# Capacity Expansion in

# 3.0 MTPA to 4.0 MTPA in Clinker Production Through Up gradation and optimization of plant Parameters
# &
# 5.0 MTPA to 6.0 MTPA in Cement Production Through Up gradation In plant Parameters
# at
# Maihar Cement, Sarlanagar, Maihar, Distt. Satna, Madhya Pradesh

Maihar Cement, (Century Textiles and Industries, Ltd),

Sarla Nagar , Maihar Dist. Satna, Madhya Pradesh (MP)

## 1. EXECUTIVE SUMMARY

M/s Maihar Cement is a division of Century Textiles and Industries Ltd, a flagship company of BK Birla Group. The company is well diversified having interest in Cement, Textiles, Rayon, Chemicals, Pulp and Paper.

Maihar Cement is situated at Sarlanagar, Maihar, Distt. Satna in the State of Madhya Pradesh with licensed production capacity of 5 Million TPA (3MTPA Clinker & 5 MTPA Cement). Maihar is 45 Kms South - East of Satna on Howrah - Mumbai Central Railway Main Line.

Maihar Cement at Sarlanagar Madhya Pradesh, currently operates 2 Units : Unit 1 consists of 2 Kiln lines each producing around 2350 tpd clinker and unit 2 has one kiln producing ~ 4500 tpd clinker whereas present Cement production is 5 Million TPA.

Maihar Cement is proposing to upgrade the existing pryro processing lines in Unit 1 to enhance clinker productivity along with improved fuel and power efficiency to reduce variable cost of clinker production and also to capitalize on the projected improved cement demand. Both existing kiln lines in Unit-1 consist of dry kiln with 4 stage pre-heater.

It is proposed to increase the clinker production capacity of the Plant from 3.0 Million Tons Per Annum (MTPA) to 4 MTPA in Clinker production by upgrading Kiln No.1 & Kiln No.2 of Unit -1. Slight modifications will also be carried out in unit- 2 to reach its maximum potential. The existing cement mills will be optimized and bottlenecks will be removed to reach maximum potential.

The proposed modifications will be carried out within the existing plant; there will not be any additional land or site requirement. As well as existing infrastructure will be utilized for the proposed modifications.

The principal raw materials required for the production of Clinker are Limestone and Laterite. Limestone is being met from Captive limestone mines of Maihar Cement which are located adjacent to the plant. Fuels used will be Coal and Pet Coke.

Total power requirement for simultaneous running of the complete plant is about 46 - 47 MW which is met from MPSEB, and captive power plants. Maihar Cement has two Thermal Power Plant with a capacity of 15.7 MW each i.e. total own power generation capacity is 31.4 MW and remaining power is fulfilled by MPSEB.

About 3200 KL/ day is required for cement plant complex inclusive of power plant section, which is met from a perennial river "Tamus" a point called (River Pump House -at a distance of about 2 Km from the plant) during the rainy season only and during non monsoon season, water is met from water reservoir developed at Mine lease. The capacity of water reservoir is 2040000 KL. Further marginal increase 25 KL per day will be required for proposed expansion

Maihar Cement has also developed a reservoir in the Cement Plant having designed capacity of 500000 KL and is capable of meeting about 40 days water requirements of the Cement Plant.

Water from river and mines is drawn and passed through a filtration plant for purification and chlorination. The chlorinated water is then pumped to two overhead tanks of 4.5 lacs liters capacity each in the colony and the two ground level tanks with 4.5 lacs liters capacity each in the plant.

Wastewater generated from captive Thermal Power Plant is being treated and re-used in the Cement Plant. Present domestic wastewater generation from the Plant and colony is 375 - 400 KLPD.

There is no solid waste generation from the Cement Plant. Ash generated from the captive Thermal Power Plant is being consumed in the cement plant. Dust collected from air pollution control equipment is 100% recycled in process and there are no solid wastes.

There is no wild life sanctuary, national park, eco-sensitive area within the 10 km radius of the project site.

Existing infrastructure includes railway siding and well developed roads, storm water drains with adequate storage space for Clinker and flyash and parking area. All infrastructure facilities such as education, health facilities and other social facilities are available as well as developed at nearest populated area.

Green belt in an area of 149 acres with more than 1,10,000 number of trees has been developed in the Plant and colony area.

Maihar Cement has well-defined CSR policy to Carryout social development and welfare measures in the surrounding villages. Under CSR activity Maihar Cement has and continues to carry out community development projects, in the fields of health, education and environmental preservation.

## 2. PROJECT OVERVIEW / INTRODUCTION OF THE PROJECT

### (I) Identification of Project and Project Proponent

M/s Maihar Cement is a division of Century Textiles and Industries Ltd, a flagship company of BK Birla Group. The company is well diversified having interest in cement, textiles, rayon, chemicals, pulp and paper.

Maihar Cement is situated at Sarlanagar (Maihar) Dist. Satna in the State of Madhya Pradesh with licensed production capacity of 5 Million TPA (3 MTPA Clinker & 5 MTPA Cement). Maihar is 45 Kms South - East of Satna on Howrah - Mumbai Central Railway Main Line. Maihar cement is now proposing up-gradation in Pyro processing system through modification at tertiary air duct, pre-calciner, top stage pre-heater cyclone and other plant parameters to achieve the increased production capacity from 3MTPA to 4 MTPA in clinker production.

Apart from this, the company has two more cement plants and one grinding unit, namely Century Cement at Baikunth, Dist. Raipur in the State of Chhattisgarh with an installed capacity of 2.4 MTPA and Manikgarh Cement at Gadchandur,

Dist. Chandrapur, Maharashtra with an installed capacity of 6.0 MTPA and One Grinding unit at West Bengal with an installed capacity of 1.6 MTPA.

More emphasis is given for production of blended cement which constitutes about 95% of the total cement produced by the company. All Cement plants are equipped with captive power plants, which not only ensures an uninterrupted power supply, but also helps company substantially on power cost as the own generated power is quite economical as compared to grid power.

The Maihar Cement, sells its product cement under its premium brand name - BIRLA GOLD. Maihar Cement is pioneer in producing Blended Cement i.e. Portland Pozzolana Cement. The motivation for the production of Blended cement has been primarily with the aim of preserving limestone reserves and environment.

Maihar Cement's commitment to produce quality cement by adopting quality systems, eco-friendly state of the art manufacturing process has enabled the Company to receive following certifications:

1. IS/ISO-9001 Certification: For Quality Management System
2. IS/ISO-14001 Certification: For Environmental Management System
3. IS-18001Certification: For Occupational Health Safety management System

"Trust Our Customer" is the focal point for all our endeavors and what we value most is their trust in us, whether that be in the aspect of reliability of supply or in the aspect of quality assurance. An extensive distribution network and a retail chain of thousands of outlets stretching across the length and breadth of regions, play a vital role in taking our cement units closer to the customer's doorsteps. Further, our efficient and responsive technical staffs excel in providing quick and expert care so as to enable thousands of users to keep smiling and ever wanting our products.

## (II) Brief Description & Nature of the Project

Maihar Cement is proposing to upgrade the existing Pyro processing lines in Unit 1 to enhance clinker productivity along with improved fuel and power efficiency to reduce variable cost of clinker production and also to capitalize on the projected improved cement demand. It is proposed to increase the clinker production capacity of the Cement Plant from 3.0 Million Tons Per Annum (MTPA) to 4 MTPA in Clinker production by upgrading Kiln No.1 & Kiln No.2 of Unit -1. Slight modifications will also be carried out in unit- 2 to reach its maximum potential. The existing cement mills will be optimized and bottlenecks will be removed to reach maximum potential

### Basis of up-gradation

The high specific power consumption of 66 kWh/t and the heat consumption of 820 kcal/kg clinker contribute to the increased variable costs. The aim of the upgradation project is to enhance capacity, improve the energy efficiency, maintain stable operation and quality of the clinker at a capital expense which can be justified vis- a vis the benefits

| Particulate | Existing Details | Proposed Details |
|---|---|---|
| Capacity | 3 MTPA Clinker<br>5 MTPA Cement | 4 MTPA Clinker<br>6 MTPA Cement |
| Cost of Project | 989.11 crores | Increased by 80 Croes (Approx) |
| Type of Fuel | Coal and Per Coke | Remain same |
| Source of Fuel | Linkage and purchase | Linkage and Purchase |
| Water Requirement | 3200 KLD | Increased by 25 KLD |
| Source of Raw water | River Tamas and water reservoir developed at Mines and Plant | River Tamas and water reservoir developed at Mines and Plant |
| Pollution control equipment | Hybrid ESP, Bag filter and RABH | APCE shall be same with certain modification |
| Level of particulate Matter after APC | 30 Mg/nm3 | 30 Mg/nm3 |
| Cost of Pollution Control Equipments | 82.75 crore | 10 crore |
| Total Employment generation | 340 | Increased by 10-15 number |
| Ash Generation | 225 TPD | Remain same |
| Fly Ash Silo Capacity | 8000 MT | Remain same |

**(III) Need for the Project and its Importance to the Country /Region**

According to the 2018 budget of Government of India, India needs massive investments estimated to be in excess of Rs. 50 Lakh crore in infrastructure to increase growth of GDP, connect and integrate the nation with a network of roads, airports, railways, ports and inland waterways and to provide good quality services to our people. The government has allocated budget of Rs. 5.97 trillion for creating and upgrading infrastructure in the next financial year. It is expected that, consequently the Cement demand will grow up. Considering this, Maihar Cement proposes to increase Clinker production capacity

**(IV) Demand –Supply Gap**

**i. Market Demand and Projections**

India's total cement production capacity is nearly 425 Million tonnes, as of September 2017. The growth of cement industry is expected to be 6-7 per cent in 2018 because of the government's focus on infrastructural development. The industry is currently producing 280 Million Tonnes for meetings its domestic demand and 5 MT for exports requirement. The country's per capita consumption stands at around 225 kg. Housing forms the major portion of cement demand at around 67 per cent.

The Indian cement industry is dominated by a few companies. The top 20 cement companies account for almost 70 per cent of the total cement production of the country. A total of 210 large cement plants account for a cumulative installed capacity of over 350 million tonnes, with 350 small plants accounting for the rest of

these 210 large cement plants, 77 are located in the states of Andhra Pradesh, Rajasthan and Tamil Nadu.

The Indian cement Industry is poised for a period of significant growth. Cement demand is likely to boost up from Q4 FY 18, this demand is positively impacted by the housing segment. Cement consumption is expected to grow by 5.0-5.5 per cent in FY18 on the back of increased spends on roads and railways, push towards affordable housing by central government and materialisation of pent-up demand.

Cement companies were operating at levels below capacity in the past but with the demand and supply reaching equilibrium, almost all plants are working at above 80% capacity. The rate of growth in cement demand is growing at a faster pace as compared to the capacity expansion. This will improve the realizations of the industry in the coming year.

**(V) Imports vs. Indigenous Production**

India is self sufficient to meet the demands of the market with the GDP projected at 6-7 % in the coming years and in view of the infrastructure. Domestic demand will increase and expansion is necessary to this demand.

**(VI) Export Possibility**

No export possibility is considered.

**(VI) Domestic / Export Markets**

Entire clinker will be consumed in domestic markets.

**(VII) Employment Generation (Direct and Indirect) due to the Project**

Total direct employment generation for the existing plant is estimated as 340 numbers whereas indirect employment is around over the more than 50,000. With the proposal of expansion, 10-15 numbers of employees will be increased.

## 3. PROJECT DESCRIPTION

**(I) Types of Project including interlinked and Interdependent Project, if any**

The proposal is for capacity utilization through up-gradation of pyro processing system at Kiln 1 and 2 of unit-I. Slight modification may also envisaged at Unit-II, if required. Up gradation is also proposed in Cement Mill. The existing cement mills will be optimized and bottlenecks will be removed to reach maximum potential The clinker/cement expansion project is not interlinked with any new project.

**(II) Location (Map showing General Location, Specific Location, and Project Boundary & Project Site Layout with Coordinates**

Maihar Cement is situated at Sarlanagar (Maihar), Dist. Satna in the State of Madhya Pradesh. Maihar Cement Plant lies at Longitude: 24° 10' N to 24° 15' N and Latitude: 80° 45' E to 80° 50' E and is covered under Topo sheet No.63-D16

The area lies in the region of Kymore Hill range. The terrain of the area is partly hilly and partly plain. The elevation of the area above the mean sea level is 600 meter where as cement plant lies on 460 m contour. The main basin of the area is Mahanadi. The area is drained by the Tamus river, Tamus river flows along north

eastern foot hill of Kymore range and Andhari nala which is a seasonal stream and gets dry in summer. This river ultimately joins with Mahanadi River.

Maihar is 45 Kms South - East of Satna on Howrah - Mumbai Central Railway Main Line. Distance from Satna to Maihar is approximately 45 km, south of Satna by metalled tar district road via Uchehara (part of the road is national highway no. 7) Maihar to Sarlanagar is 8 km south of Maihar by metalled tar road.

Maihar Cement Plant is a working unit and expansion of Clinker capacity is within the existing cement plant complex. The entire land is in possession of Group and no additional land is required for the project.

**Location of the Project**

| District/State | Taluka | Village | Khasara No | Area in acres |
|---|---|---|---|---|
| Satna | Maihar | Maihar | 2142 | Total 477.36 acres. |

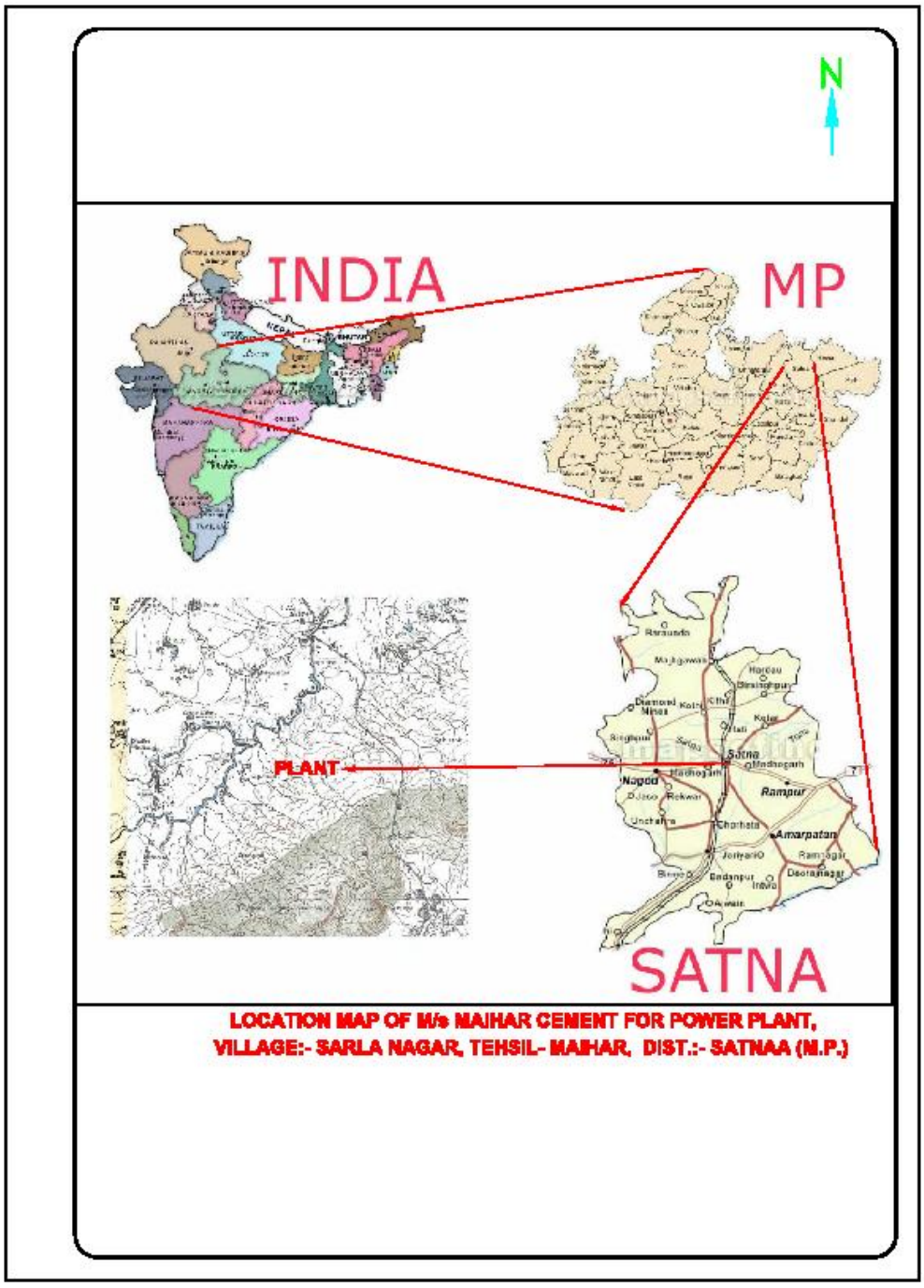


**Fig -1 Location Map**

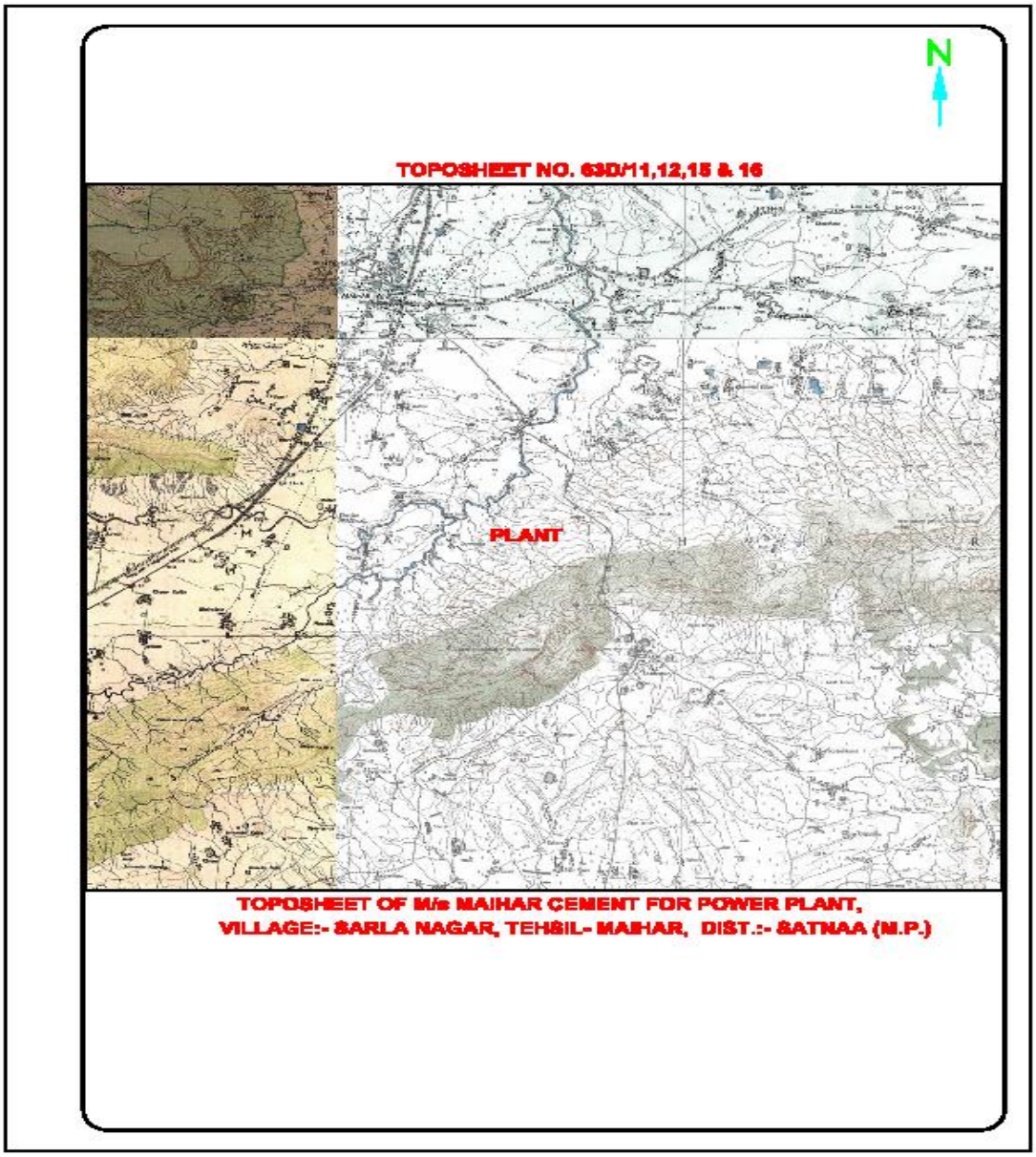


**Fig -2 Topographical Sheet of the Area**

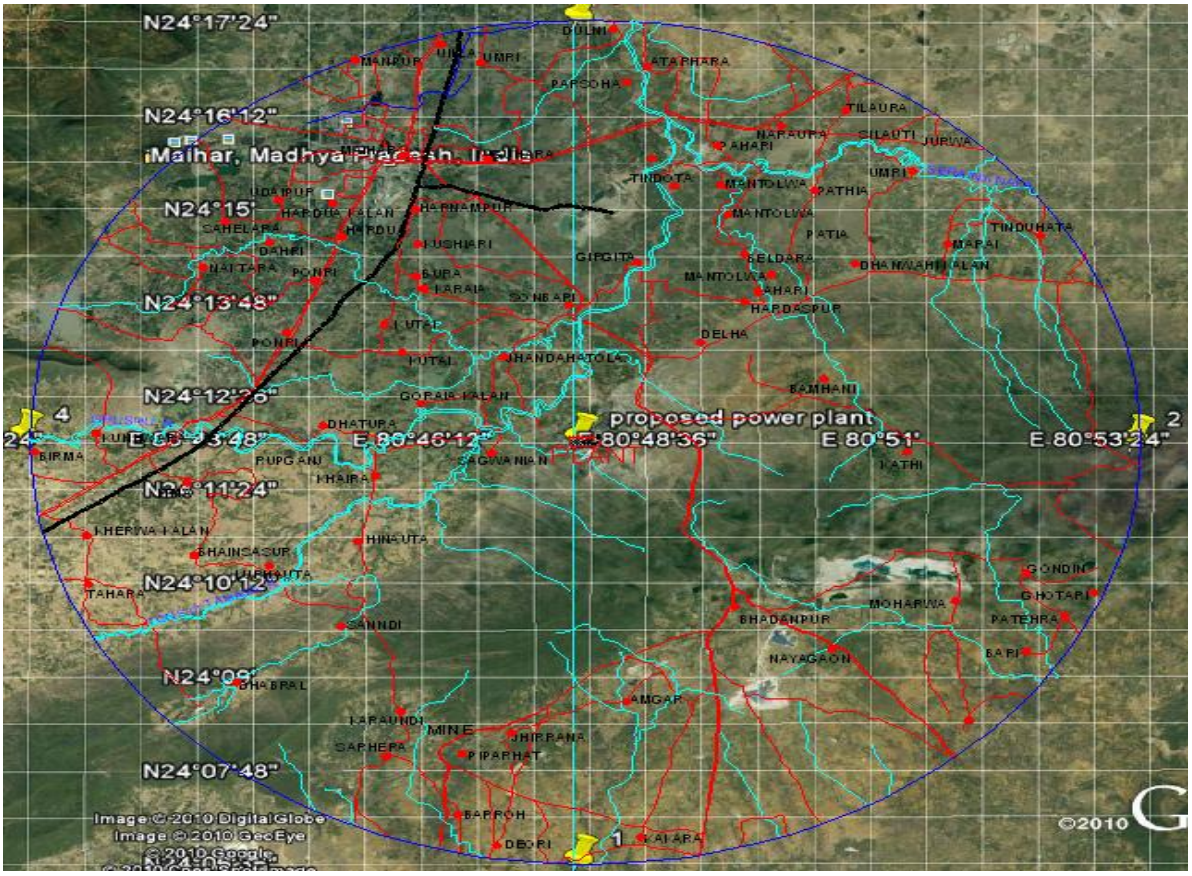


**Fig -3 Tographical Base Map of Area**

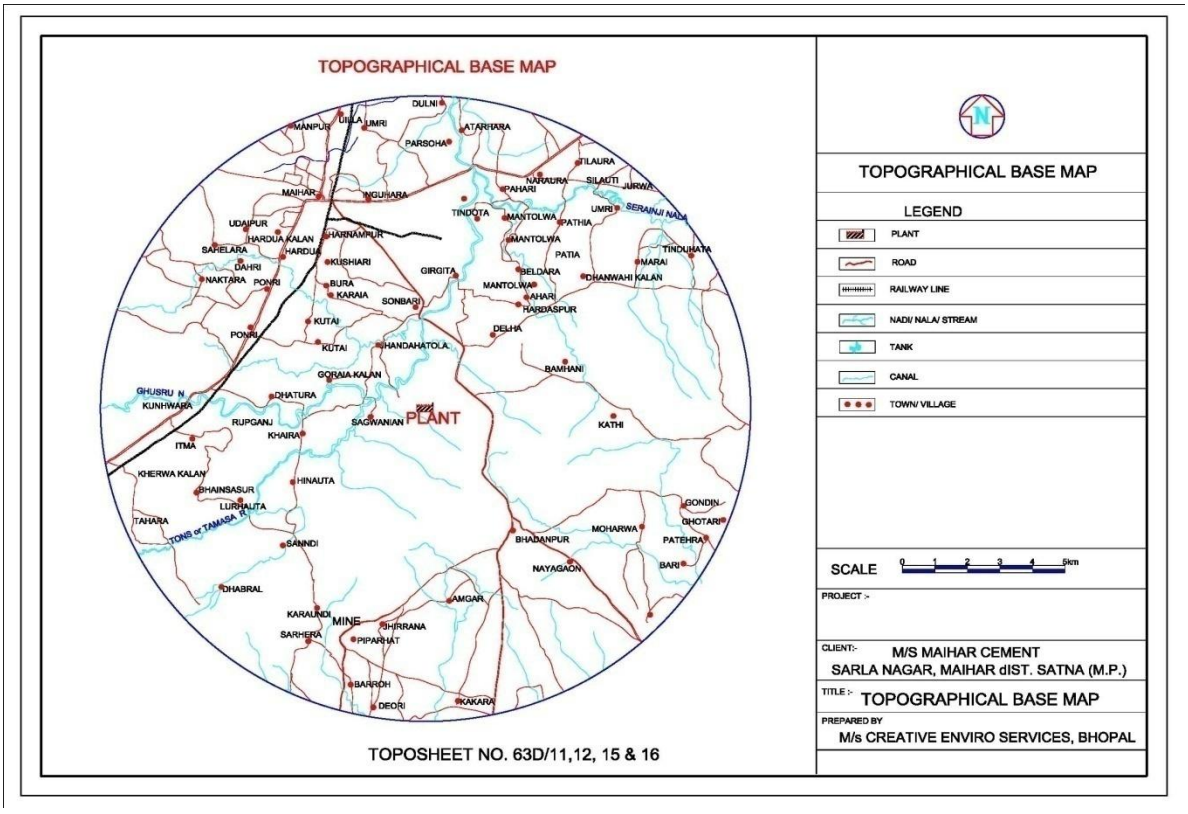


**Fig -4 Tographical Base Map covering 10 km radius**


**Fig -5 Google View of The Maihar Cement Plant**

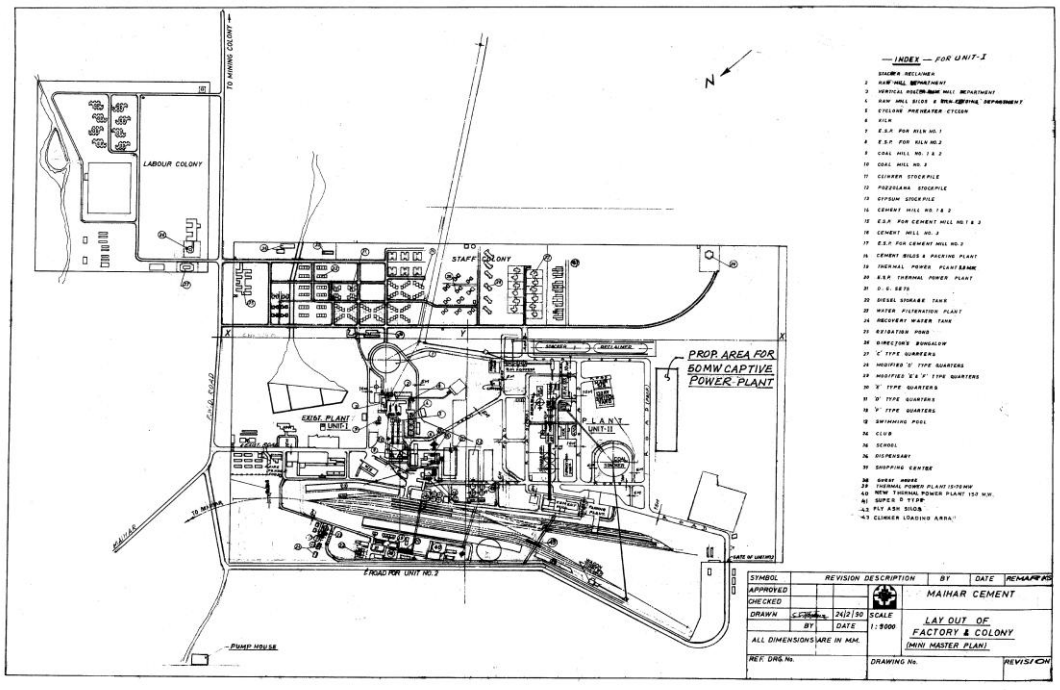


**Fig -6 Layout of the Plant**

**(III) Details of alternate sites considered and the basis of selecting the proposed site, particularly the environmental considerations gone into should be highlighted.**

The proposed up-gradation will be located within the existing cement plant complex, no additional land or site is required. The proposed up-gradation will require setting up of new structure besides the existing Pre-Heater Building. Hence, no alternate site is considered.

**(IV) Size or magnitude of operation**

- Total Present Clinker Production Capacity of all three Kilns : 3 MTPA
- Clinker Production Capacity after expansion : 4 MTPA
- Total Present Cement Production Capacity of all three Kilns : 5 MTPA
- Cement production Capacity after expansion : 6 MTPA

**(V) Project description with process details (a schematic diagram/flow chart showing the project layout, components of the project etc. Should be given.**

**Project description and process details:**

The cement process typically comprises of

- Crushing of limestone
- Raw Mix preparation
- Raw mix homogenization
- Coal preparation
- Calcination and Clinkerisation
- Cement Grinding

**Description Of Each Of The Above Operation Is Detailed Below:**

Limestone raised from the Mines is crushed and stacked before being reclaimed by reclaimer. The reclaimer discharges the blended Limestone to Limestone hoppers. The laterite is transported to its hopper through a belt conveyor system from the stockyard.

Raw materials are extracted from the respective hoppers with the help of speed controlled weigh feeders to maintain the required composition of the raw meal. The weigh feeders discharge on a common belt which feeds to the vertical mill or two ball mills where it is ground and thus raw meal is produced. Fineness of the raw meal is maintained by regulating the speed of separator, which is mounted on the top of mill. The raw meal produced is stored in the three blending silos where the same gets blended as a result of feeding and extraction operation. The raw meal is extracted in the regulated manner and fed to suspension preheater, preheater precalciner through bucket elevator, where raw meal is preheated and calcined to around 80% before it enters the Kiln. Calcined raw meal is clinkerised at around 1450°C in the kiln and stored in clinker silo. Required thermal energy is provided

by firing pulverized coal, which is obtained from the vertical coal mills, after crushing it in coal crusher and preblending in coal blending system.

**(A) Process Description**

**General**

Carbon dioxide is released during the production of clinker, a component of cement, in which calcium carbonate ($CaCO_3$) is heated in a rotary kiln to induce a series of complex chemical reactions (IPCC Guidelines). Specifically, $CO_2$ is released as a by-product during calcination, which occurs in the upper, cooler end of the kiln, or a precalciner, at temperatures of 600- 900°C, and results in the conversion of carbonates to oxides. The simplified stoichiometric relationship is as follows:

**$CaCO_3$ + heat CaO + $CO_2$**

At higher temperatures in the lower end of the kiln, the lime (CaO) reacts with silica, aluminum and iron containing materials to produce minerals in the clinker, an intermediate product of cement manufacture. The clinker is then removed from the kiln to cool, ground to a fine powder, and mixed with a small fraction (about five percent) of gypsum to create the most common form of cement known as Portland cement.

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Cement grinding section consists of mills for grinding clinker, gypsum and flyash to produce cement.

**(B) Process To Be Adopted For Up-Gradation**

**I. For the up-gradation in Kiln System, the following sections are considered:**

**Mining of Limestone:** Limestone is mined from existing mines.

**Crushing:** The two common existing limestone crushers of 1200 tph and 650 tph capacity are sufficient for the proposed up-gradation

**Stacker & Reclaimer:** The Existing raw material handling system for Unit 1 consists of one stacker of 650 tph and one reclaimer operating at 350 tph. Reclaimer will be upgraded to 450 tph.

**Raw Mill:** Existing Raw Mill system being used.

**Continuous Blending Silo:** Existing 3 nos. Raw Meal Silos each with a blending compartment of 3000 T and storage compartment of 5000 T common to both Kiln Lines.

**Pre Heater, Kiln, Cooler:** Maihar Cement unit-1, consists of 2 Dry process Kilns of 2350 TPD Clinker Production capacity. Both the existing Kiln Lines in Unit-I consist of 4 Stage suspension Pre-Heater. Maihar Cement unit-2 consists of one Kiln of around 4500 TPD Clinker Production capacity. For upgradation, the two Kilns of unit-1 will be upgraded to 3000 TPD each.

**Preheater & Calciner:** For the proposed up-gradation, the Existing Top Stage Twin Cyclone in the Pre-Heater Structure would be modified and replaced by single Cyclone of 7.2 dia. A new Top Stage Single Cyclone of 6.9 m dia is envisaged. A new Modified Inline Calciner (U-Shape) of 56 m Effective Length and 4.6 m effective dia is also envisaged.

For Both, the Calciner and 5th Stage Cyclone a new structure would be erected over Kiln Pier.

**Kiln:** For the up-gradation of each of the Kilns of unit-1 to 3000 TPD, both the existing kiln will be able to cater to upgraded capacity.

**Cooler:** The Up-gradation would require modification and extension of existing cooler and cooler hood. Cooler length is envisaged to increase from existing 50.79 $m^2$ to 60 $m^2$.

**Coal Mill:** Mixture of Coal and Pet coke in 50:50 ratio is used as fuel for the generation of heat and clinkerization. The coal mill section consists of a VRM with a capacity of 40 tph for coal grinding but currently grinding a 50-50 mixture of coal and petcoke at a rate of 27 tph with 2.5 % residue on 90 microns. This is sufficient for running the two kilns.

Along with coal mill VRM, one of the ball mills would also have to operate to meet the requirement of around 29 TPH fuel after upgradation.

There is a fine coal bin of 100 m3 for main kiln firing and a 90 ton bin for secondary firing. The main firing FK pump has a capacity of 15 tph and the secondary firing is at a rate of 4 tph to the smoke chamber. A system for fuel firing to the Calciner will have to be included in the upgradation project.

**Coal Handling:** No new Crusher is envisaged

**Cement Mill:** Existing System consists of three cement mills in Unit-1. All three cement mills are close circuit mills. Two mills are supplied by L&T, these are close circuited with Sepax separator and producing cement about 115 TPH supplied by L&T, where as third one supplied by Fuller KCP, Madras and producing about 140 TPH cement.

Cement mills are run with PLC and equipped with HAG's. Cement mill No.1, 2 & 3 are vented through ETS Elex. Hybrid filters with design outlet emission 25 mg/nm3.

For clinker grinding in Unit-2, there are two cement mills with a capacity of 165 TPH each of Portland cement. The system is provided with High Pressure Rolls (HRC) and Sepax separator to get the required fines. The existing circuit of the Cement mill gases vented to the atmosphere through Hybrid Filters with design outlet emission below 25 mg/nm$^3$.

The cement so produced is being transported to 4 silos in Unit-1 having total capacity of 20,000 tonnes. In Unit-2, the cement is stored in three silos, having the capacity 10,000 M.T. each. The storage capacity of cement is 30,000 M.T.

Century Cement produces three types of cement namely, Ordinary Portland Cement- 43 grade, Ordinary Portland Cement-53 grade & Portland Pozzolana Cement. The quality of our cement above the standard prescribed by Bureau of Indian Standards.

**Packing and despatch of cement:**

Maihar Cement has four Electronic Rotary Packers in Unit-1; two are having single discharge with a capacity of 100 TPH, where as other two is double discharge with capacity of 180 TPH.

In Unit-2, they have four Electronic Rotary Packers; two are having single discharge with a capacity of 100 TPH, where as other two is double discharge with capacity of 180 TPH

The cement stored in the silo is transported to the packer hopper through screw conveyor and elevators. Cement from the packer hopper is flushed through the spouts in each packer to self sealing 50 Kgs HDPE bags. The cement bags from the packer are transported through conveyor belt system and loaded in Railway Wagon / Trucks at different platform exclusively built for such task. It is ensured that HDPE bags do contains minimum 50 Kgs of Cement.

For upgradation of packing house Electronic Rotary Packers of 100 TPH (four Nos) to be converted into double discharge with capacity of 180 TPH and venting bag filters to be replaced.

There are four concrete silos for storage of dry fly ash, each having a capacity of 2000 MT, dry fly ash received through bulkers is pneumatically unloaded in these silos and fed to cement mills day hoppers through PD pumps. In addition to this, Maihar Cement has commissioned two Truck tippler during year 2013 for the dry fly ash unloading (coming through trucks) system along with dense phase conveying system, to minimize fugitive emission which occurs during truck unloading and transportation of material through belt conveyors.

For clinker dispatch, Maihar Cement has a clinker loading facility with static weigh bridge at their railway siding. They have M/s DCL make clinker loading & dust control system.

**Environmental Consideration**

The proposed up-gradation will not effect the particulate emission since it is proposed to extend the existing Hybrid ESP to take care of Preheater gas volume increase. Moreover addition of an efficient top-stage cyclone will reduce the specific dust losses with the preheater gases. The existing cooler ESP will be able to handle the slight increase in quantity of cooler vent gases. Adequate dedusting filters will be provide at material transfer points to take care of fugitive emissions if any.

Details for upgradation in APC at Cement Mill and packing house additional supporting bag filters (03 no.) to be installed to control dust emission etc.

In the Hybrid Filter of Cement Mills additional module to be added in Existing Hybrid Filter for control of dust emission from cement mill stack

Since petcoke is being used along with coal as fuel there is a concern on $NO_X$ emission. In order to reduce the $NO_X$ emission to below acceptable range of 800 mg/ Nm3, it will be necessary to install a low $NO_X$ system for the Calciner. It may be advisable to replace the kiln burner with a low $NO_X$ burner. It is not envisaged that additional SNCR system will be required at this point. However based on the final pyro system selected, the estimated $NO_X$ emission can be evaluated and abatement will be accordingly finalized. The SOX emission is usually taken care of in the cement process based on the raw material alkali content.

Captive Power Plant: Existing capacity to be used.

***I. Specific consideration for upgardation in Pyro Process system***

Since the total production increase is 1300 tpd, all the existing raw mills (2 ball mills and one VRM) would have to be operated simultaneously and yet may fall a little short of the requirement of 9000 tpd . (410 tph kiln feed requirement, total raw mills production is 390 tph). It will be required to improve the ball mills circuit and a Pre-grinder/ Pre-crusher system can also be considered. The raw material hoppers may have to be augmented for the simultaneous operation of 2 ball mills.

Along with coal mill VRM, one of the ball mills would also have to operate to meet the requirement of around 29 tph fuel. Plant may also consider separate grinding of pet coke and coal to get higher fineness in pet coke.

It will be necessary to increase the reclaimer capacity to achieve 450 tph instead of existing 350 tph. The extraction from the silo would also need to be augmented to achieve around 200 tph x 2 from existing 136 tph x 2(design) operating at 160 tph.

**Raw Meal Extraction from Silo and Kiln feed system**

This system will have to be augmented to meet the requirement of around 200 tph per kiln line. This will entail replacement of existing air slides and bucket elevators. The kiln feed bin will be resized to 60 m3.

**Kiln**

The kiln has a dimension of 4.35 m diameter by 65 m length. Operating the kiln at 3000 tpd level would be feasible with some modifications to Kiln drive system .

- The specific loading would go from 3.0 tpd/ m2 at 2350 tpd to 3.95 tpd/m3 at 3000 tpd. Since ILC kilns are designed to operated upto much higher specific loadings of ~5 tpd/m3, kiln size is Ok for the proposed throughput.
- The kiln drive system would need slight modification so kiln speed increases from 2.7 rpm to around 3.5 rpm
- Kiln refractory lining will have to be changed

**Preheater /Calciner**

- In order to produce 3000 tpd clinker with better energy efficiency and stable operation, it is proposed to install a precalciner and one more preheater stage.
- New Calciner and TA duct to be installed
- Preheater modification can be carried out as follows
- New structure has to be built for for calciner and one top stage new cyclone.
- Replace the existing top stage twin cyclone of 4 stage preheater with with single cyclone .
- Alternately, use existing PH building for one calciner and 1/2 new cyclones, new structure for 3 top stage cyclones to get a new single string ILC system however this would require more downtime and would be more expensive
- New structure can be constructed over kiln pier and Calciner and new top stage cyclone on this new Structure
- Provision for WHR system will be kept
- The existing kiln feed system would have to be modified to go from 155 tph to 200 tph.
- Based on ERCOM's past projects and interactions with OEM, the following key modifications are suggested
- Existing top stage twin cyclone to be modified – replaced by single cyclone of 7.2 dia
- New Top stage single cyclone proposed of 6.9 m dia
- Modified Inline Calciner (U shape) of 56 m effective length and 4.6 m effective dia.
- These dimensions are tentative and will have to be confirmed during procurement stage by OEM.
- The proposed location of the new structure for Calciner and 5th stage cyclone is as shown in photo below: It is proposed to make a new structure over kiln.

**Cooler**

- In order to upgrade from 2350 to 3000 tpd it would be necessary to modify and extend existing cooler and cooler hood
- Cooler length extension required with area increase to 60 m2 m for 3000 tpd production (50 tpd/m2)
- Cooler fans will have to be replaced to meet the design requirements of the new cooler.

- Expansion may be carried out without touching the coal mill building. Cooler vent location will have to be towards coal mill building
- Cooler hood would have a larger area and new TA duct to be installed
- Kiln Burner modifications may not be required.
- Cooler vent volume can be handled by existing ESP and ESP fan

**Exhaust Gas Handling**

- The PH exhaust gas will be at about 320 C. It can be cooled to about 240 C using a down comer spray or by retaining the existing GCT. In case the GCT is removed, new down comer will have to be installed of around 3 m diameter.
- The waste gas fan will fall slightly short of its volumetric capacity to handle the flows at 3000 tpd. It may be possible to reach the desired capacity by tipping of fan blades. While we have estimated around 880 mm pressure drop, the final estimate provided by OEMs will determine the suitability of existing fans. Otherwise new Waste Gas fan will have to be procured.
- The hybrid ESP will fall short of its capacity and it will have to be extended by one more compartment. ESP fan will be sufficient since reduced exhaust gas temperatures will ensure that gas volumes to do not increase considerably at the increased production rates.

**Technical Summary of Operation at Upgraded Capacity**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Clinker production | tpd | 2350 | Original design for 1200 tpd, upgraded to reach average of 2350 tpd in each line |
| Kiln specific loading | tpd/m3 | 3 | This is standard for preheater kiln |
| Cooler Specific loading | tpd/ m2 | 45 | Cooler Area is Ok for existing operation |
| Specific Heat Consumption | Kcal/ kg clinker | 820 | This is to be reduced during modifications |
| Specific Power consumption (upto clinkerization) | kwH/t | 66 | This is high compared to new facilities. Consumption for Clinkerization is 28 kwh/t, coal grinding around 6 kWh/t |
| PH outlet Pressure | mm WG | 675 | The cyclone sized of 1200 tpd and LP cyclones used in top 2 stages only. |
| PH outlet Temperature | °C | 390 | Typical for 4 stage SP system |
| Waste Gas fan inlet Pressure | mm WG | 730 | Fan is rated at 900 mm Wg |
| Waste Gas fan inlet Temperature | °C | 218 | GCT reduces by 170 C |
| Cooler Vent Temperature | °C | 320 | 280 C is after water spray |
| Clinker Temperature | °C | 150 | Cooler is not able to achieve further cooling due to design and fan limitations |

**Technical Summary of Operation at Upgraded Capacity**

The expected operating parameters while operating single kiln 3000 tpd clinkerization with respective modifications are given below:

| Parameter | Unit | Expected Value |
|---|---|---|
| Clinker production | tpd | 3000 |
| Kiln specific loading | tpd/m3 | 3.9 |
| Cooler Area reqd at 48 tpd/m2 | tpd/ m2 | 62.5 |
| Specific Heat Consumption | Kcal/ kg clinker | 760 |
| Specific Power consumption (for clinkerization) | kwh/t | 24 |
| PH stages | 4 existing plus 1 new | |
| PH outlet Pressure | mm WG | ~850, may be 1000mm if existing cyclones not modified) |
| PH outlet Temperature | oC | 320 |
| Waste Gas fan inlet Pressure | mm WG | ~880 (may if 1030 mm if existing cyclones not modified) |
| Waste Gas fan inlet Temperature | oC | 220 (with GCT spray / WHR provision) |
| Cooler Vent Temperature | oC | 270 |
| Clinker Temperature | oC | 75 +amb |

An estimate of process Fan flows is given below

| Parameter | Units | Existing | Estimated | Fan Specification |
|---|---|---|---|---|
| Daily Clinker Production | tpd | 2350 | **3000X2** | |
| Clinker production | tph | 97.92 | 125 | |
| | | | | |
| clinker factor | | 1.48 | 1.48 | |
| Kiln feed requirement | tph | 144.9 | 185 | |
| Specific Cooler Vent Air | Nm3/kg | 1.1 | 1 | |
| Cooler Vent air flow | Nm3/h | 107708.3 | 125000 | 125000 nm3/Hrx2 |
| Air density | kg/nm3 | 1.29 | 1.29 | |
| Cooler Vent air flow | kg/h | 138943.8 | 161250 | 161250 kg/Hr x 2 |
| Vent air Density | kg/m3 | 0.62 | 0.62 | |
| Cooler Vent air flow | m3/h | 224103 | 260081 | |
| Specific Waste Gas Quantity | Nm3/kg | 1.75 | 1.6 | 1.8 |
| Waste Gas flow | Nm3/h | 171354.2 | 200000 | 225000 nm3/hr x 2 |
| Gas density | kg/nm3 | 1.42 | 1.42 | 1.42 |

| | | | | |
|---|---|---|---|---|
| Waste Gas flow | kg/h | 243322.9 | 284000 | 319500 |
| Vent Gas temperature | □C | 390 | 320 | |
| Vent gas Density | kg/m3 | 0.51 | 0.55 | |
| Waste Gas flow | m3/h | 477104 | 516364 | |
| Temp at fan inlet | □C | 220 | 240 | |
| Pressure at fan inlet | mm wg | 730 | 880 | 700 |
| Flow at WG fan inlet | m3/h | 385178 | 439294 | 472000 |
| Hybrid Filter | m3/h | 450000 | 444000 | 500000m3/hr x2 |

**A comparison of fuel firing requirements is given below:**

This is based on existing fuel mix of 50% coal and 50% petcoke with an average calorific value of 6600 kcal/kg clinker.

| | | **Existing** | **Estimated** |
|---|---|---|---|
| Daily Clinker Production | tpd | 2350 | 3000 x 2 |
| Specific heat consumption | kcal/kg clinker | 820 | 760 |
| Fuel Calorific Value | kcal/kg coal | 6600 | 6600 |
| Total Heat consumption | Mkcal/h | 80.3 | 95 |
| firing in kiln | % | 70 | 50 |
| Fuel to kiln | tph | 8.52 | 7.20 |
| Daily Clinker Production | tpd | 2350 | 3000 x 2 |
| Fuel to sec firing | tph | 3.65 | |
| Fuel to calciner | tph | | 7.20 |
| Total fuel requirement | tph | 12.17 | 14.39 |

## *II. Specific consideration for upgardation in the existing Cement Mills*

For upgradation from 5 MTPA to 6 MTPA in Cement grinding section following jobs are proposed.

In the existing Cement Mill No.1&2 from 115 TPH to 150 TPH following modification and upgradation are:

a) In the existing cement mill Drag peb liners to be replaced by thinner classifying liners.

b) Dynamic separator to be installed and cyclones to be modified for high efficiency cyclones.

c) Existing fan to be replaced for higher flow capacity with keeping high efficiency fan.

d) Pregrinder (VRPM) output rate is to be increased by modifying existing V-separator.

e) Additional module to be added in Existing Hybrid Filter for control of dust emission from cement mill stack.

In the existing Cement Mill No.3 from 140 TPH to 160 TPH following modification and upgradation are:

a) In the existing cement mill Drag peb liners to be replaced by thinner classifying liners.

b) Dynamic separator to be installed and cyclones to be modified for high efficiency cyclones.

c) Existing fan to be replaced for higher flow capacity with keeping high efficiency fan.

d) Pregrinder (HRC) output rate is to be increased by modifying the existing HRC.

e) Additional module to be added in Existing Hybrid Filter for control of dust emission from cement mill stack.

In the existing Cement Mill No.4 & 5 from 165 TPH to 200 TPH following modification and upgradation are proposed:

a) In the existing cement mill Drag peb liners to be replaced by thinner classifying liners.

b) Dynamic separator to be installed and cyclones to be modified for high efficiency cyclones.

c) Existing fan to be replaced for higher flow capacity with keeping high efficiency fan.

d) Pregrinder (HRC) output rate is to be increased by modifying the existing HRC.

e) Installation of static V-separator in place of existing Deagglomerator.

f) Additional module to be added in Existing Hybrid Filter for control of dust emission from cement mill stack.

**(V) Raw material required along with estimated quantity, likely source, marketing area of final products, mode of transport of raw material and finished product.**

The requirement of major raw material i.e limestone will be met from existing mines.

The present requirement of cement grade limestone for the plant is about 14500 metric Tonnes per day. The upgraded requirement will be around 18500 metric Tonnes per day. The requirement will be met from the captive mines at Bhadanpur & Tiloura which was opened up in 1978.

Total Limestone Production capacity - 48.97 Lac Ton/year

Total Laterite Production capacity - 1.00 Lac Ton/year

Balance quantity of Limestone and Laterite if any required to be purchased from nearby mines owners.

Part of the Clinker produced in the plant will be utilized for cement production and balance Clinker is transported by the railway wagons from Maihar to Sonar Bangla Grinding Unit of Century Textiles and Industries Limited.

**Days for Storages**

The norms for storage capacity as are described below.

| S. No | Department | Storage Capacity in MT Capac capacity MT | Days |
|---|---|---|---|
| 1 | Limestone Pre-blending covered Stockpile | 100000 | 6.0 |

| | | | |
|---|---|---|---|
| 2 | Iron Ore/Bauxite | 27000 | 90.0 |
| 4 | Raw meal Silo | 30000 | 2.5 |
| 5 | Clinker Silo | 70000 | 8.0 |
| 6 | Coal stock pile/petcoke | 64000 | 40.0 |
| 8 | Cement storage | 50000 | 4.0 |
| 9 | Fly ash storage | 38000 | 13.0 |
| 10 | Gypsum storage | 20000 | 70.0 |
| 11 | L/s Additives | 8000 | 20.0 |

| **Material** | **Sources** | **Transportation** | **Existing Requirement (LMT)** | **Proposed Requirement (LMT)** |
|---|---|---|---|---|
| Limestone | Captive mines/purchase | OLBC | 44.4 | 59.2 |
| Bauxite | purchase | OLBC | 0.444 | 0.592 |
| Iron ore | Captive mines/purchase | OLBC | 1.332 | 1.776 |
| Gypsum | purchase | Wagon | 1.50 | 1.80 |
| Flyash | purchase | Bulker/trucks box type | 17.0 | 20.40 |
| Coal/ Pet Coke | Linkage/eauction/purchase | Wagon/trucks | 4.74/2.9625 | 6.32/3.95 |

**Pollution Control Measures**

The equipment for the project has been designed in accordance with the environmental protection standards. Keeping the future requirements in view, all pollution control equipment is proposed to be designed for less than 25mg/Nm$^3$ dust on dry basis, though SPCB has given limits of 30 mg/Nm3. All covered sheds/Silos shall be provided for Raw materials and Finished Products.

**Air Pollution Control Equipment**

| **Emission Source** | **Existing APCE** | **Proposed APCE** | **Designed Emission level ( mg/nm$^3$)** | **Stack Dia (mt)** | **Stack Height** | **Remark** |
|---|---|---|---|---|---|---|
| Kiln No. 1 | Hybrid Filter | Extra module to be added | 25 | 3.9 | 80.0 | Collection efficiency will increase |
| Kiln No. 2 | Hybrid Filter | Extra module to be added | 25 | 3.9 | 80.0 | Collection efficiency will increase |
| Kiln No. 3 | RABH | Extra module to be added | 50 | 4.6 | 102.0 | Collection efficiency will increase |
| Coal Mill No. 4 (VRM) | Bag Filter | | 50 | 1.8 | 40.0 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Coal Mill No. 5 (VRM) | Bag Filter | | 50 | 1.8 | 60.0 | |
| Clinker Cooler no.1 | ESP | One more zone to added | 50 | 2.0 | 40.0 | Collection efficiency will increase |
| Clinker Cooler no.2 | ESP | One more zone to added | 50 | 2.0 | 40.0 | Collection efficiency will increase |
| Clinker Cooler no.3 | ESP | One more zone to added | 50 | 4.8 | 50.0 | Collection efficiency will increase |
| Cement Mill No. 1 & 2. | Hybrid Filter | Extra module to be added | 25 | 1.5 | 40.0 | Collection efficiency will increase |
| Cement Mill no. 3 | Hybrid Filter | Extra module to be added | 25 | 1.8 | 40.0 | Collection efficiency will increase |
| Cement Mill no. 4 &5 | Hybrid Filter | Extra module to be added | 25 | 1.3 | 31.0 | Collection efficiency will increase |
| Thermal Power Plant ( 15 MW-I) | Hybrid Filter | - | 25 | 2.5 | 70.0 | - |
| Thermal Power Plant ( 15 MW-II) | Hybrid Filter | - | 25 | 2.5 | 72.0 | - |

**(VII) Resources optimization/ recycling and reuse envisaged in the project, if any, should be brief outlined.**

Maihar Cement after expansion will produce clinker of 4 MTPA and Cement of 6 MTPA. Balance clinker will be sent to Sonar Bangla Grinding unit in Murshidabad, West Bengal.

Entire quantity of fly ash generated from CPP is being utilized Portland Pozzolana Cement production in the cement plants.

The fugitive dust emissions occurring during material handling and material transfer points is being controlled by installing bag filters and water sprinkling. Closed conveyor belts are used for material transport within the plant premises. The same practice shall be continue in future also.

**(VIII) Availability of water its sources, energy /power requirement and sources should be given.**

In conventional cement plant, water is used to meet the following basic consumptive requirements:

1. Cooling water requirement.
2. Process requirements.
3. To meet miscellaneous requirements such as Fire fighting, General services like floor washing and other services, Dust extraction and dust suppression in the RM yard, Potable use (for Power Station and township), Horticulture and afforestation.

**Water:** Present water consumption is approximately 3200 m3/day for Cement Plant, TPP, Mines and colony. The present requirement of water for the Cement

Plant, Thermal Power Plant and colony is met from a perennial river "Tamus" a point called (River Pump House) located at a distance of about 2 Km from the Cement Plant as well as reservoir developed in the captive mines.

Cement Plant area also has a reservoir where rainy season water are being collected for about 40 days water requirements of the Cement Plant.

Mine water pits/reservoir situated at a distance of approximately 9 KM from the plant. Water from river and mines is drawn and passed through a filtration plant for purification and chlorination. The chlorinated water is then pumped to two overhead tanks of 4.5 lacs liters capacity each in the colony and the two ground level tanks with 4.5 lacs liters capacity each in the plant. The requirements of consuming centers are met from here.

**Water Balance**

| **Unit** | **Water Consumption KLD** | | **Waste water generation KLD** | |
|---|---|---|---|---|
| | **Existing** | **Proposed (Additional)** | **Existing** | **Proposed** |
| Cooling Tower | 525 | -- | 5 | 00 |
| DM water | 75 | -- | 10 | 00 |
| Others Cement Plant (process) | 1550 | 25 | 00 | 00 |
| Domestic/colony | 800 | | 385 | -- |
| Mines Process | 150 | | -- | -- |
| Mines Domestic | 100 | | -- | -- |
| **Total** | **3200** | **25** | **400** | **--** |

**Power:** Present total power requirement for simultaneous running of our complete plant is about 46 - 47 MW which is met from MPSEB, and our captive Thermal Power Plants. There are two Thermal Power Plant with a capacity of 15.7 MW each i.e. total own power generation capacity is 31.4 MW and remaining power is fulfilled by MPSEB. After enhancement of clinker production capacity incremental power will be met by increasing the contract demand from MPSEB.

**(IX) Quantity of wastes to generated (liquid and solid) and scheme for their management/disposal.)**

Broadly Cement Manufacturing process shall not generate any Solid or Liquid Wastes. However the following Wastes are generated from Cement Plant operations. Complete care of these wastes will be taken, as to their disposal etc. as given below:

| **Description** | **Unit** | **Quantity** | **Mode of Disposal** |
|---|---|---|---|
| Used Oil | KL | 27.74 | Disposed off to authorized recyclers |
| Lead Acid batteries | Number | 159 | Exchanged with OEMs |
| Metal Scrap | MT | 1870 | Recycled through PCB approved Agencies |
| Rubber Belt Scrap | MT | 80 | Consumed in Kiln |
| Flyash | TPD | 225 MT/day | Used for Manufacturing of PPC |
| Waste Water from | KL | Zero Liquid | The waste water generated |

| | | | |
|---|---|---|---|
| Cement plant & CPP<br><br>Waste water from Colony | | Discharge Condition<br><br>400 kl/day | from cement plant and CPP is being be treated in the treatment plant 800 KLD. Waste water Treated in the STP and treated effluent water are being re-used in the plant process and gardening purposes and solid waste are being used as manure. |
| Transformer Oil | KL | 4 KL | Giving to PCB approved Agencies |
| STP Sludge | Kg/Day | 20 Kg/Day | Used as Manure and used for Plantation |

**HSD Quantity**

HSD is used in oil firing at the initial light up of Kiln after long stoppage period. Adequate storage and safety measures shall be provided. The consumption for Kiln Light up 60000 Liter/year.

Waste water Treated in the STP and treated effluent water are being re-used in the plant process and gardening purposes and solid waste are being used as manure.

**(X) Schematic Representations Of The Feasibility Which Give Information Of EIA Purpose.**

Up-gradation is existing cement plant is proposed which is operational since long back . The capacity expansion is proposed through modernization and optimization of plant parameters.

## (4) SITE ANALYSIS

### (I) Connectivity

The area is located at a distance of 53 km south of Satna. Distance of Satna to Maihar is 45 km, and approchaed by metalled tar district road via Uchehara (part of the road is national highway no. 7). Maihar is also approchaed through railtrack on main Mumbai- Hawara Rail Line. Maihar to Sarlanagar is 8 km south of Maihar by metalled tar road.

### (II) Land form, land use and land ownership.

Maihar Cement Plant is a operational unit and expansion of capacity is proposed within the existing cement plant complex. The entire land is in possession of Group and no additional land is required for the project.

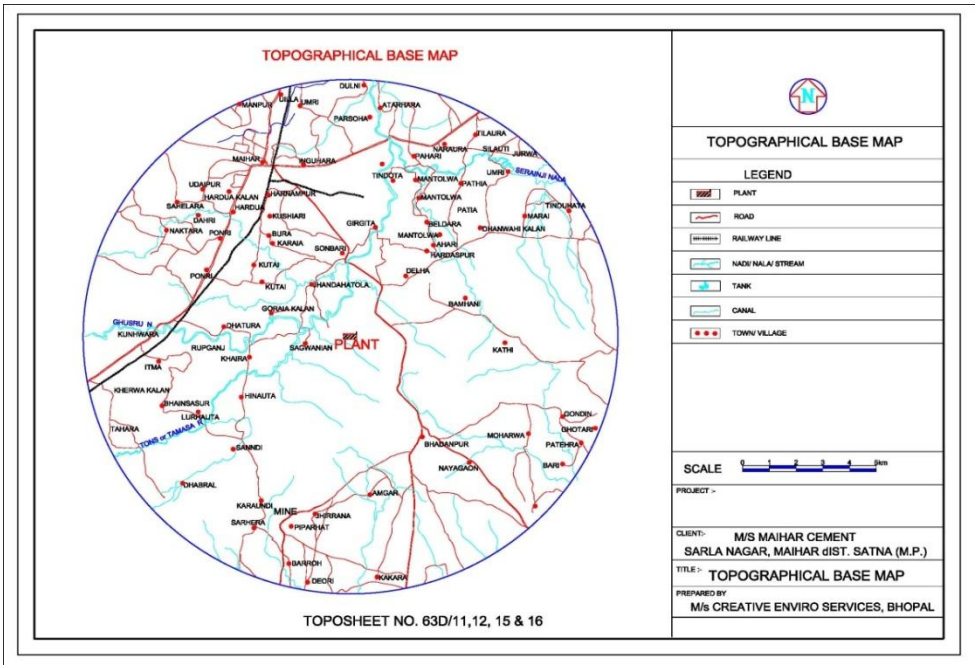
**Location of the Project**

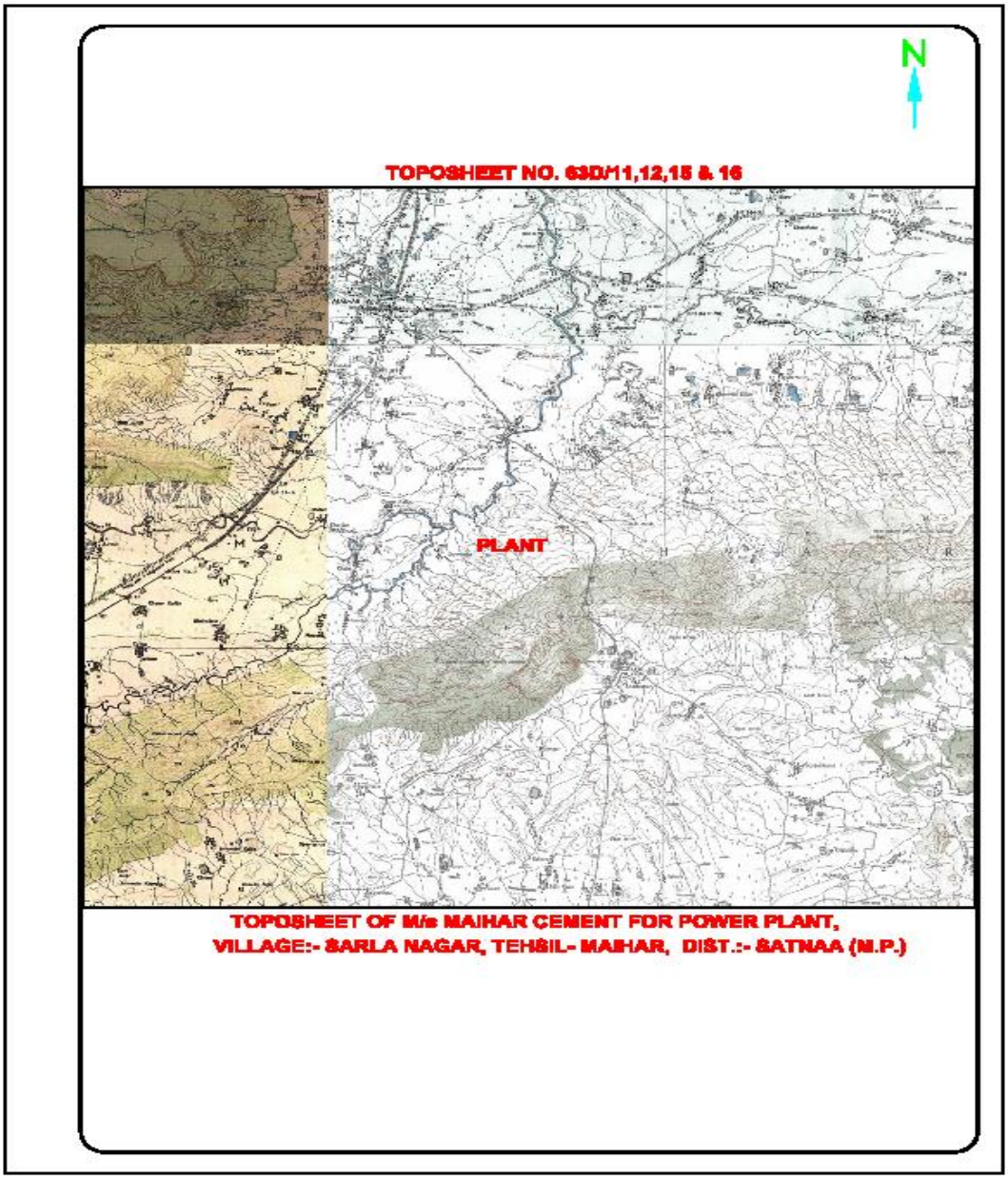
| District/State | Taluka | Village | Khasara No | Area in acres |
|---|---|---|---|---|
| Satna | Maihar | Maihar | 2142 | Total 477.36 acres. |

Maihar Cement Plant lies at Longitude: 24 ° 10' N to 24 ° 15' N and Latitude: 80 ° 45' E to 80 ° 50' E and is covered under Topo sheet No.63D16

**(III) Topography (Along with map)**

The area lies in the region of Kymore Hill range. The terrain of the area is partly hilly and partly plain. The elevation of the area above the mean sea level is 600 meter where as cement plant lies on 460 m contour. The main basin of the area is Mahanadi. The area is drained by the Tamus River. Tamus River flows along north eastern foot hill of Kymore range. This river ultimately joins with Mahanadi River.






**(IV) Existing land use pattern (agriculture, non-agriculture, forest, water bodies (including area under CRZ)), shortest distances from the periphery of the project to periphery of the forests, national park, wild life sanctuary, eco sensitive areas, water bodies (distance from the hfl of the river), crz. In case of notified industrial area, a copy of the gazette notification should be given)**

The environment Setting of the 10 km radius is as follows:

| S. No. | Particulars | Details |
|---|---|---|
| 1 | A. Location | Sarla Nagar, Maihar Dist Satna (MP) |
| | Toposheet No. | 63D16 |

<table>
<tr><td>2</td><td>Latitude<br>Longitude</td><td>
<table>
<tr><th>S. No.</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>1</td><td>24°11'29.17"N</td><td>80°47'52.45"E</td></tr>
<tr><td>2</td><td>24°11'33.30"N</td><td>80°47'56.52"E</td></tr>
<tr><td>3</td><td>24°11'45.66"N</td><td>80°48'7.99"E</td></tr>
<tr><td>4</td><td>24°12'8.54"N</td><td>80°48'29.34"E</td></tr>
<tr><td>5</td><td>24°12'22.10"N</td><td>80°48'12.57"E</td></tr>
<tr><td>6</td><td>24°12'23.14"N</td><td>80°48'13.24"E</td></tr>
<tr><td>7</td><td>24°12'23.96"N</td><td>80°48'12.43"E</td></tr>
<tr><td>8</td><td>24°12'25.27"N</td><td>80°48'11.50"E</td></tr>
<tr><td>9</td><td>24°12'26.80"N</td><td>80°48'8.43"E</td></tr>
<tr><td>10</td><td>24°12'29.62"N</td><td>80°48'2.61"E</td></tr>
<tr><td>11</td><td>24°12'15.29"N</td><td>80°47'48.24"E</td></tr>
<tr><td>12</td><td>24°12'3.52"N</td><td>80°47'25.47"E</td></tr>
<tr><td>13</td><td>24°11'59.63"N</td><td>80°47'22.32"E</td></tr>
<tr><td>14</td><td>24°11'57.67"N</td><td>80°47'22.85"E</td></tr>
<tr><td>15</td><td>24°11'53.62"N</td><td>80°47'26.91"E</td></tr>
<tr><td>16</td><td>24°11'51.31"N</td><td>80°47'24.51"E</td></tr>
</table>
</td></tr>
<tr><td>1.</td><td>General ground level</td><td>441-341m above MSL</td></tr>
<tr><td>2.</td><td>Nearest National/ State Highway</td><td>NH-7- 6km<br>SH-11 - Adjacent</td></tr>
<tr><td>3.</td><td>Nearest Railway Station</td><td>Maihar – 6.50km - NW</td></tr>
<tr><td>4.</td><td>Nearest Airport</td><td>Khajuraho- 116km</td></tr>
<tr><td>5.</td><td>Nearest Tourist Place</td><td>Maihar – 6.50km</td></tr>
<tr><td>6.</td><td>Archaeological Important Place</td><td>None within 10km radius</td></tr>
<tr><td>7.</td><td>Ecological Sensitive Areas (Wild Life Sanctuaries)</td><td>None within 10km radius</td></tr>
<tr><td>8.</td><td>Reserved / Protected Forest within 10km radius</td><td>None within 10km radius</td></tr>
<tr><td>9.</td><td>Nearest major city <50000 population</td><td>Maihar – 6.50km - NW</td></tr>
<tr><td>10.</td><td>Nearest Town / City within 10km radius</td><td>Maihar – 6.50km - NW</td></tr>
<tr><td>11.</td><td>Surrounding village within 1 km area of the project.</td><td>Delha – 1.0km - N<br>Sarla Nagar- Adjacent</td></tr>
<tr><td>12.</td><td>Nearest village</td><td>Delha – 1.0km - N<br>Sarla Nagar- Adjacent</td></tr>
<tr><td>13.</td><td>Nearest River within 10km radius</td><td>Tons or Tamas River–0.50 km– WNW</td></tr>
<tr><td>14.</td><td>Nearest Lake/ Ponds within 10km radius</td><td>Seasonal nallah – cross<br>Seasonal nallah – 0.75km- N<br>Ghusru N – 1.75km- NW<br>Serainji Nalla – 6.15km- NEN<br>Andhayari Nalla- 3.15km – SE<br>Godin Nalla – 7.00km – ESE</td></tr>
<tr><td>15.</td><td>Nearest Hill Ranges within 10km radius</td><td>Kaymore hill</td></tr>
<tr><td>16.</td><td>Other industries within 10km radius</td><td>KJS Cement – 5.50km- N<br>Reliance Cement – 9.00km – WSW</td></tr>
<tr><td>17.</td><td>Mines within 10km radius</td><td>Maihar Cement, Bhadanpur Limestone mine<br>Sadera Limestone mine, Reliance Cement<br>Amaliya & Girgita Limestone mine, KJS</td></tr>
</table>

| | | |
|---|---|---|
| | | Cement,<br>Maihar Cement, Tiloura Limestone Mines<br>No. of other mines |

The land use of the area is defined by the operational unit of Cement Plant, captive Thermal Power Plant, Residential colony etc.

**Land Use Break-Up Of Cement Plant Complex Area**

| **Particulars** | **Area in Acres** |
|---|---|
| Built up area of Cement Plant | 50 Acre |
| Residential Colony | 75 Acres |
| Cement Plant area | 131 Acres |
| Existing Green belt | 149 Acres |
| Open area | 120.36 Acres |
| Total Area | 477.36 Acres |

**DETAILS OF LAND USE PATTERNS OF THE VILLAGES AROUND 10 KM RADIUS**

| **Village Name** | **Total Geographical Land** | **Forest Land** | **Irrigated Land** | **Un-irrigated** | **Cultura-ble Waste** | **Area not available for cultivation** |
|---|---|---|---|---|---|---|
| Bhadanpur (North Patti) | 1336.25 | - | 26.51 | 99.15 | 614.56 | 596.03 |
| Bhadanpur (South Patti) | 1478.12 | - | 5.98 | 321.76 | 620.31 | 530.07 |
| Nayagaon | 214.12 | 0.89 | 9.34 | 120.68 | 9.31 | 75.9 |
| Moharwa | 444.9 | - | 35.78 | 100.46 | 165.56 | 143.12 |
| Patchra | 134.90 | - | 39.86 | 63.38 | 12.59 | 18.95 |
| Piparawakhand | 360.47 | - | 6.23 | 148.88 | 178.87 | 18.95 |
| Ghotari | 134.61 | - | 4.67 | 31.52 | 34.70 | 63.70 |
| Kirhite | 346.96 | - | 13.63 | 226.50 | 30.92 | 75.92 |
| Gondin | 163.00 | - | 7.67 | 50.31 | 68.84 | 36.18 |
| Kothi | 726.18 | - | - | 96.55 | 96 90 | 532.73 |
| Bari | 165.90 | - | 94.24 | 29.68 | 17.98 | 24.00 |
| Bamhaui | 755.18 | | 2.26 | 92.42 | 117.84 | 543.66 |
| Hinanta | 262.41 | 9.42 | 25.07 | 158.82 | 15.93 | 53.17 |
| Amandari | 386.75 | - | 12.24 | 77.68 | 9.66 | 287.17 |
| Tinduhalte | 910.98 | - | 18.11 | 247.13 | 23.16 | 622.58 |
| Marai | 1395.98 | - | 29.66 | 312.77 | 102.71 | 950.84 |
| Dhavwali Kalam | 512.12 | - | R(4.85) | 199.97 | 7.30 | 300.00 |
| Hardarpur | 287.70 | - | 89.94 | 81.35 | 20.71 | 95.00 |
| Mantolwa | 263.52 | - | 7.52 | 206.01 | 11.86 | 38.13 |
| Delha | 548.15 | - | 3087 | 253.10 | 26.13 | 238.05 |
| Beldarr | 305.60 | 7.74 | 74.63 | 150.60 | 27.48 | 45.15 |
| Mantotera | 263.52 | - | 7.52 | 206.01 | 11.86 | 38.13 |
| Patia | 127.56 | - | 8.59 | 79.92 | 1.18 | 37.87 |

| Village Name | Total Geographical Land | Forest Land | Irrigated Land | Un-irrigated | Cultura-ble Waste | Area not available for cultivation |
|---|---|---|---|---|---|---|
| Umri | 190.24 | - | 18.71 | 114.37 | 7.95 | 19.21 |
| Jurwa | 221.48 | - | - | 178.53 | 16.81 | 26.14 |
| Silanti | 262.14 | - | 0.17 | 188.70 | 57.13 | 22.14 |
| Tilaura | 288.51 | - | 5.14 | 169.28 | 23.73 | 30.36 |
| Naraurg | 203.46 | - | 14.49 | 125.66 | 31.23 | 32.00 |
| Pahari | 612.17 | - | 49.80 | 193.50 | 215.45 | 153.42 |
| Atarhara | 135.68 | - | 73.16 | 35.30 | 2.13 | 25.09 |
| Dulini | 105.65 | - | 35.30 | 45.57 | 7.53 | 17.27 |
| Umri | 290 | - | 66.59 | 161.41 | 33.10 | 29.32 |
| Girgita | 262.28 | - | 65.60 | 116.73 | 44.35 | 35.60 |
| Sonbari | 1614.97 | - | 100.85 | 824.97 | 174.70 | 514.43 |
| Harnampur | 310.88 | - | 4.00 | 225.98 | 12.39 | 68.51 |
| Kushrari | 45.75 | - | 29.32 | 11.97 | 2.85 | 1.65 |
| Bura | 31.28 | - | 19.77 | 9.20 | 1.48 | 0.91 |
| Karaia | 136.22 | - | 72.89 | 57.69 | 5.36 | 6.28 |
| Kutai | 389.64 | - | 57.23 | 228.83 | 95.46 | 14.12 |
| Goraia kale | 503.93 | - | 10.54 | 483.29 | 5.00 | 5.10 |
| Dhatura | 928.09 | - | 87.16 | 465.70 | 270.82 | 104.41 |
| Ratgang | 164.74 | - | 24.66 | 123.67 | 3.46 | 12.95 |
| Khaire | 330.56 | - | R(3.00) | 188.31 | 186.20 | 33.05 |
| Lurhant | 302.48 | - | 20.38 | 247.34 | 23.92 | 10.84 |
| Bhaiusasur | 276.79 | - | W(4.18) | 250.27 | 3.74 | 18.60 |
| Itma | 386.11 | - | W(37.88) | 294.93 | 7.25 | 41.85 |
| Hinanta | 411.33 | - | 10.41 | 144.47 | 10.92 | 245.53 |
| Dhabrai | 1511.62 | 64.15 | 38.45 | 174.98 | 110.82 | 1123.38 |
| Karaundi | 150.22 | - | 3.61 | 99.78 | 31.49 | 15.34 |
| Pouri | 816.64 | - | 36.52 | 437.92 | 104.41 | 237.79 |
| Noktara | 1066.50 | - | 65.41 | 163.74 | 50.14 | 781.21 |
| Hardnua | 110.14 | - | 71.51 | 17.01 | 20.06 | 1.56 |
| Udaipur | 243.92 | - | 63.20 | 120.98 | 19.09 | 40.65 |

From VDI, 2011

**(V) Existing Infrastructure**

M/s Maihar Cement is having cement plant (unit no.1 and unit-2), power plant of 15.7 MW, 15.7 MW within the existing premises and all are operational. Required infrastructure like residential colony, medical facility and other facilities have already been developed by the group.

**(VII) Climatic Data From The Secondary Sources.**

The region has a subtropical monsoon climate with long and humid summer and short winters. In the district, climate is very pleasant except in summers. Except South West Monsoon rest of the year waves moves slowly. District's usual minimum temperature rests around 25-26 degree Celsius and maximum temperature raises upto 45-46 degree Celsius. May is the hottest month of the year. It is extremely hot during summer and in the end of this season is

accompanied by dustful storms. However, there is a significant drop in mercury with approaching monsoon. District's 90% rainfall observed in monsoon months only i.e. from June to September. An average rainfall is of 60 days and measuring approximately 40 Inches. During December-January region is gripped in cold weather and average temperature during day time is around 9 degree Celsius. Heavy fogs are also observed during this time of the year. The winds in the area are light to moderate during summer and winter. However, the speed of the wind increases during the end of the summer season and monsoon season.
The brief discussion over the meteorological condition of the area is as below:

**Temperature:** The winter season starts from December and continues till the end of February. January is the coolest month with the mean daily maximum temperature at 24°C and the mean daily minimum temperature at 6°C. Both the night and day temperatures increase rapidly during the onset of the pre-monsoon season from March to May. During pre-monsoon season, the mean maximum temperature (June) was observed to be 44.0°C with the mean minimum temperature (March) at 25°C. The mean maximum temperature in the monsoon season (Sep.) observed to be 34°C whereas the mean minimum temperature was observed to be 25°C. By the end of September with the onset of post-monsoon, the day temperatures increase slightly, with the mean maximum temperature at 36°C and the mean minimum temperature at 20°C.

**Relative Humidity:** The air is generally humid in this region during the monsoon when the average relative humidity at 0830 hr. was observed to be with a maximum of 75% and a minimum of 52%. Similarly, at 1730 hr., the average value was observed to be with a maximum of 94% and a minimum of 60%. Generally, the weather during Post monsoon seasons was observed to be with a maximum of 90% and a minimum of 15%.

**Rainfall:** Monsoon in the area comes from southwesterly winds. The average annual rainfall based on the last 10-year IMD data, was observed to be 1000-1200 mm. The monsoon sets in the month of June and continues till mid observed in the evenings, with clear mornings. During the monsoon season, both in the mornings and evenings, the skies were found to be clouded.

**Cloud:** 30 years average data reveal that maximum cloud cover was observed around 7.0 oktas in the month of July, august. Whereas cloud cover was observed around 2.2 (in oktas) in the month of November, December, January, February and March.

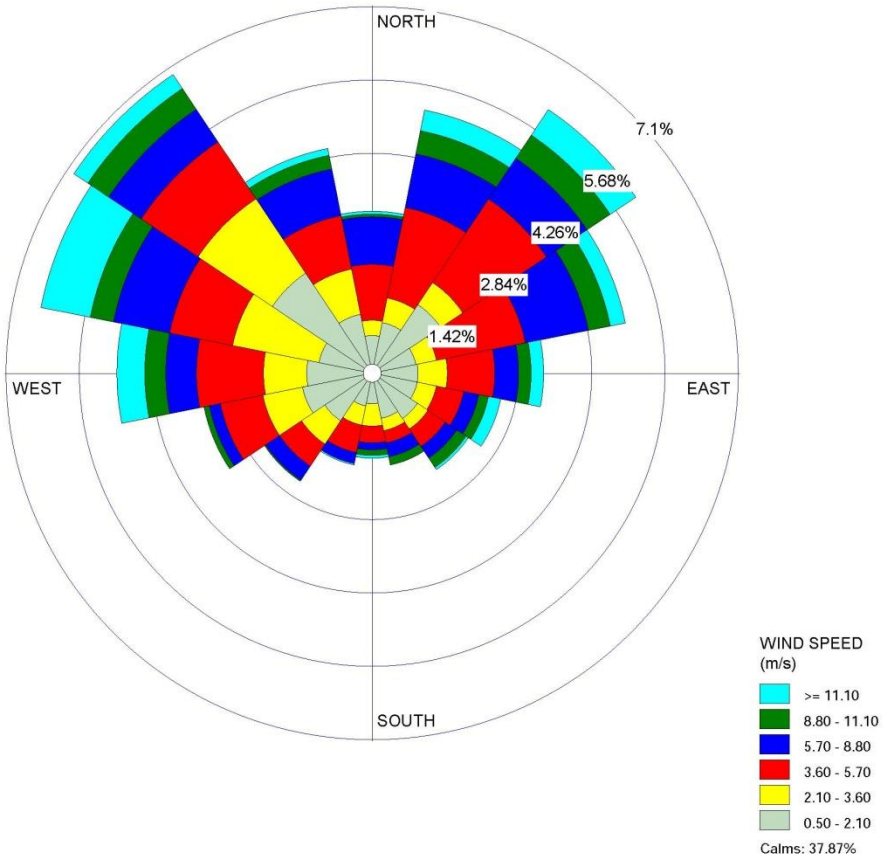
**Wind Pattern:** Generally light to moderate winds prevails throughout the year. Winds were light and moderate particularly during the morning hours. While during the afternoon hours the winds were stronger. A review of the wind rose diagram shows that predominant winds are mostly from SSE, NW, SE, SW, W & SW directions followed by NW direction.

WIND ROSE PLOT:

**M/s Maihar Cement (Century Textiles and Industries Ltd.)**
**Post Sarla Nagar, Tehsil -Maihar, Dist.Satna (MP)**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**




| COMMENTS: | DATA PERIOD: | COMPANY NAME: | |
|---|---|---|---|
| Wind Rose of capacity expansion of Cilnker production at Sarla Nagar Dist. Satna (MP) | **Start Date: 3/1/2016 - 00:00**<br>**End Date: 5/31/2017 - 23:00** | **M/s Maihar Cement** | |
| | | MODELER:<br>**Creative Enviro Services, Bhopal (MP)** | |
| | CALM WINDS:<br>**37.87%** | | |
| | AVG. WIND SPEED:<br>**2.93 m/s** | | PROJECT NO.: |

WRPLOT View - Lakes Environmental Software

**(VIII) Social Infrastructure Available.**

Plant is operational since last two decades and all infrastructure facilities such as Education, Health Facilities and other social facilities have been developed. M/s Maihar cement has contributed at large scale to develop the entire area through various programme.

## 5. PLANNING BRIEF

**(I) Planning concept (types of industries, facilities, transportation etc) town and country planning/development authority classification**

The proposal is for up gradation in existing system and optimization of plant parameters to achieve the targeted production capacity.

The total project implementation is estimated to take around 10 months considering that lines 1 and 2 will be upgraded in succession (and not simultaneously). Only the civil work should be carried out simultaneously in case of preheater tower and common TAD support.

For up-gradation to 4TPA in clinker production and 6 TPA in cement production , each kiln line may be shut down for 45 days. Considering the annual shut down of 30 days and other planned stoppoages, the project can be scheduled such that the impact of the up-gradation related shutdown is minimized.

**(II) Population projection.**

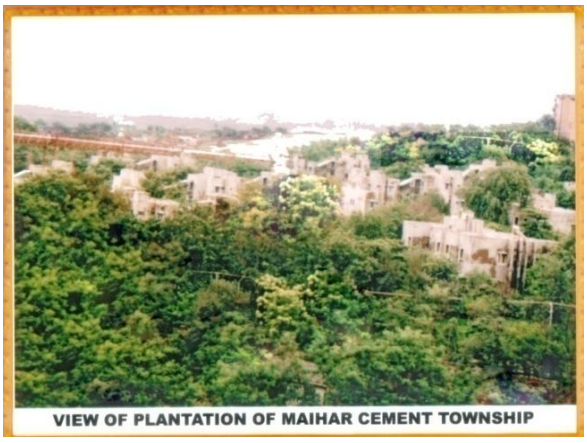
The project is small in magnitude and upgardation will be performed within the existing facilities. No influx of population is expected as skilled / Un-Skilled workers shall be deployed from the local villages

**(III) Land use planning (breakup along with green belt etc)**

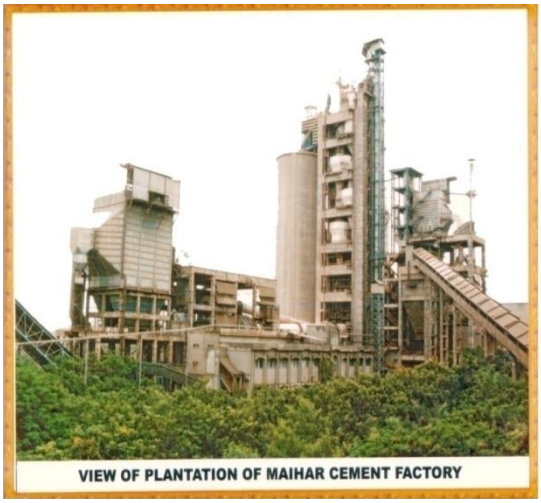
Considering the up gradations in existing plant and machineries, No new land use shall be created. No additional Land is required. The existing Land use breakup is given in the following table:

| **Particulars** | **Area in Acres** |
|---|---|
| Built up area of Cement Plant | 50 Acre |
| Residential Colony | 75 Acres |
| Cement Plant area | 131 Acres |
| Existing Green belt | 149 Acres |
| Open area | 120.36 Acres |
| Total Area | 477.36 Acres |

Till date more than 1100000 plants has been in survival stage at Cement Plant, colony, and mine premises. Out the same, about 8.50 lacs has been existed at plant & colony premises and 2.5 lacs have been existed in mine premises.



VIEW OF PLANTATION OF MAIHAR CEMENT TOWNSHIP



VIEW OF PLANTATION OF MAIHAR CEMENT FACTORY

VIEW OF THE OFFICE BUILDING OF MAIHAR CEMENT

## (IV) Assessment of infrastructure demand (physical & social)

New infrastructure is required at very little scale and within the plant boundary only. The following equipment will be installed.

| S.No | Equipment | Capacity (after modification) | Nos |
|---|---|---|---|
| 1 | Calciner | 3000 tpd | 2 |
| 2 | Cooler | 3000 tpd | 2 |
| 3 | Hybrid Filter Expansion | 3000 tpd | 2 |

ALL other physical and social infrastructure are already available and developed in and aground the industry.

**(V) Amenities/ facilities.**

All infrastructure facilities such as education, health facilities and other social facilities are adequate for labours, staff and their families.

## (6) PROPOSED INFRASTRUCTURE

**(I) Industrial area (processing area)**

All existing infrastructure will be used. No additional infrastructure is required.

**(II) Residential area (Non processing area)**

Residential Town ship with all essential facilities has already been provided within the existing premises. No additional facility is required

**(III) Green belt**

Till date more than 1100000 plants has been in survival stage at Cement Plant, colony, and mine premises. Out the same, about 8.50 lacs have been existed at plant & colony premises and 2.5 lacs have been existed in mine premises. Plantation programme is being taken on continue basis.

**(IV) Social infrastructure.**

The area has been developed since from inception of unit. Maihar Cement's Seva Trust started its activities from July, 1992 and at larger scale. These activities has helped in developing the good social infrastructure as larger scale. Some of the activities are being as follows :

**1. Vocational Training Centre (V.T.C.)**

This centre was established in 1992 with a view to provide training to unemployed youths in such a trade where they can start their self employment. The selection is made primarily from among the persons belonging to the families who live to below poverty line category and special preference is being given to members of weaker sections of the community and land losers. The officers representative of the local Administration of the State Government are associated in the process of selection.

**2. Community Development & Welfare**

- Seva Trust Hospital

  Maihar Cement always concerned for community and has started Maihar Cement Seva Trust Hospital with the objective to promote good health and timely treatment to the employees, their families and also neighboring community. The hospital offers free-of-cost treatment, services of Family Planning Operations, Counseling and advise by competent Doctors and immunization of children against six major childhood diseases. The hospital also offers Pathology Tests, ECG and X-Ray services at highly subsidized rates.

  Regular immunization camp twice in a month are held in association with the Health Department of the Government of Madhya Pradesh. M/s Maihar Cement has adopted Villages i.e. Sonwari, Bhadanpur, Delha, Patehra, Arkandi for the above activities. The total number of 1389 of medical care camp in nearby villages has been organized till date and 36157 number of villagers is benefited through the camp activity.

  Maihar Cement continues to set up Yoga and Naturopathy Camps, Eye Camps, Family Planning Camps in the nearby area, free of cost, benefitting the locals.

  Drinking water booths are organized in the nearby areas to provide Cold drinking water, similarly, Nimbu-Pani booths providing fresh Nimbu-Pani during the Nav Ratra Mela for ten days. The Trust has also undertaken cleaning and renovation of one old Bawli in Juranala Village and one in Chopra Village.

  The Trust has also undertaken Reconstruction of Second Flight of Steps of Sharada Devi Temple. As a part of complete eradication of illiteracy, the Trust has organised literacy classes for duration of three months each. 34 ladies have been put under this drive at each batches and the output of this efforts are satisfactory.

  Trust has organised a camp under Mahila Samriddhi Yojna to encourage the village women to save their money in this Yojana and number of women has opened their account in this camp.

  The Trust has promoted establishment of youth clubs in 11 selected villages of the adjoining area, where provided with free sports goods like Foot-ball, Rubber Rings and also one set of musical instruments consisting of one Harmonium, one set of Tabla, Majiri and Jhanjh.

  Services of Fire Tender and Fire Fighting Team are provided in emergency at nearby villages.

- **Education**

  The education activities for children are being managed by Sarlanagar Shiksha Samiti, which runs English Medium Schools at Sarla Nagar Factory site upto Senior Secondary level affiliated to Central Board of Secondary Education, Delhi and the other at outside of factory premises also.

- **Maihar - Sarlanagar Road**

  The condition of Maihar - Dhanwahi Road passing through Sarlanagar had become very drastic and even to walk on foot had become impossible, due to which not only

the villagers of Sonwari, Delha, Chopra, Harnampur, Bhadanpur were facing problems to reach their Tehsil Head Quarters with their daily transactions but also the link with other cities were mostly cut off.

- Total Rs. 1.5 crore has been incurred to improve the road condition and it was dedicated to public on 27.07.2002. and Rs. 1 Lacs were spent for the renovation of Civil Hospital Maihar Under Sanivini Yojana
- Under the Janbhagidari Scheme of Govt of MP, Maihar Cement Seva Trust has distributed school kits like school bags, Copies, Pensil, Rubber, shoes, shocks etc to poor student studying in the 10 nearby villages of our factory be spending amount of Rs. 1,56,606/-
- In the interest of the villagers' and neighboring communities, Maihar Cement has cost of Rs. 1.61 crores.
- Drinking Water facility to residents of Satna

  Maihar Cement has played vital role to bring the water to Satna from Bansagar Dam by making channel of 2.5 km long, 2 m width and 2.5 m depth. Maihar cement has done 12500 cum cutting of hills in 07 days time. The work was appreciated by Govt. of MP

**(V) Connectivity (traffic and transportation road/ rail/metro/ water ways etc)**

The area is located at a distance of 53 km south of Satna. Satna to Maihar is 45 km, south of Satna by metalled tar district road via Uchehara (part of the road is national highway no. 7) Maihar to Sarlanagar is 8 km south of Maihar by metalled tar road. No other connectivity is proposed

**(VI) Drinking water management (source and supply of water)**

The river water / mine water reservoir has been used as source of water for drinking water. Water treatment plant has already been provided to ensure the potable quality of water.

**(VII Sewerage system**

Proper sewerage net work has been designed for the industrial and residential area. The Sewage Treatment Plant (800 KLD) is in operation to take care of the effluent generated from domestic activities.

**(VIII) Waste management**

Waste water Treated in the STP and treated effluent water are being re-used in the plant process and gardening purposes and solid waste are being used as manure.

**(IX) Solid waste management**

Proper Solid and hazardous waste management system with statutory permission is already in operation. No other management is required.

**(X) Power requirement & supply / source.**

As submitted power is being met through captive TPP and remaining is being taken from MPEB. The same shall be continue in future also.

## 7 REHABILITATION AND RESETTLEMENT (R & R) PLAN.

**(I) Policy to be adopted (central/ state) in respect of the project affected persons including home oustees, land oustees and landless laborers (a brief outline to be given).**

No R&R plan is required as no displacement of people is proposed for the project. The expansion of Clinker production for Kin No.1 & 2 and increase in cement production is proposed within the existing operational Kilns, within the Cement Plant premises.

## 8 PROJECT SCHEDULE AND COST ESTIMATES

**(I) Likely date of start of construction and likely date of completion (time schedule for the project to be given)**

Construction activity will involve installation of few new process equipment . The total project implementation is estimated to take around 10 months considering that lines 1 and 2 will be upgraded in succession (and not simultaneously). Only the civil work should be carried out simultaneously in case of pre-heater tower and common TAD support.

**Project Implementation Schedule**

| Activity | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | 11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic Design and Plot Plan | | | | | | | | | | | | | | | | | | | | | | |
| Tender preparation | | | | | | | | | | | | | | | | | | | | | | |
| Tender Floating | | | | | | | | | | | | | | | | | | | | | | |
| Receipt of Offers | | | | | | | | | | | | | | | | | | | | | | |
| Evaluation and Clarification of Offers | | | | | | | | | | | | | | | | | | | | | | |
| Receipt of Commercial Offers | | | | | | | | | | | | | | | | | | | | | | |
| Negotiation and Order Placement | | | | | | | | | | | | | | | | | | | | | | |
| Receipt of GA and Load Data | | | | | | | | | | | | | | | | | | | | | | |
| Civil Design | | | | | | | | | | | | | | | | | | | | | | |
| Excavation Drawing | | | | | | | | | | | | | | | | | | | | | | |
| Foundation Drawing | | | | | | | | | | | | | | | | | | | | | | |
| Superstructure Drawing | | | | | | | | | | | | | | | | | | | | | | |
| Civil Construction tender preparation | | | | | | | | | | | | | | | | | | | | | | |
| Receipt of offers from Civil Contractor | | | | | | | | | | | | | | | | | | | | | | |
| Selection of Civil Contractor | | | | | | | | | | | | | | | | | | | | | | |
| Civil Construction Manpower Deployment | | | | | | | | | | | | | | | | | | | | | | |
| Civil Construction | | | | | | | | | | | | | | | | | | | | | | |
| Mechanical Equipment receipt at Site | | | | | | | | | | | | | | | | | | | | | | |
| Mechanical Erection tender Preparation | | | | | | | | | | | | | | | | | | | | | | |
| Receipt of Offers from Mechanical Contractors | | | | | | | | | | | | | | | | | | | | | | |
| Evaluation and Selection of Mechanical Contractor | | | | | | | | | | | | | | | | | | | | | | |
| Deployment of Mechanical Manpower | | | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fabrication/ Erection of Mechanical Equipment | | | | | | | | | | | | | | | | | | | | | | |
| E&I tender Preparation | | | | | | | | | | | | | | | | | | | | | | |
| E&I Tender Floating | | | | | | | | | | | | | | | | | | | | | | |
| Receipt of E&I Offers | | | | | | | | | | | | | | | | | | | | | | |
| Selection of E&I Contractor and Order Placement | | | | | | | | | | | | | | | | | | | | | | |
| E&I Erection | | | | | | | | | | | | | | | | | | | | | | |
| Precomissioning Trial | | | | | | | | | | | | | | | | | | | | | | |
| Commissioning of Plant | | | | | | | | | | | | | | | | | | | | | | |

**(II) Estimated project cost along with analysis in terms of economic viability of the project**

Total capital Investment Cost is Rs 80 cores and Rs. 7.5 crores will be spent for Environmental Management Plan. The estimated investment Cost for the project has been based on the requirement of fixed and non-fixed assets for cement plant.

| **Parameter** | **Unit** | **Value** |
|---|---|---|
| Upgraded Clinker Production | tpd | **6000** |
| Annual Clinker production | tpa | 2010000 |
| Specific heat consumption | kcal/kg cl | 760 |
| Days of operation | | 335 |
| Calorific value of mix fuel | kcal/kg fuel | 6600 |
| Fuel Savings | annual tons | 18273 |
| Power Consumption in clinkerization (without coal mill) | kw/t clinker | 26 |
| Power savings annually | kwH | 4020000 |
| **Investment (Capex excluding taxes and duties)** | **INR crores** | **80** |
| Investment per ton of enhanced clinker | INR/ annual ton | 175 |

## 9 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

**(I) Financial and social benefits with special emphasis on the benefit to the local people including tribal population, if any in the area**

The financing of the project shall be sourced from the internal accruals. In view of the acceptable payback period, the project is financially feasible.

Based on the growing demand for Cement over the next 10 years, the proximity of the project location to these markets is an advantage with respect to reduction in freight of cement to these markets. The financial viability also show a good payback period for the project. Considering the above, Maihar Cement is planning to go ahead with the project, once it gets all the statutory approvals for this enhancement project.