

EXECUTIVE SUMMARY

Introduction

M/s Kasturi Cement Limited Raipur is proposed to set up a Rotary Kiln based Integrated Cement Plant to produce 0.98 million TPA cement and Captive Thermal Power Plant of 50 MW capacity at Bharuvadikhkalan Village, Tilda Tehsil, Raipur District of Chhattisgarh State based on limestone deposit available at village Patharakundi & Kathiya, Tehsil Tilda, district Raipur, Chhattisgarh.

DETAILS OF THE AREA

Salient Features of the Study area

Details Of The Area:	
District & State	Raipur, Chhattisgarh
Mandal/Tehsil	Tilda
Village	Bharuvadikhkalan
Land Availability	Limestone mine: 234.158 Cement & Power Plant: 60 ha in 2 phase Colony & Railway line yard: 20 ha in 2 phase
Nature of the Area	
Toposheet No.	64 G/15
Geographical Co-ordinates	Latitude: 27°27'13.59' N Longitude: 81°54'57.85' E
General Climatic Conditions	
Maximum Temperature (°C)	33.4
Minimum Temperature (°C)	16
Annual Rainfall (mm)	1288
Wind Pattern during study period	Northeast (NE)
Elevation above mean sea level	
Accessibility	
Road Connectivity	Site is about 8.0 km from Kharora, a Tehsil place of Raipur district, which is connected through Ripu-Baloda road. Baloda Bazar road is well connected by state highway and 84 km from Raipur. National highway no. 6 Mumbai-Howrah is passing through Raipur and N.H 200 is 60 km from Kharora
Rail Connectivity	Bhatapara (30 km) is the nearest railway station on Raipur-Bilaspur section, Tilda (15 km), Mohara (10 km).

Airport	
Historical / Important Places	
Archaeological/ Historically Important Site	None within 10 km radius of the site
Eco-Sensitive Places	None within 10 km radius of the site
Forest/Sanctuaries / National Parks	Khaulidabri Protected Forest (0.2 km)
Water Bodies	Kumhari Tank (1.0 km) Pindraon tank (4.6 km)

PROJECT DESCRIPTION - CEMENT PLANT

The proposed cement plant is based on dry process technology. M/s Kasturi Cement Limited proposes to produce 0.98 MTPA cement and Captive Thermal Power Plant of 50 MW capacity.

On an average of 300 working days basis, the total annual output of clinker will be about 0.98 mtpa.

RAW MATERIAL REQUIREMENT

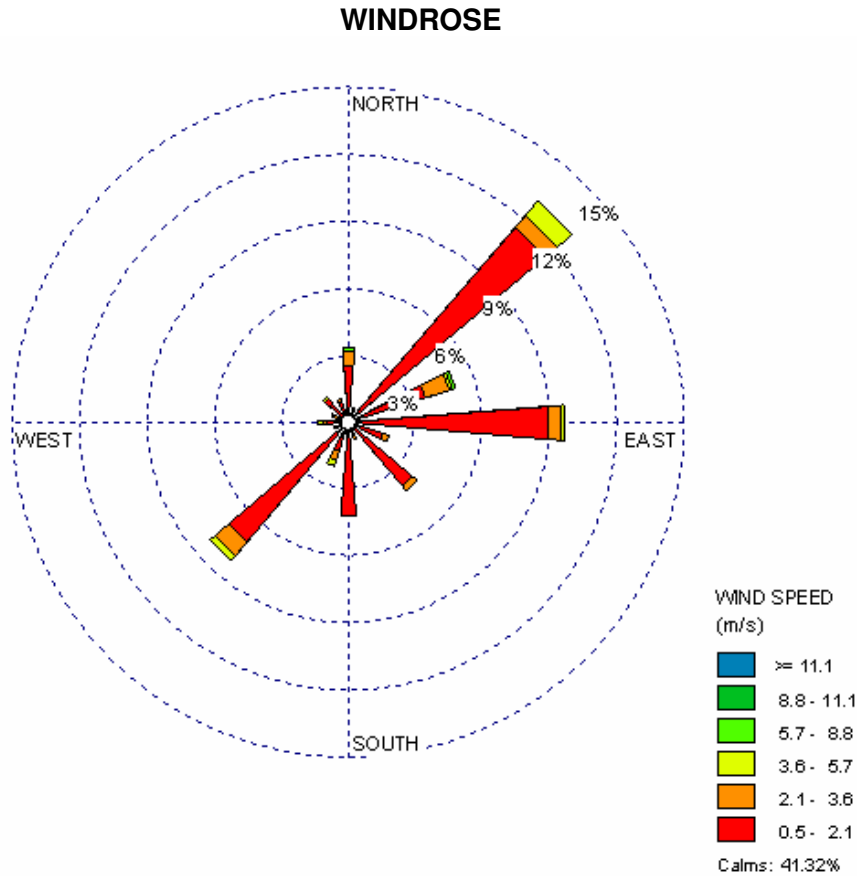
Type of Cement	Raw Material				
	Clinker	Gypsum	Fly Ash	Slag	Total
OPC					
Ratio (%)	95	5	-	-	
Quantity	269990	14210	-	-	2,84,200
PPC					
Ratio (%)	65	5	30	-	
Quantity	394143	30319	181912	-	6,063,74
PSC					
Ratio (%)	55	5	-	40	
Quantity	145530	13230	-	105840	2,646,00
Grand Total					9,80,000

PROPOSED CAPTIVE POWER PLANT

To meet the total power requirement of the cement plant it is proposed to install a coal based captive thermal power plant of 15 + 35 MW capacity. The proposed Power Plant will be installed adjacent to the cement plant area. The proposed CPP shall consist of CFBC boiler and 15+35 MW capacity Steam Turbine.

ENVIRONMENTAL STUDIES

The predominant wind direction during the study period post-monsoon season 2010 is from Northeast



BASELINE STATUS

AMBIENT AIR QUALITY

Ten ambient air quality monitoring stations were studied and the results obtained were well within the prescribed standards. The location of monitoring stations and maximum values are given in the following table:

Maximum Values ($\mu\text{g}/\text{m}^3$)

Location	Code	PM ₁₀	SO ₂	NO _x	CO (mg/m^3)
Proposed plant area	A-1	53.7	8.9	14.9	0.9
Bharuwadih Khurd	A-2	55.8	9.7	15.7	1.2
Bharuwadih Kalan	A-3	46.6	9.2	13.0	1.2
Kathiya	A-4	44.6	9.0	12.7	1.0
Mohiya	A-5	43.5	8.6	13.0	1.0
Khaulidahri	A-6	44.9	8.5	12.0	1.0
Pachdeori	A-7	43.9	8.9	12.1	1.0
Mohrengo	A-8	43.1	8.4	12.4	1.0
Mach	A-9	44.7	8.8	14.9	1.0
Petthrakundi	A-10	45.8	9.1	13.7	1.0

NOISE QUALITY

Noise levels were monitored at 10 locations (same as ambient air). The results obtained were well within the limits.

Noise Levels dB (A)

	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Min	41.9	41.4	40.7	40.9	40.4	40.5	42.9	44.9	40.8	41.5
Max	49.5	50.0	45.8	46.3	46.0	46.0	45.5	45.5	48.5	49.0
Ld	43.6	43.9	41.7	42.4	42.0	41.8	41.8	42.2	33.9	42.8
Ln	33.0	33.2	31.8	33.0	33.2	33.2	33.5	33.9	42.8	29.9

WATER REQUIREMENT & BALANCE

Section	Requirement		Loss / Consumption	Wastewater
	Fresh Water	Recycled Water		
Cooling Water, Make up CPP	740	-	290	450
Boiler Make up	125	-	125	-
DM Plant Regeneration	16	-	-	16
RO Rejects	128	-	-	128
Filtration Plant	41	-	-	41
Clarifier	104	-	-	104
Raw Water Tank	22	-	22	-
Domestic	180	-	40	140
Service, AC & FF	144	-	76	68
Cooling Water, Cement Plant	-	614	614	-
Dust Suppression	-	185	185	-
Sludge Cakes for disposal	-	8	8	-
Green Belt	-	140	140	-
Total	1500	947	1500	947

WATER QUALITY

Two surface water and five ground water sampling stations were fixed to know the water quality and analyzed as per drinking water quality standards IS: 10500

- pH of the surface water samples varies between 7.53-7.71 and for ground water samples pH varies between 7.24-7.57.
- The concentration of Total Dissolved Solids in surface water varies between 140-160 mg/l and in groundwater varies between 510-360 mg/l.
- Total Hardness in surface water is in the range of 95-100 mg/l and in groundwater 240-415 mg/l.
- Fluoride values in surface water are in the range of 0.3 mg/l and in groundwater 0.5-0.6 mg/l.

It is observed that the physico-chemical characteristic of the samples analyzed were well within the permissible limits of the prescribed drinking water standards.

Soil Quality

- The texture of the soils is sandy to sandy loam. The pH of the soils are in the range of 6.42-7.52
- The electrical conductivity for the soil samples is in the range of 1280-1420 μ ohms.
- It was observed that calcium and magnesium are in the range of 4080-5360 ppm and 390-1000 ppm respectively.
- Sodium and Potash in the soils vary from 230-540 ppm and 380-1070 ppm respectively.

Land Environment

The land use pattern of the study area based on satellite imagery is shown in the following table

**LAND USE PATTERN IN STUDY AREA
(As per satellite imagery)**

TABLE –3.10

S. No	Land Use Type	Area (Ha.)	Percentage (%)
1	Agricultural land	14145.48	45.03
2	Protected Forest	1366.25	4.35
3	Barren land	4794.17	15.26
4	Land with/without scrub	4035.32	12.84
5	Fallow land	5145.60	16.38
6	Water body	1212.32	3.86
7	Built up land	716.78	2.28
TOTAL		31415.92	100

Biological Environment

Socio-economic Environment

The study area has 44 villages with a population of 36408. The SC & ST population comprise of 16.5% and 4.05% respectively. The literacy rate is 55.09% in the project area.

4.0 Prediction of Impacts & Management Plan

Predicted Ground Level Concentration

Units: ($\mu\text{g}/\text{m}^3$)

24 Hourly Concentrations	Particulate Matter		Sulphur dioxide (SO₂) ($\mu\text{g}/\text{m}^3$) Including Existing & Proposed project	Oxides of Nitrogen (NO_x) ($\mu\text{g}/\text{m}^3$) Including Existing & Proposed project
	PM10 (cumulative)	PM10 Plant		
Predicted Ground Level Concentrations (max)	27.49189	11.20036	24.17293	29.15137

Management Plan

- Water sprinkling on haul roads and raw material storage areas
- Regular maintenance of equipments and transport vehicles
- Handling of fine coal in closed circuit
- Sulphur dioxide emissions will be reduced by the combustion of limestone in the boiler
- Low NO_x boilers are proposed to minimize the NO_x generation and emission for CPP.
- Regular monitoring of stack emissions and ambient air quality monitoring in the study area

POLLUTION CONTROL EQUIPMENT

The installation of the following pollution control equipment is proposed:

- Bag house for raw mill and PH fan exit gases
- Low-NO_x generation kiln burner
- Low-NO_x generation precalciner
- Cooler bag house for cooler vent gases
- Coal mill bag filter
- Cement mill bag filter
- Bag filters for dedusting of storages and auxiliaries in different departments
- Two ESPs for Captive Thermal Power Plant.

FUGITIVE EMISSIONS

The sources of fugitive emissions at plant area are loading and unloading operations, stock yard, transfer points of conveyors and retreat points will be controlled fully i.e., with total enclosures and all transfer emissions are connected with extractor inlet point and pass through a high efficiency Bag filter before discharging into the atmosphere.

Noise Environment

SOURCES OF NOISE POLLUTION

Plant machinery like cement mill, raw mill, Coal mill, ID fans, compressors, turbo generators, Crusher etc. are the major sources of noise pollution.

CONTROL MEASURES

- Provision of acoustic dampeners in foundations and insulators in the interiors
- Encasement of noise generating equipment.
- A thick greenbelt will be developed all around the plant boundary to act as noise attenuator.
- In addition personnel working near high noise level generating sources will be provided with ear muffs.
- Proper and suitable acoustic barrier will also be provided around areas generating high noise.
- Effective preventive maintenance and vibration measurement of all rotating equipment will help in the improvement of plant life and also noise reduction.
- Automatic door enclosures for control room and laboratory etc.

WASTEWATER GENERATION AND DISPOSAL

PLANT WASTEWATER

The waste water to a tune of about 615 m³/day will be generated which is treated and used in dust suppression and cooling tower in the plant.

The quantity of domestic wastewater is estimated to be 140m³/day. The domestic wastewater will be treated in Sewage Treatment Plant. The solid waste generated from the Sewage Treatment Plant will be disinfected and used as manure in the Green Belt. The treated wastewater will be utilized for development of Green Belt and gardening purpose in the Plant as well as the Colony.

Water Quality Management

Water effluents

Acidic and alkaline effluents are generated during regeneration of various ion exchange unit in the RO water plant. In order to neutralize the effect of these effluents, it has been proposed to lead these effluents to a neutralizing pit where acid or alkali shall be dozed depending upon the type and concentration of effluent. This effluent is further treated in Effluent treatment plant.

The treated effluent is used for development/ maintenance of the green belt.

Cooling Tower Blow Down

Cooling water system for auxiliary circuit operates in a closed cycle with a cooling tower for heat rejection. In order to keep the concentration of dissolved solids within the limits, a blow down is maintained from the system.

For inhibition of corrosion/ scaling in the circulating cooling water system, a chemical treatment system for dozing of inhibiting chemical is provided.

Blow down water is treated in neutralizing pit located in the cooling tower area.

Rainwater Harvesting System

M/s Kasturi Cement Limited proposes to achieve proper utilization of rainwater by harvesting through rain water-harvesting mechanism in the plant area. Rainwater harvesting will be done by the construction of harvesting pits all along the storm water drainage network.

SOLID WASTE GENERATION

The dust collected in the air pollution control equipment in the cement plant will be recycled back to the process. Hence no solid waste which requires disposal is generated from the plant. Total wastes from mine including the overburden generated during mine period shall be 17 million tones, with Ore: Waste ratio of 1:0.17. The sites selected for these surface dumps are on non-mineralized zone to avoid re-handling. Surrounding these dump retaining walls shall be erected and afforested immediately. The soil at the top will be removed first and transported by 35 T tippers for Stacking and later this soil stack shall be immediately reused for spreading over the back filled portions with the overburden and mine wastes.

Biological Environment

Generally cutting of herbaceous vegetation, during the construction phase results in the loosening of the topsoil. There is no removal of vegetation in the proposed site. Further plantation measures would help in preventing soil erosion.

SOCIO-ECONOMIC BENEFITS

The establishment of the Cement Plant would aid in the overall social and economic development of the region. The plant will give direct employment to about 100 people, in addition there is indirect employment to many more people in the form of contractual jobs, business opportunities, service facilities etc. This will enhance the economic status. Apart from the jobs, the company provides medical and educational facilities to the employees which can also be availed by the people around \ the plant. The company also constructed a full fledged colony comprising of 100 quarters. Adequate recreational facilities for the staff of the company and the local people are constructed.

➤ Social Welfare to Locals

To uplift the economic status of the surrounding villages, Kasturi Cements has taken up the following social welfare/development programmes for the villages in the vicinity.

- a.) Education : Opening of a school.
- b.) Health : Hospital with required facilities and trained staff.
- c.) Water supply : Proper water supply system will be designed to supply water.
- d.) Employment : Local people will be preferred for employment based upon their suitability and requirement of the company.

Occupational Health & Safety

Kasturi Cements provides all necessary provisions under Factory Act. In addition a Safety committee formed and manned by equal participants from Management and Workers. Safety shoes, helmet & uniform are issued to each worker. Other safety equipments are used according to the nature of job involved. Kasturi Cements

established its own well equipped occupational health center headed by experienced Doctors with a team of Nurses, Compounders and Pathologist.

Adequate air pollution and noise control measures are provided in proposed plant to conform regulatory standards. Employees working in high noise work place would be provided protective devices like ear plugs/earmuffs for ensuring minimum impact on human health. The environmental management and emergency preparedness plans are proposed to ensure that the probability of undesired events and consequences are greatly reduced, and adequate mitigation is provided in case of an emergency. An occupational safety & Health related program would be implemented.

- Occupational Health Surveys of employees, Health awareness and Training Programs will be conducted once in six months.
- Designing and implementation of Hazards based Medical Surveillance System consisting of Preventive Health Examinations e.g., Pre-employment, Periodic health check ups. Hazards based Medical Surveillance for health impacts of Respirable dust and chemical hazards on lungs by Spirometry (Lung Function Testing) and impact of noise on ears by Audiometry (Hearing capacity testing), Bio-medical surveillance program.
- Organization policy development for Tobacco, Alcohol etc.
- Conducting Training workshops on “Occupational Health & Safety issues”
- Diseases Screening Programs for Diabetes, Hypertension, Tuberculosis, Occupational Diseases etc.
- Occupational Stress Assessment and Management Programs will be conducted.
- Emergency Medical Response Preparedness including Hazard Communication, First aid and Cardio-Pulmonary Resuscitation (CPR), Evacuation plan etc.
- Industrial Hygiene Program for Work environment monitoring for Chemicals and Physical hazards e.g. Heat, Noise, dust, Illumination, etc.
- Orientation programs will be conducted for Factory Medical Officers and health personnel on Occupational Health.
- Health awareness and Training Programs on key health issues e.g., workplace hygiene, personal protective devices, first aid measures, nutrition, communicable diseases e.g., Pulmonary diseases such as TB, Hepatitis, Malaria control, family welfare, tobacco and alcohol health impacts, HIV and other relevant issue.
- Personal Protective Equipment (PPE) Program

- Health Information System Development including reporting formats, check lists etc
- Health Facilities e.g. Medical Center, Occupational Health Center for plant and township.

5.0 Environmental Monitoring

Monitoring of various environmental parameters will be carried out on a regular basis to ascertain the following:

- State of pollution within the plant and in its vicinity;
- Generate data for predictive or corrective purpose in respect of pollution;
- Examine the efficiency of Pollution Control Systems installed in the complex
- To assess and monitor environmental impacts

Environmental Laboratory Equipment

Name of the Equipment	Quantity
Stack Gas Quality Monitoring Equipment	1
Ambient air quality monitoring equipment	3
Dust samplers	2
Noise level meter	1
BOD incubator	1
pH meter	1
Spectrophotometer	1
Portable flue gas analyzer	1
Online opacity meter	1
Weather monitoring station to measure wind direction, wind speed, humidity, and temperature	1

Fire Fighting Arrangements

A Fire Hydrant system has been proposed to meet the norms, in addition to providing fire extinguishers at respective places wherever required.

Details of Fire Hydrant System

S. No	Details	Standard	Capacity
1	CO ₂	IS:2878	7kg
2	Foam	IS:933	9 ltrs
3	Dry Powder	IS:2171	9 kg
4	Buckets	IS:2546	10 ltrs

5	CO ₂ Type	(Trolley mounted)	22.5 kg
6	Dry Powder Type	(Trolley mounted)	22.5 kg
7	Foam Type	(Trolley mounted)	45 ltrs

- Kasturi Cement Limited strictly adheres to all fire protection and safety measures suggested by manufacturers
- Safety training will be provided to all the employees.
- No open fire is allowed and also smoking is strictly prohibited within the premises.
- Signboards will be displayed in restricted areas.
- The fuel storage yards are isolated and maintained properly such that there is no chance of ignition.
- The electrical system will be designed with safety provisions like flameproof fittings in the vulnerable areas and also by providing isolated distribution system.
- Kasturi Cement Ltd. provides fire-fighting equipments at various locations in the factory premises.

Environmental Budget

M/s Kasturi Cement Ltd. has proposed a budget towards implementation of environmental management plan for proposed integrated project. It is necessary to include the environmental cost as a part of the budgetary cost component. The project authorities propose to undertake the following environmental works to achieve the environmental quality as desired.

The budget for environmental protection has been formulated and given in the following table:

Budget for Environmental Protection in

CONCLUSION

Based on the EIA study it is observed that there will be an insignificant impact on ambient environment and ecology due to the Cement Plant. Moreover the Cement Plant will lead to direct and indirect employment generation in the area.

Hence, it can be summarized that the development of Cement Plant of Kasturi Cements at Bharuvadihkalan village, Raipur District, Chhattisgarh will have a positive impact on the socio-economic of the area and lead to sustainable development of the region.