production facilities of the Nirma group at its various units are given in Table 1.

**TABLE 1
PRODUCTION FACILITIES OF NIRMA GROUP IN GUJARAT**

Sl. No.	Location	District	State	Products Manufactured
1.	Kalatalav	Bhavnagar	Gujarat	Soda Ash, Detergent Powder & Cake, Toilet Soap, Edible Salt, solar salt & Caustic Soda etc.
2.	Alindra	Baroda	Gujarat	Linear Alkyl Benzene, Detergent Powder & Cake etc.
3.	Mandali	Mehsana	Gujarat	Oleum, Sulphuric Acid, Fatty Acids, Alpha Olefin Sulphonate, Glycerin, Toilet Soap, Detergent Powder & Cake etc.
4.	Moraiya	Ahmedabad	Gujarat	Detergent Powder & Cake, Single Super Phosphate, Packaging materials etc.
5	Porbandar	Porbandar	Gujarat	Soda Ash
6.	Nimbol	Pali	Rajasthan	Clinker, Cement & Power

Nirma Ltd. is setting up a Cement Plant (Cement 1.91 MTPA) and a Captive Power Plant (capacity 50 MW) in village Padhiyarka, approximately 9.5 km from Taluka HQ Mahuva in District Bhavnagar of Gujarat State.

In order to source the major raw material for the cement plant, the company has applied for various mining leases of limestone for captive use in taluka Mahuva, district Bhavnagar. The state government has issued Letters of Intent to grant three mining leases in village:

- | | | | |
|----|------------------------------|---|---------------|
| 1) | Gujarda, Dudhala and Dudheri | - | 1489.4701 Ha. |
| 2) | Padhiyarka & Doliya | - | 616.7254 Ha. |
| 3) | Vangar & Madhiya | - | 1225.8553 Ha. |

As per statutory provisions under Rule 22 of MCR 1960, the company prepared the mining plan with progressive mine closure plans of Padhiyarka and Doliya and Indian Bureau of mines vide letter no.- 682(23)(623)/2008-Udai, dated: 24.03.2009 has approved the mining plan & progressive mine closure plan. Mining of limestone will be carried out as per approved mining plan. The proposed daily run of mine (R.O.M.) excavation of limestone will be 5000 tonnes per day i.e. 1.5 MTPA.

2.2 Brief description of nature of the project

M/s Nirma Ltd. applied mining leases of limestone for captive use to cement plant and State Govt. has issued Letter of Intent to grant the mining lease near village Padhiyarka and Doliya over an area of 616.7254 hecets vide letter no. MCR-102004-1945-CHH dated 15th Feb. 2008. As per section 8 A of Mines and Minerals (Development and Regulation) Amendment Act, 2015, the tenure of Mining Leases shall be 50 years. The production level of limestone mine shall be 1.5 MTPA. Anticipated life of mine would be 19 years. Opencast mechanised mining method is selected with (i) surface miner and (ii) conventional hydraulic shovel-dumber (with blasting) combination in hard strata.

The land ownership within the lease is private & government and there is no forest land in the lease area. Lease area does not form a part of any Reserve Forest, National park, Wild life Sanctuary or National biosphere reserve.

2.3 Need for the project and its importance to the country and or region

The mine will be captive to the cement plant. Hence, the cement scenario has been discussed here.

National Scenario

In 2012-13, the Cement Industry comprised 178 large cement plants with an annual installed capacity of about 318.94 million tonnes, in addition to mini/white cement plants with total estimated capacity of about 6 million tonnes per annum. Thus, the overall installed capacity for cement in the country was about 324.94 million tonnes per annum. The cement industry holds a significant place in the national economy because of its strong linkages to various sectors, such as construction, transportation, coal and power.

The Indian cement industry is extremely energy intensive and is the third largest user of coal in the country. It is modern and uses latest technology, which is among the best in the world. Also, the industry has tremendous potential for development as limestone of excellent quality is found almost throughout the country.

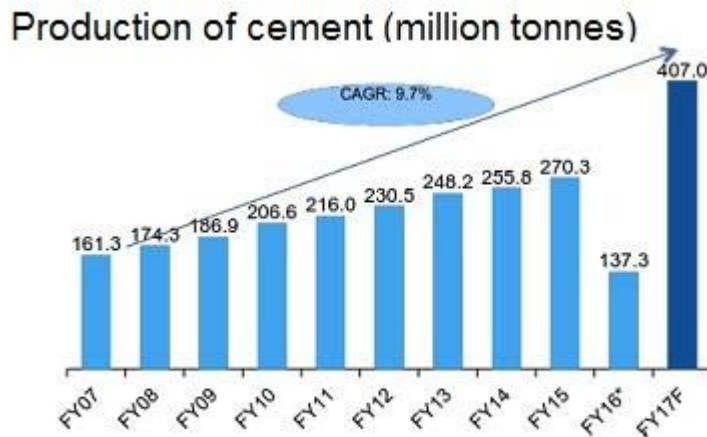
India contributes to environmental cleanliness by consuming hazardous wastes, like fly ash (around 30 MT) from thermal power plants and the entire 8 MT of slag produced by steel manufacturing units. Also as a part of Corporate Social Responsibility (CSR), the cement Industry employs around 0.1 million people and takes care of the social needs not only of the employees but also adopts several villages around the factories providing free drinking water, electricity, medical and educational facilities.

Demand in the cement industry has grown on the back of infrastructure, residential and commercial projects. According to N. A. Viswanathan,

Secretary General, Cement Manufacturer’s Association (CMA), there is a target to achieve 550 MT cement production by the year 2020. Cement consumption in the country has been growing @10% per annum in last few years. This growth pattern is expected to be maintained. Cement grade limestone is abundantly available, current reserves estimated at 110,000 Million Tonnes.

The Working Group on Cement Industry constituted by the Planning Commission for the 12th Plan period has projected a demand growth for cement at the rate of 10.75% per annum based on expected GDP growth rate of 9%. Cement production increased at a CAGR of 6.7 per cent to 270.32 million tonnes over FY07–15. As per the 12th Five Year Plan, production is expected to reach 407 million tonnes by FY17.

The growth in the cement industry is shown below:



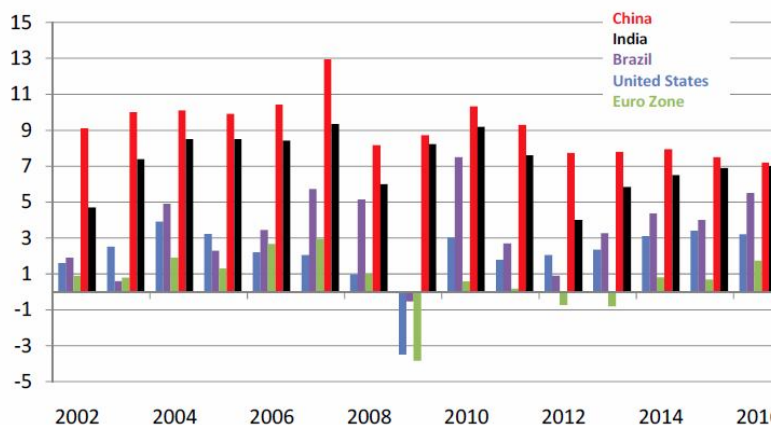
Source: Department of Industrial Policy & Promotion, Office of the Economic Advisor, TechSci Research; FY16*: April-September 2015 ; F - Forecast

(source: <http://www.ibef.org/industry/cement-india.aspx> accessed 10.04.2016)

The GDP/Cement growth of India in comparison to rest of the world is shown below:

Comparative GDP Growth Rates

Annual % Change, Real GDP

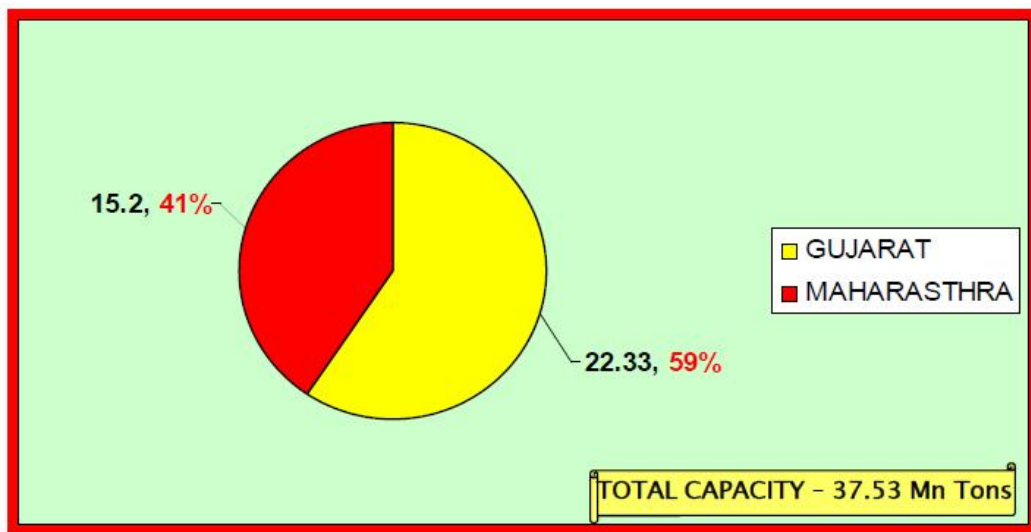


(source: World Cement Consumption by Portland Cement Association, 2013; http://www.betonabq.org/images/imguser/WorldReport_Aug_2013final__01__cement.pdf accessed 10.04.2016)

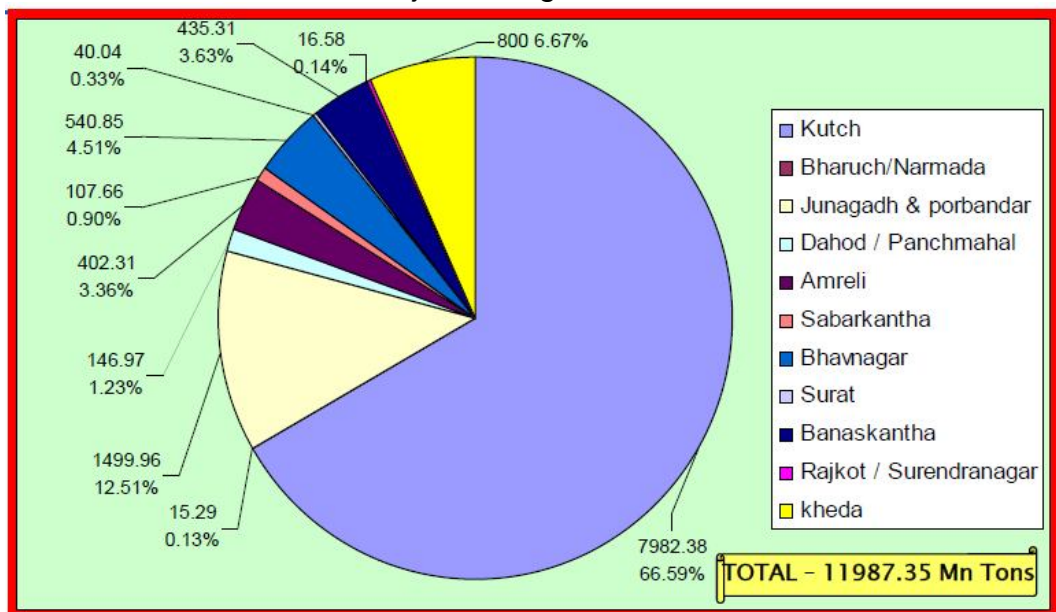
Scenario in the State – Gujarat

The all India cement consumption grew by 7.4 percent from around 208 million tonnes to 223 million tonnes during the year 2011-12. At the same time, around 15 million tonnes additional capacity has been added during the year. In the State of Gujarat, there has been an increase in the capacity in the last two years by 2.4 million tonnes. There has been increase in production in other coastal states as well. This increase in capacity coupled with lower exports has resulted in a surplus of supply over demand putting pressure on the profitability of the cement companies in Gujarat.

The cement production capacity in the western regions is shown below:



The limestone reserves in Gujarat are given below:



Data : Mineral Treasure of Gujarat – published by commissioner of geology & Mining, Gandhinagar 2002

Gujarat has :

- Cement Grade Limestone Deposit in the State (about 11% of Country's deposit)- 12,000 Mn. Tn. (approx.)
- Cement Production Capacity (i.e. 8.6% of total capacity)- 22.33 Mn tpa
- Gujarat has about 11% of lime stone reserves but has cement producing capacity of 8.6% of total Indian capacity
- Beside increasing cement usage within the State, creating/strengthening infrastructure it may act as a feeder State to other adjoining State
- Gujarat has a large coast line providing sea route access, optimizing logistics cost
- Good road network for on land transportation exist in the State, however, certain Limestone rich area need improved infrastructure
- Skilled & Educated man power is available in the State
- And the best of all Business-like Environment exists in the State

2.4 Demand-supply gap

The company proposes a Clinker plant (1.5 MTPA), Cement plant (1.91 MTPA) & 50 MW CPP at village Padhiarka, taluka Mahuva, Dist. Bhavnagar, Gujarat. The limestone raised from the various mining leases will be exclusively used for catering the requirements of Nirma's proposed cement plant. To meet the full requirement, M/s Nirma Ltd. applied for three areas for mining leases for limestone, for captive use, in Taluka Mahuva, Distt. Bhavnagar of Gujarat State at villages shown in Table 2.

**TABLE 2
DETAILS OF LIMESTONE AREAS APPLIED IN MAHUVA TALUKA**

Sl. No.	Applied ML Area	Lease Period	Area ML Applied (Ha.)	Production (TPD)
1.	Padhiyarka & Doliya	50 Year	616.7254	5000
2.	Dudheri, Gujarda & Dudhala	50 Year	1489.4701	9000
3.	Vangar & Madhiya	50 Year	1225.8553	5300

The Letter of Intents (LOIs) has been issued for grant of mining Lease for a period of 30 years from the date of execution. As per section 8 A of Mines and Minerals (Development and Regulation) Amendment Act, 2015, tenure of mining lease period shall be for 50 years.

Hence, it is proposed to use the production of Limestone from the above MLs to meet the requirement of clinker production of the proposed cement plant.

2.5 Imports vs. indigenous production

Importing limestone is more expensive than indigenous production. Therefore, indigenously produced limestone is preferred by consumers.

2.6 Export possibility

There will not be any export of limestone from the limestone block. The limestone produced will be utilized in proposed cement plant of M/s Nirma Ltd.

2.7 Domestic / export markets

The limestone will be used in cement plant. The cement will be sold in domestic market as well as exported from the port.

Opportunities & Threats

With high economic growth in Maharashtra and Gujarat, the cement consumption in these states is likely to continue at a healthy rate and would therefore give opportunities for growth in the cement industry.

Substantial increase in the prices of fuel mainly coal and petcoke has affected the profitability of the cement companies and the uncertain global situation for energy supplies would continue to pose a threat to the profitability of the industry. The infrastructural constraints in the form of congestion in the rail network, availability of wagons and high cost of handling of cement at public ports continue to pose threats to a long term stability in the industry in Gujarat. Although, Gujarat state is likely to continue to be surplus in cement production. The ports near cement plants will provide an opportunity to reduce the cost of transportation thus making other markets viable.

2.8 Employment generation

Total manpower shall be 60 persons as follows:

Category	Number of Persons
Highly Skilled	8
Skilled	22
Semi-skilled	14
Unskilled	16
Total	60

3.0 PROJECT DESCRIPTION

A brief description of the project is given in paragraph 1.0, 2.1 and 2.2.

3.1 Type of Project including interlinked and interdependent projects

In order to source the major raw material for the cement plant, the company has applied for various mining lease of limestone for captive use in taluka Mahuva, district Bhavnagar. The state government has given Letter of Intents for grant of three mining leases in village :

1)	Gujarda, Dudhala and Dudheri	-	1489.4701 Ha.
2)	Padhiyarka & Doliya	-	616.7254 Ha.
3)	Vangar & Madhiya	-	1225.8553 Ha.

3.2 Location with coordinates

The proposed Limestone Mine is present in villages Padhiarka & Doliya, Taluka Mahuva, District Bhavnagar, Gujarat. The total area of proposed mine lease is 616.7254 Ha. Please refer **Annexure 1 of Form-I** for the location map of the project.

The applied area falls within the Survey of India Toposheet No. 41 O/12 (Restricted). The applied area is bounded by Latitudes 21° 01' 5.71" & 21° 02' 16.27" N and Longitudes 71° 40' 30.85" & 71° 41' 21.27" E.

3.3 Details of alternate sites & Environmental considerations

Mining being site specific, no alternatives site is under consideration. Environmental considerations and protection measures assume greater importance for the project. The proposed project is planned to meet all environmental norms and further improve the environs in the area. M/s Nirma Ltd. shall ensure that the proposed mine causes no adverse impact on the area.

3.4 Size or magnitude of operation

The total area of the mining lease is 616.7254 ha. From the lease area, it is proposed to have a production of 1.5 MTPA.

3.5 Project description with process details

To achieve above mentioned rate of production it is proposed to adopt mechanised opencast method on two-shift basis. Opencast mining operations with Surface Miner (occasionally deep hole drilling and blasting) at the applied area will be carried out to raise limestone production for the up coming 1.91 MTPA capacity cement plant.

The Padhiyarka-Doliya deposit will be worked out by mechanized open cast mining methods. The limestone deposit will be developed and worked by both methods i.e. conventional and non-conventional mechanized method.

Soil cover of 0.5 to 1.0 meter thickness (in general) will be removed by simple dozing, stacking and removal by excavator / loader.

Mining by Surface Miner (about 50%) and by drilling - blasting operation (about 50%) will be carried out for limestone.

a) Non – Conventional Mining : Mining near villages will be carried out using surface miner and rock breakers. The area has been marked on the plan in **Annexure 5 to Form 1**. Limestone will be directly scrapped by surface miner and loaded into dump trucks, without drilling and blasting. In the area where Surface Miner will be used, bench width of 25-30 m or as directed by DGMS will be maintained to arrest rollover of loose rocks from higher benches. Approach ramp for limestone face will be developed with proper gradient of 1 in 16. Bench height and bench slope will be maintained as 6 mts (max.) and 80-85 degrees, respectively. Length of the working face will be about 300 mts.

b) Conventional Mining: Mining using drilling and blasting will be carried out in the areas where strata is hard or undulating which cannot be mined out using surface miner.

The area has been marked on the stage plan given in **Annexure 5 of Form 1**. The Drilling shall be carried out by crawler mounted 110 mm DTH fast drills, and blasted rock will be loaded by hydraulic excavators (2.0 cum) into the dumpers / trucks (capacity 25 tonnes) for onward dispatch to the crusher.

The site services like office site, fuel storage tank, store, magazine, rest shelter, water tank etc. will be common for all the three applied mining leases (proposed to be installed in nearby applied area at Gujarda, Dudheri & Dudhala).

The bench width clearance between all benches will be minimum 25 to 30 meters for 06 meters bench height enabling free movement of vehicles and mining equipment. Face length will be about 150 mts. The working slope of benches shall be maintained around 80° while the overall pit slope should not exceed 45°.

3.6 Mining method

Opencast mining method has been selected in view of the workable thickness of limestone and overburden to limestone stripping ratio, which is 0.12:1 cum/t. No waste rock likely to be generated during this plan period.

The soil over burden will be encountered from surface with the thickness varying from 1.0 to 1.5 meter. During next five year of mining operation, the

total quantity of the soil encountered will be around 0.33 million cum. Soil encountered during first year will be stacked temporarily for next three years. Soil encountered from fourth year onwards will be backfilled simultaneously in the worked out area.

The mining will be confined to NE and central part of the area during first five years. The proposed production, waste generated in first five years mining is given in Table 3.

**TABLE 3
PROPOSED PRODUCTION, WASTE GENERATED IN FIRST FIVE
YEARS MINING**

Year	Bench	Bench RL		Area	Soil	Limestone (million tones)		
		From	To			Total	HG-33%	MG-67%
		(In mts.)		Sq. mts	(cum)			
I	I	6.0	4.5	19855	29782	-	-	-
		-	-	-	-	-	-	-
II	I	-	-	-	-	-	-	-
		4.5	1.0	18446	-	0.11	0.11	-
III	I	6.0	4.5	40180	60270	-	-	-
		4.5	1.0	40180	-	0.25	0.07	0.18
IV	I	6.0	4.5	51134	76701	-	-	-
		4.5	1.0	51134	-	0.32	0.09	0.23
V	I	7.0	6.0	165646	165646	-	-	-
		6.0	1.0	165646	-	1.50	0.30	1.20
Total					332399	2.18	0.57	1.61

(HG- High Grade, MG- Medium Grade or Feedable Grade)

Mechanized mining operation is envisaged for production of Limestone and removal of topsoil. Following machineries are proposed to be deployed in the area: -

Surface Miner, Hydraulic Excavator, Dumper, Crusher, Drill Machine, Rock Breaker, Bull Dozer, Compressor, Water Sprinkler and Explosive Van.

3.6.1 Blasting pattern

The limestone being compact to soft category requires for excavation by proposing conventional (drilling & blasting - 50%) as well as non-conventional (surface miner - 50%) method. To maintain a bench height of 6 meters, drilling by 110 mm dia DTH drill machine, is recommended as a guide line to start with. Powder factor on an average is kept as `8' based on the similar condition of limestone. Blasting frequency is recommended as twice in week.

Various types of explosives such as ANFO, slurry, emulsion etc. will be used for blasting. Since ANFO is cheaper and economical, it will be used as much as possible except in rainy season. Delay detonators or Nonel detonating fuse will be used since multi row system of firing will be carried out so as to reduce the ground vibration, noise, fly rock etc due to blasting.

In order to avoid fly rocks and other blasting hazards the secondary blasting is not recommended. However for secondary breakage of oversized boulders hydraulic rock breaker shall be utilized.

3.7 Raw material required along with estimated quantity, likely source, marketing area of final product's, Mode of transport of raw material and Finished product

The limestone excavated from the captive mines will be transported by 25 T dumpers through internal haulage road to crusher and crushed limestone will be transported through belt conveyor to the cement plant. Total quantity of Limestone shall be 1.5 MTPA.

3.8 Resource optimization/ recycling and reuse envisaged in the project

The quality of limestone excavated from the mines will be suitable for clinker manufacturing. Hence, no sub grade limestone is anticipated. Thus, no resource optimisation or recycling/ reuse is envisaged. The rainwater and seepage water collected in the mine pits will be utilised for sprinkling, water, dust suppression, etc to the extent possible.

3.9 Availability of water its source, energy / power requirement and source

3.9.1 Water

Total water requirement for the mines will be 41 KLD. The source of water will be:

For drinking water & plantation : Narmada water pipeline
 For Dust Suppression & Plantation* : Reject water of RO /DM plant (proposed at Cement plant)
 * if found suitable

The water requirement has been calculated on the basis shown in Table 4.

**TABLE 4
WATER REQUIREMENT**

Purpose	Remarks	Avg. Requirement
Dust suppression	Haul road 1.24 kms. approx. from tar road @ 3 KL /Km X 3 times/day	11.2 KLD
Drinking /	Manpower – 60 persons@ 45	2.7 KLD

Purpose	Remarks	Avg. Requirement
Domestic	liters / person	
Plantation	Watering for 1800 trees / year @ 10 liters / tree on alternate day for three years.	27 KLD
TOTAL		40.9 KLD ≈ 41 KLD

Rain water and the seepage water will accumulate in mine pits which will have to be pumped out to ensure that the pits remain dry during working. The water shall be stored in a settling tank on the surface and use for plantation directly or by diluting the RO reject water with it.

3.9.2 Power

1.0 MW from Gujarat State Electricity Board/ Captive Power Plant located at Cement Plant near village Padhiyarka.

3.10 Quantity of wastes to be generated (liquid and solid) and scheme for their management / disposal

No rejects will be generated in this limestone deposit. The over burden soil cover will be removed before winning the limestone. The soil is non-toxic in nature. The waste generation in detailed is given in Table 5.

TABLE 5
QUANTITY OF TOP SOIL, OVER BURDEN/ WASTE AND MINERAL REJECTS LIKELY TO BE GENERATED DURING FIRST FIVE YEARS

Year	Soil (cum)	Overburden / Waste (cum)	Mineral Rejects
I Year	29782	Nil	Nil
II Year	-	Nil	Nil
III Year	60270	Nil	Nil
IV Year	76701	Nil	Nil
V Year	165646	Nil	Nil
Total	332399	Nil	Nil

For stacking of soil care will be taken to select suitable storage site. The soil removed upto third year will only be stacked, then after that it will be used for simultaneous backfilling. The proposed site for soil stack is shown in Year-Wise Working Plan & Sections, **Annexure 5 to Form 1**.

- i) For stacking of topsoil from the applied area is selected in between E-1800 to E-1940 and N-1000 to N-1100 north-east side of the applied area after conformance of non-availability of mineral. The capacity and dimensions of proposed soil stack is given in **Table 6** as shown in Year-Wise Working Plan, **Annexure 5 to Form 1**.

TABLE 6
DIMENSION OF SOIL STACK FOR NEXT FOUR YEARS OF MINING OPERATIONS

Year	Insitu Volume (cum)	Volume (cum)	Area (sqm)	Height (m)
	a	a * 1.3 = b	c	d
I	29782	38716	0.70	7.0
II	-	-	-	-
III	60270	78351	1.00	10.0
IV	76701	99711	Used for backfilling	-
V	165646	215339	Used for backfilling	-
Total	332399	432117	Used for backfilling	-

The dump has been designed considering the angle of repose for the soil stack is 37°. For the stability of the dump the slope angle of 22 has been taken and accordingly the dump has been designed. To find out capacity of the dump the swell factor of 1.3 has been taken. To prevent the flow of soil from the dump to the catchment area, a retaining wall of 1.5 m height is recommended.

ii) No sub-grade will be generated during the course of mining hence no storage of the same is required.

3.11 Schematic representations of the feasibility drawing which give information of EIA purpose

The conceptual plan of mining lease area is given in **Annexure 5** of Form-I.

4.0 SITE ANALYSIS

The proposed Limestone Mining Lease is near villages Padhiarka & Doliya, Taluka Mahuva, District Bhavnagar, Gujarat. The total area of proposed mining lease is 616.7254 Ha. Please refer **Annexure 1** of Form-I for the location map of the project.

The applied area falls within the Survey of India Toposheet No. 41 O/12 (restricted). The applied area is bounded by Latitudes 21°01'5.71" & 21°02' 16.27" N and Longitudes 71°40'30.85" & 71°41'21.27" E. Taluka headquarter is Mahuva at 9.5 kms away from project site.

4.1 Connectivity

Road

The applied area is near Mahuva town and is easily approachable by road from Mahuva town located at about 9.5 km towards NE. National Highway

NH- 8E (Bhavnagar to Una) at a distance of 1 km, N. Mahuva is Taluka HQ in Bhavnagar district of Gujarat. Mahuva is about 90 km from District HQ Bhavnagar.

Railway Line/Airport

The nearest railway Mahuva lies on Mahuva-Rajula broad gauge section of Western Railway Zone 9.8 km approximately by road in NE. The nearest airport for regular commercial flight is Bhavnagar, district HQ, at about 100 km NE of applied area and served regular flights from Mumbai.

4.2 Land form, Land use and land ownership

The present project area is 616.7254 Ha and no further increase in the lease area has been planned for the proposed project.

The project area will be utilized for mining operation. The present land ownership is:

- (i) Forest Land - 0 ha
- (ii) Govt. Land - 269.2267 ha
- (iii) Pvt. Land - 347.4987 ha

Present land use pattern of lease area is as follows:

(All areas in hectare)

	Forest Land	Private Land	Govt. Land	Others	Total	Indicate land req. Outside lease area
a) Pits & Quarries	-	1.21	1.49	-	2.70	-
b) Soil Stack & Mineral Stack	-	Nil	Nil	-	Nil	-
c) School, Tar Road, Cart track etc.	-	0.35	4.60	-	4.95	-
d) Township	-	-	-	-	-	-
e) Others						
(i) Govt. land	-	-	263.1367	-	263.1367	-
(ii) Private land	-	345.9387	-	-	345.9387	-
Total occupied Area	-	347.4987	269.2267	-	616.7254	-

In the 5th year of mining, the land use shall be as follows:

**Land use pattern of the mining lease area after next Five Year
(All areas in hectare)**

	Forest Land	Private Land	Govt. Land	Oth ers	Total	Indicate land req. Outside lease
a) Pits & Quarries	-	21.66	8.15	-	29.81	-
b) Soil Stack & Mineral Stack	-	Nil	Nil	-	Nil	-
c) Infrastructure including crusher, workshop & Mine Road, Tar Road, Cart track etc.	-	0.35	6.63	-	6.98	-
d) Township	-	-	-	-	-	-
e) Others						
(i) Govt land	-	-	254.4467	-	254.4467	-
(ii) Private land	-	325.4887	-	-	325.4887	-
Total occupied Area	-	347.4987	269.2267	-	616.7254	-

Area backfilled by Nirma Ltd. : 5.00 ha

Plantation done by Nirma Ltd. : 5.90 ha

Land Use Pattern at the end of the Life of the Mine (All areas in hectare)

	Forest Land	Private Land	Govt. Land	Oth ers	Total	Indicate land req. Outside lease
a) Pits & Quarries	-	159.50	10.50	-	170.00	-
b) Soil Stack & Mineral Stack	-	Nil	Nil	-	Nil	-
c) Infrastructure including crusher, workshop & Mine Road, Tar Road, Cart track etc.	-	0.35	6.63	-	6.98	-
d) Township	-	-	-	-	-	-
e) Others						
(i) Govt land	-	-	252.0967	-	252.0967	-
(ii) Private land	-	187.6487	-	-	187.6487	-
Total occupied Area	-	347.4987	269.2267	-	616.7254	-

• Area backfilled by Nirma Ltd. - 24.00 hect.

• Area afforested by Nirma Ltd. - 34.00 hect.

4.3 Topography

The deposit forms part of the coastal belt of Saurashtra in Gujarat State and exhibits slightly undulated topography. The general elevation of the area ranges from 1-15 m AMSL. The area of the deposit presents as area of low relief covered by agricultural fields.

4.4 Existing infrastructure

Currently there is infrastructure (buildings) & roads over 4.95 ha within the mining lease area. However, development of complete site facilities are important for smooth working of any mine. The same shall be developed on commencement of operations as follows: First Aid centre, canteen/ rest shelter, drinking water, urinal/ lavatory, lighting, maintenance workshop, other facilities, Welfare amenities & recreational services, dispensary, etc.

4.5 Soil classification

The pH of soils is moderately saline in the core zone while the electrical conductivity varies from 189 to 644 $\mu\text{mhos/cm}$ which is showing that the soil is average in nature. The soils have a bulk density of 1.11 to 1.37 g/cm^3 indicating soft soils and the organic matter content varies from 0.02 to 1.24. The nitrogen is less & phosphorus is very low in the soil of the above four sampling area.

4.6 Climatic data from secondary sources

The climate of the district is arid with large annual variations in rainfall and moderate humidity. The area experiences extreme climate conditions. January is the coldest month, with the temperature falling below 4°C 44.26°C . May is the hottest month of the year, when the maximum ambient temperature exceeds 40°C . As per the Climatological table for Bhavnagar Meteorological station, the average annual rainfall (1993 to 2004) in the area is 618.2 mm. The period from June to September accounts for more than 95% of total annual rainfall.

Temperature

The mean of monthly minimum temperatures recorded at IMD station Bhavnagar ranges from 14.26°C in January to 26.88°C in June. The mean of monthly maximum temperatures ranges from 28.24°C in January to 39.70°C in May.

Rainfall

The average annual rainfall was 618.2 mm recorded based on the average annual rainfall for the period 1993 to 2004 at IMD station Bhavnagar.

Wind Speed and wind direction

Annual average wind frequency from 1988 to 2002 was recorded at IMD station Bhavnagar. The predominant wind direction is from West during mornings. However, it has been observed that the wind direction keeps cyclic behavior during the day and during each season.

Relative Humidity

Monthly average RH at 8:30 and 17:30 comes to 62 and 43% respectively. Relative humidity is higher during the period of monsoon and lower during summer.

4.7 Social infrastructure available

Hospitals, school, banks, etc. are present in the villages in buffer zone within 10 Km of study area. Social infrastructures are existing as per Census 2011 as follows:

- Education facilities in the study area consist of 54 primary schools, 4 secondary school and 2 Senior secondary school.
- Medical facilities in the study area consist of 3 primary health centre (PHC), 13 primary health sub-centre, 1 veterinary hospital, 2 mobile health clinic, 1 non-govt. Medical facilities out patient(NGMF-OP), 1 non-govt. Medical facilities out patient practitioner with other degree (NGMF-OD), 6 non-govt. Medical facilities traditional practitioner and faith healer (NGMF-TPFH), 6 non-govt. Medical facilities medicine shop (NGMF-MS)
- Tube well, hand pumps & dug wells are the main source of drinking water. 31 hand pumps, 32 tap water connections, 3 covered well, 24 uncovered well, 12 tube well, 14 river and 6 ponds.
- There is 1 post office, 14 sub post offices, 32 telephones landlines, 20 public call office and 41 internet cafes in the study area.
- Communication within the study area comparatively good. There are 41 public bus services, 7 private bus services, 3 railway station, 12 autos, 7 vans, 23 tractors, 14 cycle pulled rickshaws(manual driven) and 29 carts(driven by animals) are available in the study area.
- Power supply shall be available from Gujarat State Electricity Board (GSEB). There are 41 connections for domestic purposes and 41 connections for agricultural purposes.
- There are 2 commercial bank, 2 cooperative bank, 30 agricultural credit societies, 40 self help group, 30 public distribution system, 1 regular market, 1 weekly haat, 1 agricultural marketing society, 41 nutritional centre-Anganwadi centre, 41 nutritional centre others, 34 ASHA and 3 community centre with or without TV are available in the study area.

- 10 National highways, 6 state highways, 12 major district road, 31 other district road, 38 pucca road, 37 kuccha road, 7 water bound macadam and 41 footpaths are approach top the villages.
- There are 2 public reading room, 41 daily newspaper supply, 41 assembly point and 41 birth and death registration offices in the study area.

As per the Census 2011, the social infrastructure details for the towns with in the study area is attached as **Annexure 11**.

5.0 PLANNING BRIEF

5.1 Planning concept

The company is also aiming at long term supply of limestone for cement plant projects. The mine is planned as opencast, mechanised mine with proposed production of 1.5 MTPA.

5.2 Population projection

About 60 persons would get employment in the mine. Local employees will be preferred, those residing in nearby villages while the non native employees will reside in the cement plant township which will be near the proposed ML.

5.3 Land use planning (break up along with green belt etc.)

Present and proposed status of land use plan, plantation with rehabilitation for scheme of mining, up to conceptual stage in hectares of the mining lease area is given in para 4.2 earlier.

5.4 Assessment of infrastructure demand (physical & social)

Core infrastructure, like power distribution system, road, telecommunication, service buildings viz. office, store, First Aid centre, canteen etc. will be established at the mine site. A summary of the facilities available in the villages in the study area based on Census 2011 have already been given in Section 4.7.

5.5 Amenities / facilities

Education, Hospitals, drinking water, power supply, post and telegraph, banks, communication and approach roads are present in the villages in buffer zone within 10 Km of study area. The site office & other ancillaries will be provided. Power supply shall be available for illumination from Gujarat State Electricity Board (GSEB) and/or captive power plant to be established in the cement plant. The First Aid Room, Rest Shelters, Toilets, Tool /Store Rooms etc will be available at the mine site.

6.0 PROPOSED INFRASTRUCTURE

6.1 Industrial area (processing area)

An area of 616.7254 hectare has been proposed by M/s Nirma Ltd. for limestone mining with its infrastructure.

6.2 Residential area (non processing area)

Mahuva town is 9.5 km away from the mine site. The unskilled and labour grade manpower will be available in the surrounding area but semiskilled and skilled manpower may not be available. Colony is proposed for the associated cement plant and any non-local employees can be housed in the same. The unskilled and semi-skilled personnel are intended to be employed from local villages. The mine employees will be provided transportation.

6.3 Green belt

M/s Nirma Ltd. will adopt measures to mitigate the impacts likely to be caused by its project operations on the surrounding environment. By the end of 5th year of operation 0.90 ha of greenbelt and 5.0 ha of plantation on backfilling shall be developed, while by the end of life 10 ha will be developed. Additionally, 24 ha of the excavated area will be backfilled and planted over by the end of the mine.

In order to combat pollution effects arising out of the proposed mining operations and to improve the ecological and aesthetic status of the area, a comprehensive green belt development programme will be implemented. Keeping in view the environmental problems, plantation programme has been prepared to mitigate the problems.

6.4 Social infrastructure

With the commencement of operation, amenities for communication, education, health, canteen, etc will develop around the project area.

These amenities will be available to local people also, who are directly associated with the project. Even those not associated in the project related activities will be benefited by these amenities. With the establishment of the mine, there will be substantial improvement in the overall economy of the local people in the form of additional income through employment, development of infrastructure in surrounding areas such as transport facility, health and education, shops, etc. Over and above, the people can avail any of the medical/ educational facilities that will be established by the company in the area.

6.5 Connectivity

Road

Refer section 4.1.

Railway Line/Airport

Refer section 4.1.

6.6 Drinking water management (source & supply of water)

Refer section 3.9.

6.7 Sewerage system & industrial waste management

The chances of the water quality getting affected due to mining activity are very remote, as no chemical having toxic element will be used in carrying out mining activity. The working pits or the ones not being mined during a particular period will be storing the rain water for use in mines. Also, neither soil nor Limestone contains toxic elements, which can affect the quality of the water. During the course of mining the Mine sump water and Reject water of RO /DM plant (from proposed at Cement plant) will be use in dust suppression, plantation, dumpers/ trucks washing etc, while for potable use in canteen, Rest shelter, Offices, Colony etc. requirement will be met by Narmada water pipeline.

Sewage, approximately 2 KLD, from mining lease area will be treated in Septic Tank System. Sewage sludge will be used as manure after composting. Oil and grease will get generated in the workshop located in the cement plant where effluent will be skimmed and separated by oil water skimmer and will be sold to recycling vendors authorized by CPCB.

6.8 Solid waste management

Five types of solid waste are likely to be generated through mining activities which are overburden (both topsoil and waste), sludge from oil/water separator (in workshop located in cement plant), sludge created by mine water in settling pond, sludge from domestic waste water treatment facilities and municipal solid waste. The generation of solid waste from various sources is given in Table 7.

**TABLE 7
SOLID WASTE GENERATION**

Sl. No.	Description	Quantity
1	Topsoil (life of mine)	1.7 million Cum
2	OB	Nil
3	Sludge	2.50 kg/day
4	MSW (@150 gm/capita/day)	9 kg/day

332399 cum quantity of soil will be generated from the mine in first five years and overburden and mineral rejects will be nil. The soil will be scrapped carefully using dozer and collected by machinery and will be stored temporarily in a soil stack yard by making suitable height upto 10.0 m. The soil stack will not be kept for a longer period. It will be stacked initially for the first three years only and thereafter utilized for reclamation or part backfilling purposes.

The top soil shall be used simultaneously for the plantation over backfill areas, in green belt, avenues, colonies and other areas. Some soil or meagre overburden would be backfilled into mined out areas. However, the top soil and backfill quantity is too low to bring the level upto the ground level.

The sludge from workshop shall be put in an impervious pit and the oil and grease collected in the oil water separator sold to the authorised recycling vendors.

The settling ponds will be dredged periodically and the mud removed shall be put with the backfill. The sludge from septic tanks will be composted and used as manure while the municipal solid waste will be segregated into three components- recyclable, biodegradable and non-biodegradable. The recyclable components shall be sold to recycling vendors, the biodegradable component shall be composted and used as manure while the non biodegradable component shall be land filled.

6.9 Power requirement & supply / source

Refer section 3.8.

7.0 REHABILITATION AND RESETTLEMENT PLAN

There is no displacement proposed from the mining lease area although the habitation of villages falls within the mining lease area. This is so since the ultimate pit limit boundary is proposed such that it will not require the land under village habitation.

The land required for the project shall be private agricultural land (159.85 ha) and government land (17.13 ha) for Pits & Quarries, Infrastructure including crusher, workshop & Mine Road, Tar Road, etc. The private agricultural land will be purchased from the land owners directly at mutually acceptable rates

8.0 PROJECT SCHEDULE & COST ESTIMATES

8.1 Cost of production

The mineral will be mined from the applied area and the cost of per ton of mining will be approx. Rs. 180/- per ton.

9.0 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

This is an opencast mine of capacity of 1.5 MTPA from 616.7254 ha. The life of mine will be 19 years. The limestone will be used in cement plant. Presently, disturbed area is 7.65 ha or 1.2%, during modified scheme period will be 43.69 ha or 7.1% and up to conceptual stage will be 188.98 ha or 30.64%. By the end of 5th year of operation 5.9 ha of greenbelt & plantation shall be developed while by the end of life 10 ha will be developed. Additionally, 24 ha of the excavated area will be backfilled and planted over by the end of the mine. The environmental impacts will be kept at minimum by adopting proper mitigation measures.

About 60 persons would get employment in the mine. Local employees will be preferred. With the commencement of operation, amenities for communication, education, health, canteen, etc will develop around the project area. These amenities will be available to local people also, who are directly associated with the project. Even those not associated in the project related activities will be benefited by these amenities. With the establishment of the mine, there will be substantial improvement in the overall economy of the local people in the form of additional income through employment, development of infrastructure in surrounding areas such as transport facility, health and education, shops, etc.