

PRE - FEASIBILITY REPORT

FOR

**Proposed Integrated Cement Plant
Clinker - 2.5 MTPA, Cement - 2.5 MTPA,
WHRS - 12 MW, DG Set - 500 KVA**

At

**Villages: Kosampali, Barmuda,
Dhanagar and Saraipali, Tehsil-Raigarh,
District - Raigarh (Chhattisgarh)**

APPLICANT



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ABBREVIATIONS

APCE's	Air Pollution Control Equipments
CGWA	Central Ground Water Authority
CPCB	Central Pollution Control Board
CO ₂	Carbon dioxide
CRZ	Central Regulation Zone
CSR	Corporate Social Responsibilities
DG	Diesel Generator
EIA	Environmental Impact Assessment
FC	Fecal Coliform
FY	Financial Year
GDP	Gross domestic product
GU	Grinding Unit
Ha	Hectare
HAG	Hot Air Generator
HFL	High Flood Level
HSD	High Speed Diesel
ISO	International Organization for Standardization
KLD	Kilo Liter Per Day
KVA	Kilovolt-ampere
KM	Kilo Meter
Kg	Kilogram
LED	Light Emitting Diode
M	Meter
MW	Mega Watt
MT	Metric Tonnes
MTPA	Million Tonnes Per Annam
MoEFCC	Ministry of Environment, Forest & Climate Change
NH	National Highway
NE	North East
NNE	North of North East
NO ₂	Nitrogen Dioxide
NW	North West
OPC	Ordinary Portland Cement
PF	Protected Forest
PH	Pre-Heater
PPC	Portland Pozzolana Cement
PSC	Portland Slag Cement
RCC	Reinforced Cement Concrete

RF	Reserved Forest
RO	Reverse Osmosis
R&R	Rehabilitation and Resettlement
SH	State Highway
SGWB	State Ground Water Board
SPCB	State Pollution Control Board
SOI	Survey of India
SRC	Sulphate Resisting Cement
SSW	South of South West
STP	Sewage Treatment Plant
SW	South West
ToR	Terms of Reference
TPD	Tonnes Per Day
TPA	Tonnes Per Annum
UV	Ultra Violet
VRM	Vertical Roller Mill
WSW	West of South West



PRE-FEASIBILITY REPORT

1.0 EXECUTIVE SUMMARY

Jindal Panther Cement Pvt. Ltd. is proposing Integrated Cement Plant with capacity of Clinker 2.5 MTPA, Cement – 2.5 MPTA , WHRS - 12 MW and DG set (500 KVA) at Villages:-Kosampali, Barmuda , Dhanagar Saraipali ,Distt. – Raigarh, State - Chhattisgarh. Salient features of the project are given in **Table 1**.

Table - 1
Salient Features of the Project

S. No.	PARTICULARS	DETAILS
1.	Nature of the Project	Greenfield project
2.	Size of the Project	✓ Clinker – 2.5 MTPA ✓ Cement – 2.5 MPTA ✓ WHRS – 12 MW ✓ DG set – 500 KW Proposed Project Area: 69.561 ha (171.88 acres)
3.	Category of the Project	As per EIA Notification dated 14 th Sept., 2006 & as amended thereof; this project falls under Category “A”, Project or Activity ‘3(b)’
4.	Location Details	
	Khasra Nos	Khasra Map is attached as Annexure - 1 along with PFR.
	Village	Kosampali, Barmuda, Dhanagar, Saraipali
	Tehsil & District	Raigarh
	State	Chhattisgarh
	Latitude	21°55'19.1674" to 21°54'22.6903"
	Longitude	083°20'36.5652" to 083°20'00.0718"
	Toposheet No.	F44R5(64 O/1) , F44R5(64 O/5) & F44L8(64 N/8)
5.	Area Details	
	Total Project Area	69.561 ha
	Greenbelt area / Plantation Area (ha)	22.95 ha (~33 % of the total plant area)
6.	Environmental Setting Details (with approximate aerial distance & direction from the nearest boundary of project site)	
1.	Nearest Village	Kosampali, Barmuda, Dhanagar, Saraipali
2.	Nearest Town & City	Raigarh (~5.7 km in ESE Direction)
3.	Nearest National Highway / State Highway / MDR	▪ NH 200 (~ 1 km in NW direction) ▪ NH 49 (5.55 km in East direction) ▪ SH 16 (0.78 km in South direction)
4.	Nearest Railway station	Kirorimalnagar Railway Station (1 km in NW direction) Raigarh Railway Station (5.5 km in SE direction) Bhupdeopur Railway Station (10 km in NW direction)
5.	Nearest Airport	Jharsugda Airport (~98 km in West direction)

S. No.	PARTICULARS	DETAILS
6.	National Parks, Wildlife Sanctuaries, Biosphere Reserves, (PF) etc. within 10 km radius.	No National Park, Wildlife Sanctuary, Biosphere Reserve falls within the 10 km radius study area.
7.	Reserve Forest (RF) / Protected Forest (PF) etc. within 10 km radius.	<ul style="list-style-type: none"> ➤ Protected Forest (8.5 km in North direction) ➤ Protected Forest (~ 7 km in NE direction) ➤ Lakha PF (~7.5 km in NNE Direction) ➤ Barkachhar RF (~8.5 km in NNE Direction) ➤ Dungapani PF (8 km in NE Direction) ➤ Barlia PF (9 km in NE Direction) ➤ Boidadar RF (7.5km in ENE Direction) ➤ Gajmar RF (8.5 km in ESE Direction) ➤ Lamhidarha PF (7.5KM IN ENE Direction) ➤ Protected Forest (6 km in NE Direction) ➤ Urdana RF (5 km in ENE Direction)
8.	Water Bodies within 10 km radius study area	<ul style="list-style-type: none"> ➤ Kelo river (~6 km in ENE direction) ➤ Mand river (~6 km in WSW direction) ➤ Kanthi Tal (~3.5 Km in SSW direction) ➤ Tipakhol Tal (~2.5 in NNE direction) ➤ Kokritaral Tal (~2 Km in NW direction) ➤ Ramjharan Nala (~7 Km in West direction) ➤ Pathari Nala (~6.5 km in WSW direction) ➤ Doliva Nala (~4.5 km in WSW direction) ➤ Sanapkhari Nala (~6.5 km in ENE direction)
9.	Seismic Zone	Zone - III [as per IS 1893 (Part-I): 2002]
F.	Cost Details	
1.	Total Cost of the Project	Rs. 2119 crores
2.	Cost for Environment Management Plan	<ul style="list-style-type: none"> ▪ Capital Cost: Rs. 100 crores ▪ Recurring Cost: Rs. 5 crores
G.	Basic Requirements for the project	
1.	Water Requirement (KLD)	1000 KLD
2.	Power Requirement (MW)	35 MVA
3.	Manpower Requirement (No. of persons)	<ul style="list-style-type: none"> ▪ During Construction Phase: 3000 workers & 80 Staff ▪ During Operation Phase: 574

2.0 INTRODUCTION OF THE PROJECT/ BACKGROUND INFORMATION

(i) IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

M/s. Jindal Panther Cement Pvt. Ltd. is proposing Integrated Cement Plant: Clinker – 2.5 MTPA, Cement – 2.5 MTPA, WHRS - 12 MW along with Railway Siding at Villages: Kosampali, Barmuda, Dhanagar, Saraipali, Tehsil & District: Raigarh (Chhattisgarh).

M/s. Jindal Panther Cement Private Ltd. (JPCPL) is promoted by the Indian conglomerate – Jindal Group, having significant presence in steel, power, mining, and infrastructure sectors beside many other ventures.

Jindal Group's steel vertical, Jindal Steel & Power Limited (JSPL) operates steel plants in the States of Chhattisgarh and Odisha, where Slag is generated as a by-product. The power vertical, Jindal Power Limited (JPL) operates coal-based power plants, where Fly ash is generated as a by-product. JPCPL envisions to use the by- product generated from M/s. JSPL and JPL, i.e., slag and fly ash, in manufacturing of the cement. JSPL is in possession of a captive limestone mine at Chilhati located in district Bilaspur of Chhattisgarh State. JPCPL envisages to source limestone for manufacturing clinker from this mine. The transfer of this mine from JSPL to JPCPL is in process.

M/s Jindal Steel & Power Limited (JSPL) is currently operating slag & fly ash-based cement making plant (clinker grinding facility) of 1.0 MTPA capacity at Raigarh under the brand name 'Panther Cement'.

Jindal Panther Cement Pvt. Limited (JPCPL) proposes to set up a Greenfield Integrated Cement Plant having 2.5 MTPA clinker capacity and 2.5 MTPA cement in villages: Kosampali, Barmuda, Dhanagar, Saraipali, District Raigarh, State Chhattisgarh and Waste Heat Recovery System (WHRS) of 12 MW is also envisaged. The clinkerization plant of 2.5 MTPA, cement plant of 2.5 MTPA and WHRS of 12 MW is proposed to be commissioned within 03 years of time span.

The products from this project can be viably marketed in state like. Chhattisgarh, Jharkhand, Bihar, Odisha and Southern West Bengal. They are located in a distance range of 100 – 1000 Kms. In addition to the availability of large reserves of Limestone and availability of by products of JSPL (slag and Fly ash) and Power in the location of the project has prompted the applicant to undertake proposed project.

(ii) BRIEF DESCRIPTION OF NATURE OF THE PROJECT

M/s. Jindal Panther Cement Pvt. Ltd. is proposing Integrated Cement Project: Clinker – 2.5 MTPA , Cement – 2.5 MTPA, WHRS -12 MW along with Railway Siding at Villages: Kosampali, Barmuda, Dhanagar, Saraipali, Tehsil & District: Raigarh (Chhattisgarh).

As per EIA Notification dated 14th Sept., 2006 & as amended thereof; this project falls under Category "A", Project or Activity '3(b)'.

The proposed cement plant will be operated on dry basis, which offers more advantages, particularly in fuel & water conservation. The proposed plant will comprise of limestone crusher, raw mill, pre-heater & pre-calciner, rotary kiln, cooler, coal mill and cement mills & packers in Cement Plant. The cement will be Portland Composite Cement (PCC), Portland Slag Cement (PSC), Portland Pozzolana Cement (PPC) & all other types of ordinary Portland cement depending upon the demand in the market.

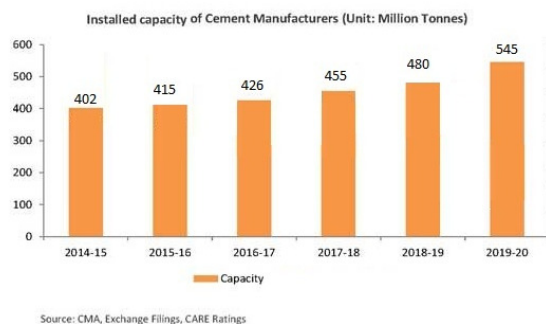
The technology adopted is with the State of Art technology using 6 stage double string Preheater with pre-calciner, third generation cooler, low NOX burner, high efficiency fans with highly efficient bag filters, a bag house will be used in place of gas conditioning tower for ESP to conserve water and avoid tripping due to CO.

Company has chosen the site located adjacent to the existing JSPL Raigarh Steel Plant, ensuring the availability of its major raw materials Slag, Fly ash in the proximity, availability of utility resources and infrastructure facilities, as per the guidelines of MOEFCC.

(iii) NEED FOR THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY AND OR REGION

Cement and steel are the most important support products for the development of infrastructure and are often referred to as belonging to core sector. Cement alone plays a vital role in the growth of society as also of nation, particularly the developing ones. It is basically a mixture of compounds, consisting mainly of silicates and aluminates of calcium, formed out of calcium oxide, silica, aluminium oxide and iron oxide. The demand for cement, being a derived one, depends primarily on the pace of activities in the business, financial, real estate, and infrastructure sectors of the economy. Cement is considered preferred building material and is used worldwide for all construction works such as housing and industrial construction, as well as for creation of infrastructures like ports, roads, power plants, etc. Thus, it is a significant contributor to the Government's revenue collection and a pillar of overall planned development of an economy.

In India, the foundation of a stable Indian cement industry was laid in 1914 when the Indian Cement Company Ltd. started manufacturing cement in Porbandar in Gujarat. In the initial stages, particularly during the period before independence, the growth of the sector had been very slow. The indigenous production of cement was not sufficient to meet the entire domestic demand and accordingly, the Government had to control its price and distribution statutorily. Also, the large quantities of cement had to be imported for meeting the deficit in the country. However, with liberalization and introduction of several policy reforms, the cement industry has been decontrolled which gave impetus to its pace of growth. It has made rapid strides both in capacity/ production and process technology terms



Today, it is one of the most advanced and pioneering sectors in the country. Cement is a basic material input which facilitates the promotional and developmental efforts, at a fast pace, in the areas of infrastructural set up and other construction related works. Since it is a decontrolled commodity, its production and prices are largely governed by economic factors, like, demand and supply, cost of raw materials and other inputs, production as well as distribution costs.

The Indian cement industry is extremely energy intensive and is the third largest user of coal in the country. It uses modern and latest technology, which is among the best in the world. Only a small segment of industry is using old technology based on wet and semi-dry process. Also, the industry has tremendous potential for development as limestone of excellent quality is found almost

throughout the country. In other words, it is experiencing a boom on account of overall growth of the Indian economy, economy in manufacturing and continuous up gradation in technology, etc. This has immensely helped it to conserve energy and fuel as well as to save material substantially.

The cement industry in India functioned on the price and distribution control system since year 1956. This system ensured fair price model for consumers as well as manufacturers. Later in 1977, government allowed new manufacturing units (as well as existing units going for capacity enhancement) to put a higher price tag for their products. A couple of years later; government introduced a three-tier pricing system with different pricing on cement produced in high, medium and low cost plants.

In spite of being the second largest cement producer in the world, India falls in the list of lowest per capita consumption of cement with 195 kg., this leaves a large opportunity for growth. The policy and regulatory framework is still applicable to the cement industry with ministry of mines regulates the mining sector and state owns the mineral sector whereby royalty is paid on the minerals used. Up to 100% FDI is allowed in mining sector, the route that facilitates entry in cement production of any magnitude.

Government of India has proposed new legislation and amended existing mines and minerals statutory regime. This is expected to open up country's regulatory environment by making it simple and transparent.

The important factors for setting up an industry are availability of raw materials and market of the finished products. Limestone is available from Chilhati mine, Tehsil: Masturi, district: Bilaspur, C.G. It is located 153 km from the proposed cement plant.

Moreover, in the Eastern region the demand and supply gap is very large as most of the demand of cement is met from supply from other parts of the country; the market is abundant in Eastern region.

(iv) DEMAND- SUPPLY GAP & IMPORTS VS. INDIGENOUS PRODUCTION

The geographical markets JPCPL plant can cater, include the followings:

1. Chhattisgarh (CG)

North CG comprising Sarguja, Surajpur, Balrampur, Jashpur, Koriya and Raigarh.

Central CG comprising Raipur, Balodabazar, Mahasamunda, Gariabandh, Damtari, Korba, Mungeli, Janjgir, Bilaspur, Durg, Balod, Bemetara, Kabirdham, and Rajnandgaon.

South CG comprising Kanker, Bastar, Kondagoan, Narayanpur, Dantewara, Bijapur and Sukma.

2. Bihar

North Bihar comprising Khagaria, Begusarai, Darbhanga, Madhubani, Muzaffarpur, Samastipur, Sitamarhi, Vaishali, Sheohar.

West Bihar comprising Aurangabad, Bhojpur, Buxar, Kaimur (Bhabua), Rohtas, Gopalganj, Pashchim Champaran, Purba Champaran, Saran and Siwan.

South Bihar comprising Jamui, Lakhisarai, Munger, Gaya, Nawada, Sheikhpura, Jehanabad, Nalanda and Patna.

3. Jharkhand (JHK)

North JHK comprising Bokaro, Deogarh, Dhanbad, Dumka, Giridih, Godda, Kodarma, Pakur, Sahibganj, Jamtara, Latehar and Hazaribagh.

South JHK comprising Latehar, Garhwa, Gumla, Lohardaga, Palamu, Pashchimi Singhbhum, Purbi Singhbhum, Ranchi, Khunti, Ramgarh, Seraikela and Simdega.

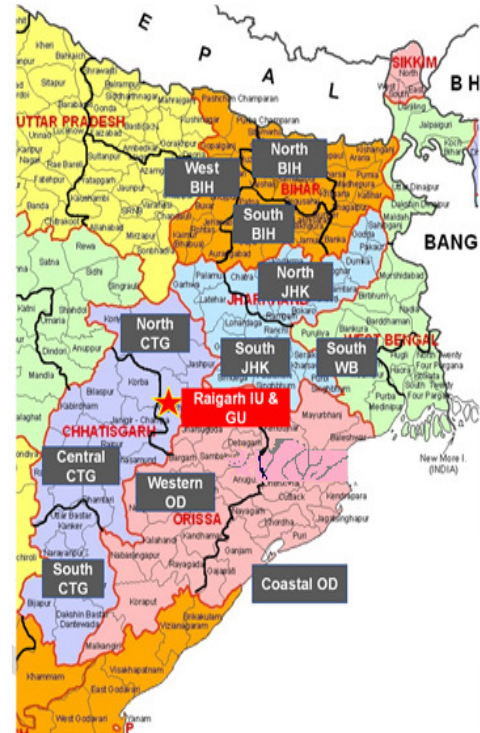
4. Odisha (OD)

Costal Odisha comprising Balasore (Baleswar), Bhadrak, Cuttak, Dhenkanal, Jajapur, Gajapati, Ganjam, Jagatsinghapur, Kendrapara, Kendujar, Khordha, Mayurbhanj, Nayagarh and Puri.

West Odisha comprising Angul, Balangir, Bargarh, Boudh, Debagarh, Jharsuguda, Kalanhandi, Kandhamal, Koraput, Malkangiri, Nabarangpur, Nuapada, Rayagada, Sambalpur, Subarnapur and Sundargarh.

5. West Bengal (WB)

Southern (WB) comprising Bankura, Birbhum, Burdwan, East, Midnapore, Murshidabad, Nadia, Purulia, and West Midnapore.



Target market of JPCPL

The estimated cement demand of the target market is given in below:

Market	Market Size (in MTPA)	% of target market
North Chhattisgarh	1.7	3%
Central Chhattisgarh	5.7	10%
South Chhattisgarh	0.8	1%

Market	Market Size (in MTPA)	% of target market
Coastal Odisha	8.7	16%
Western Odisha	5.4	10%
South WB	9.1	16%
North Bihar	4.6	8%
West Bihar	5.8	10%
South Bihar	5.7	10%
North Jharkhand	4.4	8%
South Jharkhand	4.0	7%
Total	55.8	100%

Cement demand of target market (FY 21 est.)

The estimated cement consumption in the markets of interest for FY21 is around 56 MTPA based on market information. Coastal Odisha and South West Bengal are the biggest markets with an estimated share of 16% each of the total target market.

Domestic demand plays a major role in the fast growth of cement industry in India. In fact the domestic demand of cement has surpassed the economic growth rate of India.

The estimated cement consumption in the markets of interest for FY21 is around 56 million tons based on our expected market area information. Coastal Odisha and South West Bengal are the biggest markets with an estimated share of 16% each of the total target market.

In the states of interest, UltraTech is the market leader with 24% share. Other main players in the market are Nuvoco, Dalmia, ACC, Ambuja and Shree. Top 5 players account for almost 75% of the market share. Other players in the market have a combined share of 25% with individual shares ranging from 2% to 7%.

As per ICRA, in FY22 the cement production in India is expected to increase by – 12% YoY, driven by rural housing demand and government's strong focus on infrastructure development.

As per Crisil ratings, the India cement industry is likely to add- 80 million tons (MT) capacity by FY24, highest since the last 10 years, driven by increasing spending on housing and infrastructure activities.

Higher allocation for infrastructure – 34.9% in roads, 8.7% in metros and 33.6% in railways in budget estimates of FY22, over FY21, is likely to boost demand for cement.

Market Prices

The cement consumption in the target market for FY 27 has been estimated as 91.3MTPA. This demand has been estimated on the basis of Cement Manufacturers Association (CMA) data. Supplies from mini cement plants have not been considered Prices in state are higher due to the presence of major consumption centres and relatively low supply intensity in this region.

Future Outlook

Cement Demand

The future growth rates for different markets in the target region are given in Table

Table - 2

Future growth rates for different markets

Market	Next5years
North Chhattisgarh	5%
Central Chhattisgarh	6%
South Chhattisgarh	4%
Coastal Odisha	9%
Western Odisha	9%
South WB	7%
North Bihar	9%
West Bihar	8%

SouthBihar	10%
North Jharkhand	7%
South Jharkhand	8%

Table - 3
Cement Demand Forecast

Sub-State	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
North Chhattisgarh	1.9	1.7	1.7	1.8	1.9	2.0	2.2	2.3
Central Chhattisgarh	6.6	5.7	6.0	6.4	6.8	7.2	7.7	8.2
South Chhattisgarh	0.9	0.8	0.8	0.8	0.9	0.9	1.0	1.0
Coastal Odisha	8.3	8.7	9.7	10.7	11.7	12.7	13.9	15.1
Western Odisha	5.2	5.4	6.1	6.7	7.3	7.9	8.6	9.4
South WB	8.9	9.1	9.9	10.7	11.5	12.3	13.1	14.0
North Bihar	4.4	4.6	5.1	5.6	6.1	6.7	7.3	8.0
West Bihar	5.6	5.8	6.4	7.0	7.6	8.3	9.0	9.9
South Bihar	5.4	5.7	6.3	7.0	7.7	8.5	9.4	10.4
North Jharkhand	4.2	4.4	4.8	5.2	5.5	5.8	6.2	6.6
South Jharkhand	3.8	4.0	4.4	4.8	5.2	5.6	6.0	6.5
Total	55.3	55.8	61.4	66.7	72.1	78.0	84.4	91.3

From a level of around 55 million Tons in FY 20, the cement demand in the target region is likely to reach around 91 million Tons in FY 27, indicating a CAGR of around 7% pa in the next 7 years.

Demand

The cement consumption of India based on the market information and HOLTEC estimates, for FY 21 is estimated to be around 315 MT. Its progression over the past is given in the table that follows. The compound annual growth rate (CAGR) during the last 10 years has been 4% pa. The consumption given in the following table is inclusive of the consumption of cement produced by mini cement plants.

Table-4
Past National Cement Consumption in the last 10 years

Year	Domestic Dispatches by large plants	Dispatches by mini cement plants	Total Domestic Cement Consumption	Growth year on year
FY11	215.8	6.0	221.8	6%
FY12	235.1	6.0	241.1	9%
FY13	248.1	6.0	254.1	5%
FY14	255.8	6.0	261.8	3%
FY15	270.1	6.0	276.1	5%
FY16	283.0	6.0	289.0	5%
FY17	290.2	6.0	296.2	2%
FY18	308.4	6.0	314.4	6%

FY19	347.0	6.0	353.0	12%
FY20	343.4	6.0	349.4	(1%)
FY21est.	308.5	6.0	314.5	(10%)

Demand Supply Gap

Effective capacity is estimated after making the following adjustments:

- Plants are estimated to work at an average capacity utilization 90%. This is based on the past performance of plants
- It is assumed that in the year of commissioning, a plant can supply only 50% of its installed capacity and it starts supplying 100% from next year onward.

Estimated future capacities are given in the table below:

Table-5
Estimated future capacities

Year	Effective Capacity in MTPA
FY 21 st.	469
FY 22	488
FY 23	510
FY 24	532
FY 25	547
FY 26	552

Figures in MTPA

Source: CMA data and Holtec Analysis

FY=Financial Year

Based on the projected demand (under most likely scenario) and supply figures worked out in previous sections, the most likely demand supply gap is shown in the following table:

Table: 6
Future Demand Supply Gap–Most Likely Scenario

Year Item	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26
Total Effective Capacity	469	488	510	532	547	552
Less Est. Exports (Cement Equivalent)	6	6	6	6	6	6
Domestic Supply	463	482	504	526	541	546
Domestic Demand	315	346	381	407	436	466
Surplus/ (Deficit)	148	136	123	119	105	80

Source: HOLTEC Analysis

A cement surplus situation is envisaged to continue in the short to medium term and this is likely to result in some plants working at lower capacity utilization depending upon their market strength/ competitiveness.

(v) **IMPORTS VS. INDIGENOUS PRODUCTION**

The proposed project will utilize locally available raw material from Jindal Group's steel vertical, Jindal Steel & Power Limited (JSPL) operates steel plants in the States of Chhattisgarh and Odisha, where Slag is generated as a by-product. The power vertical, Jindal Power Limited (JPL) operates coal-based power plants, where Fly ash is generated as a by-product. JPCPL envisions to use the by- product generated from M/s. JSPL and JPL, i.e., slag and fly ash in manufacturing of the cement.

(vi) **EXPORT POSSIBILITY**

The primary markets of interest for JPCPL are domestic covering mainly Chhattisgarh, Bihar, Jharkhand, Odisha and West Bengal. No cement export is envisaged. Cement produced in the state will be consumed domestically.

(vii) **DOMESTIC / EXPORT MARKETS**

Achievable Volumes and Market Shares

The plant is envisaged to be commissioned with clinker capacity of 2.5MTPA. Based on proposed product mix 50% PCC and 50% PSC, the cement capacity works out to be 2.5MTPA. Based on the CA analysis, the estimated achievable volumes and market shares of JPCPL is given in the following table:

Table: 7

Market	Market Size (FY 24)	Achievable Sales Volumes in (FY- 24)	Market Share
		Raigarh	
North CTG	1.9	0.15	8%
Central CTG	6.8	0.44	7%
South CTG	0.9	0.02	2%
Western OD	7.3	0.29	4%
North Bihar	6.1	0.04	1%
West Bihar	7.6	0.25	3%
South Bihar	7.7	0.21	3%
North JHK	5.5	0.22	4%
South JHK	5.2	0.19	4%
Total	49	1.80	4%

Table: 8

Achievable Volumes for JPCPL

Year	Achievable Volumes (MT)	Capacity Utilization
	Raigarh IU	Raigarh IU
FY 24	1.8	74%
FY 25	2	79%
FY 26	2.1	86%
FY 27	2.3	92%
FY 28 onwards	2.5	100%

JPCPL is estimated to sell 100% of its capacity from third year of its operations.

Net Realization

The average realization is given in the following table:

Table: 9

Figures in Rs. per bag

Particulars	Raigarh PCC & PSC
Retail Price	306
GST @ 28%	67
Margins	30
Freight	52

*PCC=Portland Composite Cement, PSC=Portland Slag Cement Source: Holtec Analysis

Overall Conclusion

The markets of interest for JPCPL are essentially Chhattisgarh, Bihar, Odisha, Jharkhand and South West Bengal. It is estimated that JPCPL would be able to sell its entire production from third year of operation.

(viii) EMPLOYMENT GENERATION (DIRECT AND INDIRECT) DUE TO THE PROJECT

JPCPL will give preference to the local people for the employment opportunities on the basis of their qualification, eligibility and requirement. Staff will be hired from outside only in case of unavailability of skilled labours/workers in the local / nearby area.

A summary of the manpower requirement for the proposed cement plant is as given below. \

Table: 10

Details of man power

Project Period	Manpower			Remarks
	General shift	Shifts	Total	
	(A)	(B)	(A + B)	
Implementation Period - Raigarh IU	80	-	80	Of the total estimated 80 manpower, 15 persons may be taken on contract
Operation Period - Raigarh IU	114	460	574	Of the total estimated 574 manpower, 239 persons may be taken on contract

Total no. of persons will be Approx.80 persons in implementation period from JPCPL& out of these 15 persons may be taken on contract.

In operation period the total no. of persons will be approx.574persons from JPCPL & out of these 239 persons may be taken on contract.

Table: 11

S. No	Manpower Category	No. of Manpower
1	Unskilled	264
2	Skilled	110
3	Semi- skilled	70
4	Highly skilled	40
5	Supervisory	55
6	Managerial	35
	Total	574

Apart from above, 3000 persons will be employed during construction period of the project. Project will also generate indirect employment.

3.0 PROJECT DESCRIPTION

(i) TYPE OF PROJECT INCLUDING INTERLINKED AND INDEPENDENT PROJECTS IF ANY

The proposed project is to set up a Greenfield Integrated Cement Plant having 2.5 MTPA clinker capacity, 2.5 MTPA cement making unit (grinding facility) and Waste Heat Recovery System (WHRS) of 12 MW.

This proposed project will be an interdependent project. Location of Cement plant is decided by the availability of limestone, major additives i.e. Slag, fly ash and support in terms of infrastructure factors like road, rail, water and power. Slag & fly ash is planned to be sourced the steel plant of JSPL at Raigarh and also from JPL for any shortfall of ash.

(ii) LOCATION (MAP SHOWING GENERAL LOCATION, SPECIFIC LOCATION, AND PROJECT BOUNDARY & PROJECT SITE LAYOUT) WITH COORDINATES

The proposed Integrated Cement Plant is located at Village: Kosampali, Barmuda, Dhanagar, Saraipali, Tehsil & District: Raigarh (Chhattisgarh). Location map is shown in **Figure - 1**. The map showing the project layout boundary, project components and facilities is shown in **Figure - 2** given below:

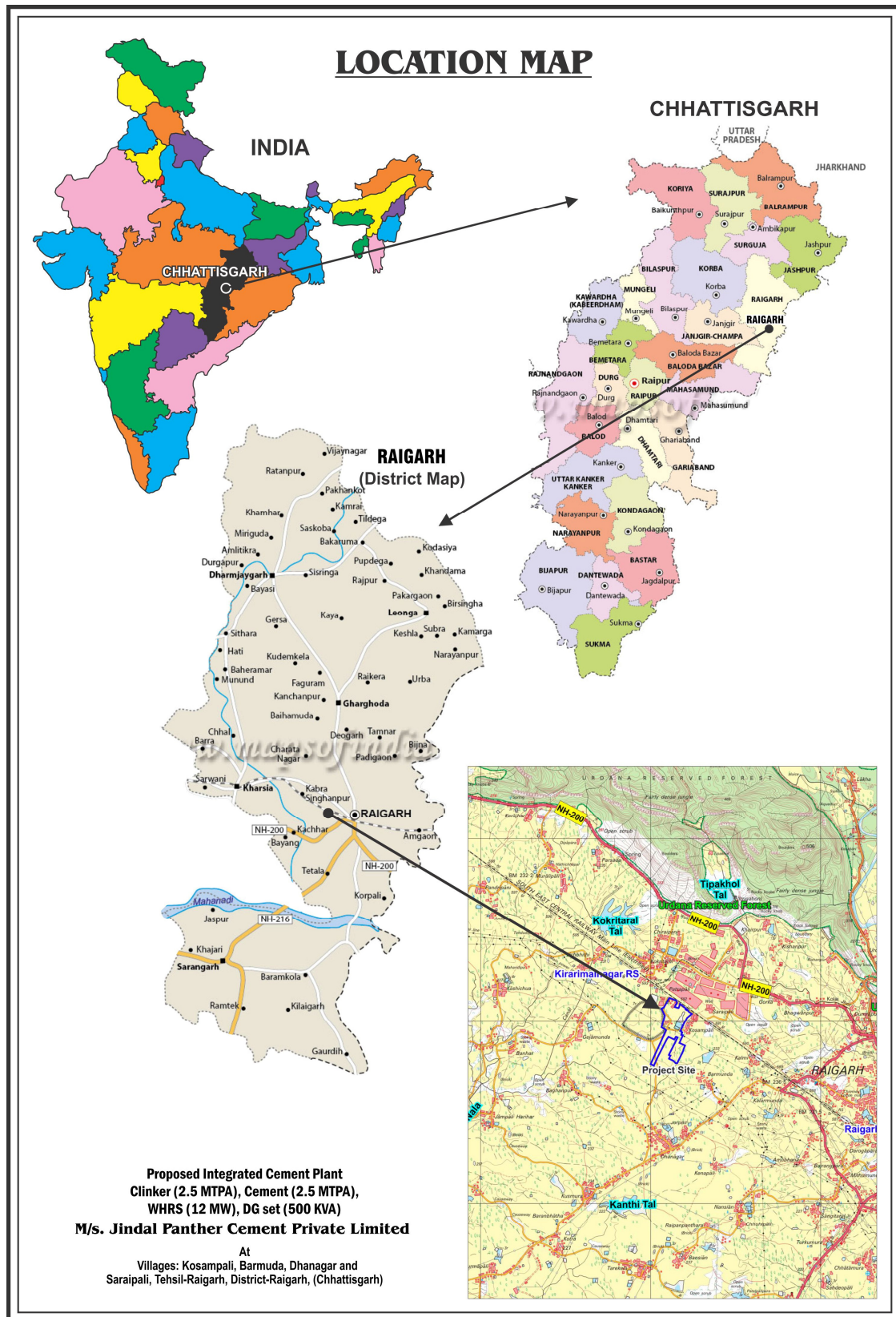


Fig. 1 Location map

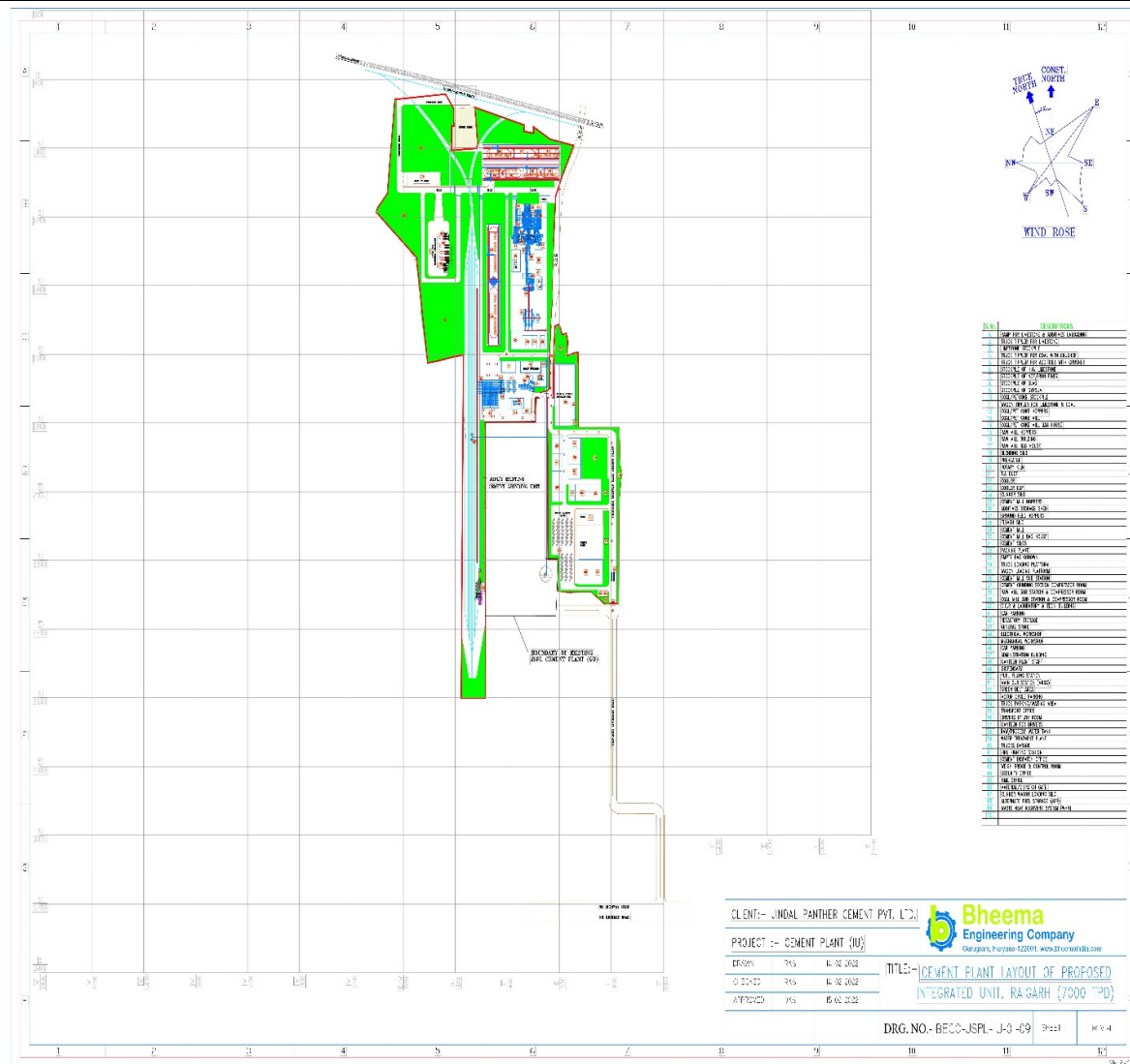


Fig. 2 Layout of project

(iii) Key Plan

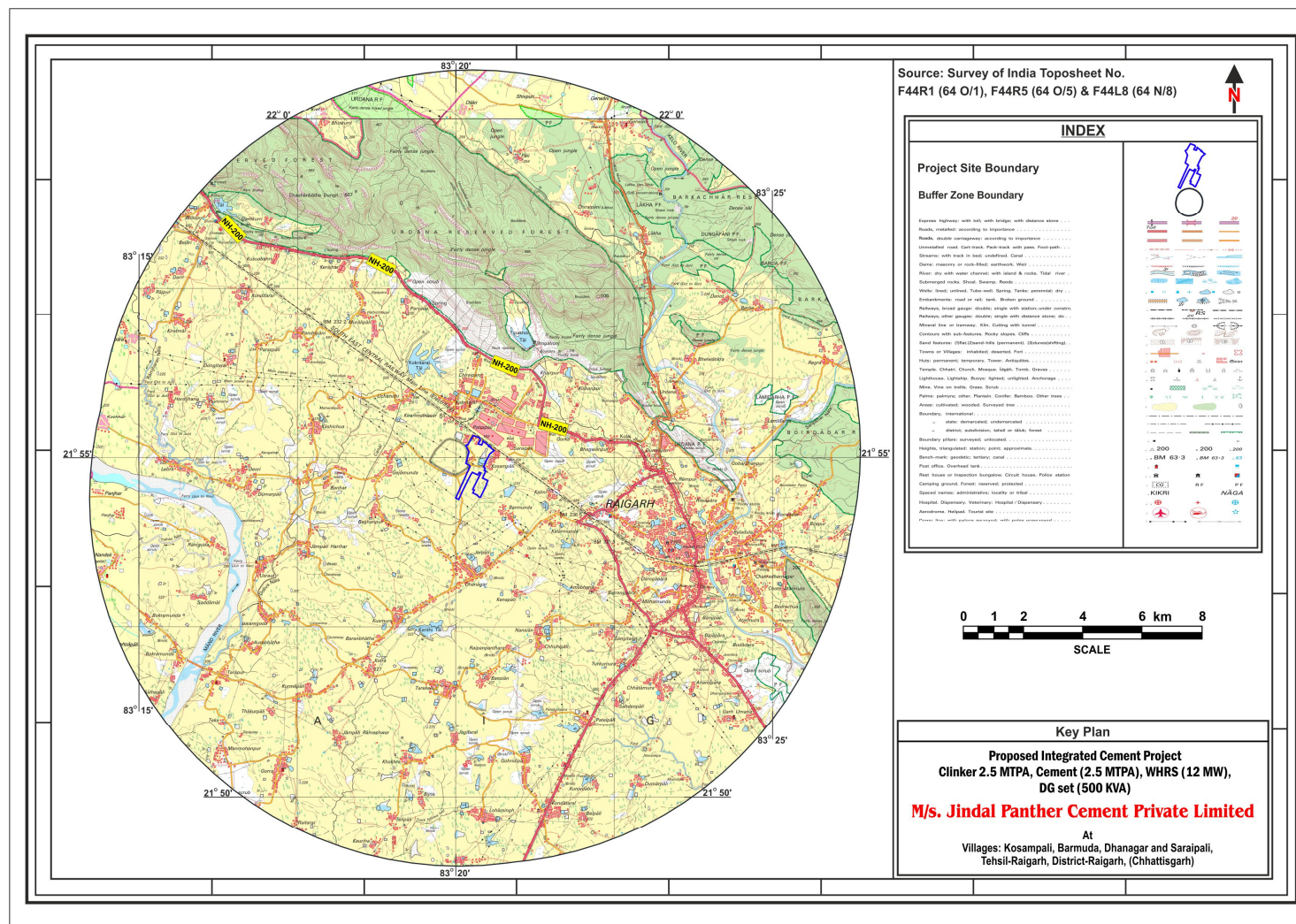


Fig.3 Key plan

(iv) **DETAILS OF ALTERNATIVE SITES CONSIDERATION AND BASIS OF SELECTING THE PROPOSED SITE, PARTICULARLY THE ENVIRONMENTAL CONSIDERATIONS GONE INTO SHOULD BE HIGHLIGHTED.**

The proposed integrated cement plant is to be located adjacent to the existing Integrated steel plant and Cement plant of M/s Jindal Steel & Power Ltd. (JSPL).

- Majority of land i.e. about 59 ha land out of total required land of 70 ha, is already acquired/ purchased by JSPL and the same will be transferred to JPCPL.
- JSPL has captive power plants and the power requirement for JPCPL will be met from JSPL at economical price.
- Slag and fly ash is available at steel plant of JSPL and this will enable JPCPL to avoid transportation of slag and ash from long distance.
- Existing water pipeline of JSPL is proposed to be used by JPCPL.
- Existing railway infrastructure of JSPL will be used for raw material and product transportation till the separate siding of JPCPL is established.

In view of the above, no alternate sites were explored.

(v) **SIZE OR MAGNITUDE OF OPERATION**

Jindal Panther Cement Pvt. Ltd. Integrated Cement Project: Clinker – 2.5 MTPA, Cement 2.5 MTPA, WHRS-12 MW with Railway Siding at Kosampali, Barmuda, Dhanagar, Saraipali, Tehsil & District: Raigarh (Chhattisgarh).

Screening Category: Category “A”.

Table - 12

Size of The Project

S. No.	Plant Capacity	Unit	Project
1.	Clinker	MPTA	2.5
2.	Cement	MPTA	2.5
3.	WHRS	MW	12
4.	DG Set	KVA	500

Days for Storages

The norms for storage capacity as derived, based on industry experience for similar plants are described below.

Table: 13

Department	Storage Days	Remarks
Limestone	3	Mill Days
Correctives	3	Mill Days
Raw meal	2	Kiln Days
Fuel (Indian Coal)	15	Kiln Days
Fuel (Imported Coal)/ Pet Coke	15	Kiln Days
Clinker	10	Kiln Days
Additive-1 : Gypsum	15	Mill Days

Additive-2 : Slag	2	Mill Days
Additive-3 : Fly ash	1	Mill Days
Cement	4	Mill Days

Sizing Norms for Main Machinery

Table: 14

S. No	Department	Operating			Design Safety Factor
		Hrs./Day	Days/Year	Hrs./Year	
1	Mines	10 (12)	300	3,000	1
2	Crushers	10 (12)	300	3,000	1.15
3	Pyro	24	330	7,920	1
4	Grinding mills	21	340	7140	1.15
5	Packing & dispatch	15	360	5,400	1.25

Size of Major Equipment's

Table: 15

Operation	Equipment/ Storage	Unit	Envisaged Capacity & Configuration
Raw Material Preparation	Limestone crusher	tph	1 x 1000
	Limestone storage	t	2 x 35,000
	Limestone (High grade) storage	t	1 x 10000
	Slag/ NOF/ Iron fines storage	t	1 x 5000
	Raw mill	tph	1 x 250
	Raw meal storage	t	1 x 20,000
Pyro Processing	Rotary kiln	tpd	1 x 7,500
	Clinker cooler	tpd	1 x 7,500
	Clinker storage	t	1 x 60000
	Coal & Gypsum crusher	tph	1 x 300
	Solid fuel (Indigenous Coal)	t	1 x 15000
	Solid fuel (Imported Coal)/ Pet coke	t	1 x 15000
	Coal mill	tph	1 x 60
Clinker Grinding	Gypsum storage	t	1 x 5,000
	Fly ash storage	t	1 x 3000
	Slag Storage	t	1 x 10000
	Cement grinding	tph	1*350
	Cement Storage	t	4 x 7,500
kin g & Dis pat	Packers	tph	6 x 240

Table - 16

Magnitude of Operation in Terms of Cost

S. No.	Particular	Details
1.	Total Cost of the Project	Rs. 2119 Crores
2.	Cost for Environmental Protection Measures	Approximately Rs 100 crores <ul style="list-style-type: none"> Capital Cost: 100 crores Recurring Cost: 5 crores

Activities for the Proposed Project

The major facilities and associated activities of proposed project are as given below:

Table - 17

Scope of Proposed Project

S. No.	Unit	Major facilities and associated activities proposed
1.	Cement Plant	<ul style="list-style-type: none"> Limestone stacker and Reclaimer Crushing, Stacking & Reclaiming of Coal and Use of Alternate Fuels Raw Mill / Kiln Feed Preparation Clinkerization Cement Grinding & Storage Heat Recovery system Alternate Fuel
2.	WHRS	Waste Heat Recovery Boilers with Pre-heater and Clinker Cooler
3.	D.G. Set	Diesel Generator with storage of fuel
4.	Others	<ul style="list-style-type: none"> Railway Siding Residential Colony for employees Sewage Treatment Plant, Effluent Treatment Plant

(vi) **PROJECT DESCRIPTION WITH PROCESS DETAILS (A SCHEMATIC DIAGRAM/ FLOW CHART SHOWING THE PROJECT LAYOUT, COMPONENTS OF THE PROJECT ETC. SHOULD BE GIVEN)**

Selection of Process

Dry process of cement manufacturing offers more advantages, particularly in fuel consumption and is the most rational and logical choice. The proposed plant will adopt dry process to manufacture Portland Composite Cement, Portland Slag cement, Portland Pozzolana Cement (PPC) using rotary kiln, pre-heater and pre-caliner.

Dry process Principle

In the dry process, the raw materials are dried in a combined drying-cum-grinding installation to reduce the moisture content to below 1%. The drying in the grinding unit is achieved by using kiln exhaust gases for normal moisture and is supplemented by auxiliary hot air furnace for rainy season etc. for high moisture. The ground raw mix is then homogenized in silos and fed into the rotary kiln. Heat required for evaporation of added moisture is eliminated in this process. The latest

technological innovation is to replace the conventional suspension pre-heater by well-designed suspension pre-heater having high efficiency, low pressure drop cyclone and pre-calcinator.

Suspension pre-heater achieves better heat economy and therefore, fuel consumption in this process is low. This process is environmental friendly and reduces consumption of natural resources

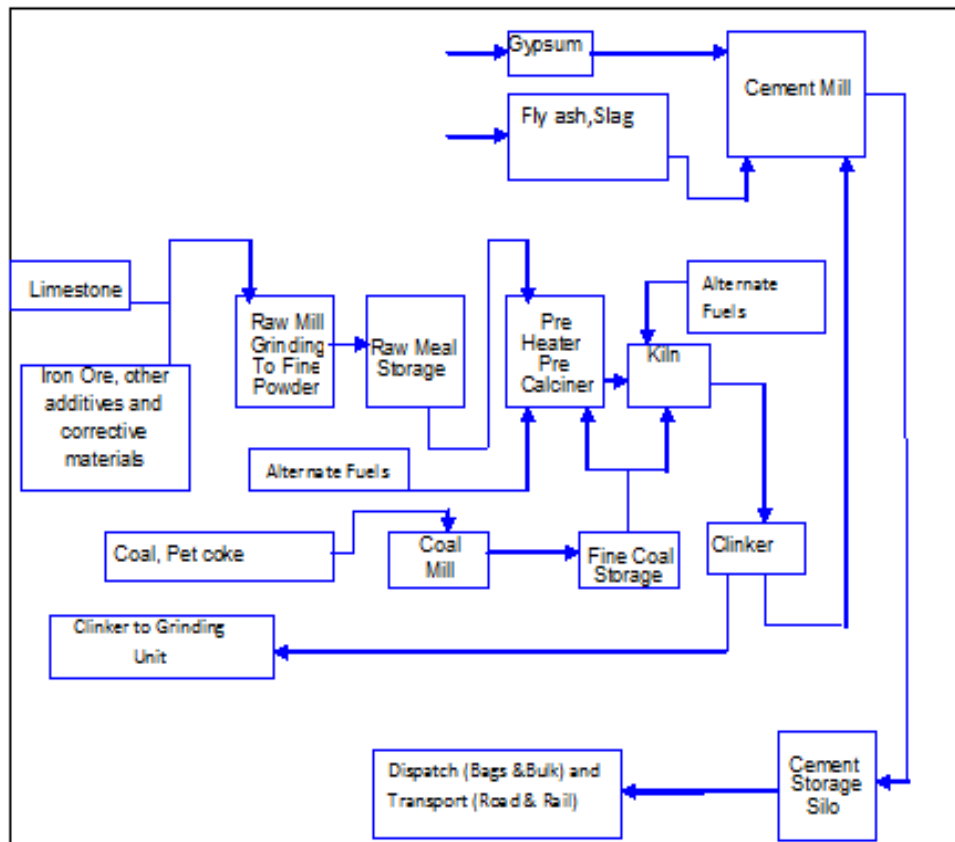


Fig. 4 Process Flow Sheet of Cement Plant

The major steps involved in cement manufacturing are as follows:

A. Crushing Stacking & Reclaiming of Limestone

The Limestone Crushers will crush the limestone and discharge the material onto a belt conveyor which takes it to the stacker. The material will be stacked in stockpiles. Limestone will be extracted transversely from the stockpiles by the reclaimers and conveyed to the Raw Mill hoppers for grinding of raw meal. Other additives and corrective materials will also be mixed during grinding of limestone in raw mill in appropriate proportion for desired quality of clinker.

B. Crushing, Stacking & Reclaiming of Coal and Use of Alternate Fuels

The process of making clinker requires heat. Coal/pet coke/ alternate fuel will be used as the fuel for providing heat. Raw Coal/ pet coke received from the supply industry will be stored in coal yard and conveyed to coal mill for grinding and finally stored in fine coal bins before used in pyro processing.

C. Raw Mill / Kiln Feed Preparation

Reclaimed limestone along with additives and corrective material will be fed to the raw mill for grinding and product is called raw meal. The hot gases generated from the clinkerization process will be used in raw mill for drying and for generating power. Raw meal will be finally stored and homogenized in silo. Extracted raw meal from silo is called kiln feed which will be fed to the top of multistage preheater for pyro processing.

D. Clinkerization

Clinker will be made by pyro processing of Kiln feed in the preheater and the rotary kiln. Fine coal / pet coke & alternative fuel will be fired to provide the necessary heat in the kiln and the pre-calciner located at the bottom of the preheater. Hot clinker discharged from the Kiln will drop on the grate cooler and will get cooled. The cooler will discharge the clinker onto the pan / bucket conveyor, and it will be transported to the clinker silo. The clinker will be taken from the silo to the Cement mill hoppers for cement grinding.

E. Cement Grinding & Storage

Clinker and Gypsum, fly ash and slag components according to requirement will be extracted from their respective hoppers and fed to the Cement Mill. Cement Mill grind the feed to a fine powder and the mill discharge will be fed to an elevator, which will take the material to a separator, which separates fine product and the coarse product. The Cement, so provided will be transported to RCC Cement Silos for dispatch.

F. Heat Recovery system

Waste heat gases from Preheater and cooler will be fed to Boilers to generate low pressure steam subsequently fed to turbine to generate power.

G. Alternate Fuel

Industrial waste / Municipal waste will be collected in covered shed. It will be processed and fed to Kiln / calciner. This will help in reducing CO₂ emissions and fuel consumption.

Plant Layout

The features of the layout are as follows:

- Process plants will be consolidated into comprehensive production unit requiring short conveying distances and lengths of gas ducts.
- Sufficient space will be provided for ease of operation and maintenance.
- The lengths of power cables will be minimized by suitably locating load distribution centres in respect of process departments.
- Outward movements of materials from customers/suppliers will be segregated from internal plant traffic; and
- Safety requirements will be kept in mind while locating the workshops and vehicular movement inside the plant.

Railway Siding:

Kiromalnagar Railway station has been selected for take-off of a Railway siding on North Western Railway for the Proposed Cement Plant where facility is proposed to be developed

to handle Cement, Clinker, Coal & other Raw materials.

A 1 km in length railway siding with installation of wagon tippler for unloading of raw material and automated packer system for loading of cement bags and clinker for rack and locomotive workshops building, weigh bridge will be developed by the company.

Residential colony:

Colony provision is not considered. However Essential staff and workmen of the plant shall be accommodated in the existing colony of JSPL on mutual agreement basis. The colony has essential amenities like banking, health and education facilities.

D G set:

A 500 KVA DG set has been envisaged for black start of the plant and/or to meet any insurgencies in the power demand during construction period and operation period.

Waste Heat Recovery Boiler

12 MW Waste Heat Recovery Power Plant will be installed by utilizing the Waste Hot Gases from the Pre-heater and Cooler. This power will be used for captive consumption.

FLOW CHART OF THE WHRS

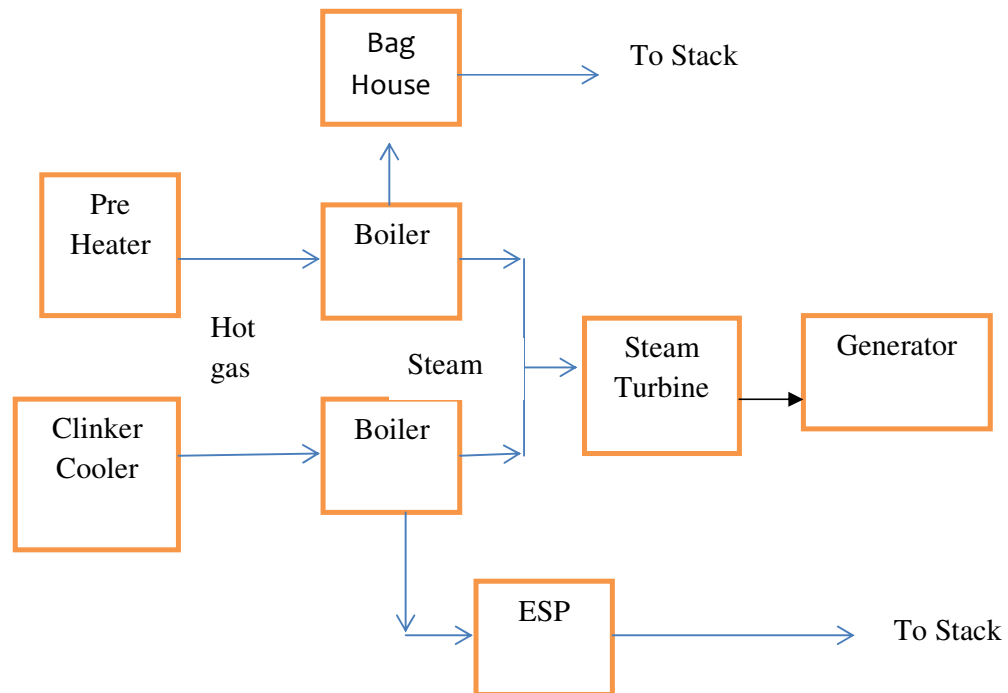


Fig. 5: Flow Chart of WHRS

Pollution Control Measures:

The planning of a new cement plant demands an increased attention to the environmental implications covering the dust emission, noise level, water & air contamination as well as the reclamation of exploited raw material deposits.

The stringent environmental regulations of Indian cement industry shall be followed.

The equipment for the new project shall be 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 30 mg/Nm³ dust on dry basis. A common high temperature resistant reverse air bag house/Jet Pulse Bag Filter is envisaged for raw mill and kiln gases. All covered sheds/Silos shall be provided for Raw materials and Finished Products.

Pollution Control Equipment

Table: 18

Section	Stack height in mtr	Stack dia. in mtr	Gas temp in degree	Control equipment	TPM (mg/Nm ³)
Raw Mill/Kiln	150	5	100-120	Bag filter	30
Clinker Cooler	40	6.5/5.0	90-100	ESP	30
Coal Mill	30	2	50-60	Bag filter	30
Cement Mill Ventilator	30	1	60-70	Bag filter	30
Packing Plant	40	1	50-60	Bag filter	30

(vii) RAW MATERIAL REQUIRED ALONG WITH ESTIMATED QUANTITY, LIKELY SOURCE, MARKETING AREA OF FINAL PRODUCTS, MODE OF TRANSPORT OF RAW MATERIAL AND FINISHED PRODUCT.

Raw material requirement, estimated quantity, source, mode of transport of raw material are as follows:

Table – 19

Details of Raw Material Requirement along with Source and Mode of Transport

S no	Material	Consumed in MTPA	Source Category	Source Locality	Distance from plant (KM)	Remarks
1	Limestone	2.55	Captive Concession	Godadih	153	Crushed limestone shall be stacked & stockpiled near mines, and then transported by road to the captive railway siding located at Jairamnagar, and thereafter by rail upto Raigarh IU. In case of any shortage of rakes, some crushed LS will be transported through high-capacity tippers to IU
2	HG/LG limestone	1.13		Mahal No.2 Tehsil Masturi, District Bilaspur	153	
3	Iron ore/NOF	0.075	JSPL Raigarh	JSPL Raigarh	< 1	Will be transported through tippers.
4	Slag	1	By-product of JSPL Steel plant	JSPL Raigarh steel plant	< 1	Will be transported through tippers.
5	Gypsum (Chemical & imported)	0.075	Purchase	Coromandel Fertilizers, Visakhapatna	630	Coromandal fertilizers/ Imported from middle east. Envisaged to be transported by rail to the

	natural)			m OR Imported from Middle East		respective plant sites
6	Fly ash	0.375	By-product of JSPL Power plant	JSPL Raigarh Power plant	< 1	Will be transported through bulklers.
7	Indian Coal/ Imported Coal	0.463/0.32 4	Purchase	Korba coal fields	120	Indigenous coal is envisaged to be sourced from Korba coal fields, and shall be transported by high capacity trucks to respective plant sites. Imported coal shall be received at Paradip port and shall be transported by rail to proposed Raigarh IU site.
8	Pet coke	0.241	Purchase	Indian petroleum industry	Import/Indian	Pet coke will be sources from India/abroad petroleum industry depending upon economic viability.

HSD Quantity

HSD shall be used in DG sets for emergency power supply in case of power failure and 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 48 KL /year and the Emergency Power will be 3 Liter/hour.

Construction Material:

The total concrete quantities have estimated 100000 cubic meters. The required material with quantity for constructions of the proposed project are given below:

Table: 20

Particulars	Source	Quantity
ToR Steel	Authorized supplier	15000 MT
Structural Steel	Authorized Supplier	10000 MT
Cement	Authorized Supplier	40,000 MT
Stone	Authorized supplier	60000 MT
Sand	Authorized supplier	40000 MT
Bricks	Authorized supplier	20,00,000 no.

(viii) **RESOURCES OPTIMIZATION/ RECYCLING AND REUSE ENVISAGED IN THE PROJECT, IF ANY, SHOULD BE BRIEFLY OUTLINED.**

- Dust collected from various pollution control equipment like Bag house & Bag filters will be recycled into the process.

- Sewage Sludge (~10 MT/annum) will be used as manure in greenbelt.
- Domestic wastewater (about 84 KLD) generated from plant & colony will be treated in STP (Cap.: 90 KLD) & treated water will be reused for cooling & GB development.
- Boiler Blow down (17.28KLD) generated from plant will be treated in ETP (20 KLD) and treated water will be used for Dust suppression/Green belt development.

(ix) AVAILABILITY OF WATER IT'S SOURCE, ENERGY /POWER REQUIREMENT AND SOURCE SHOULD BE GIVEN.

Water Requirement:

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 suppression in the RM yard, Potable use (for factory no colony is envisaged), Horticulture and afforestation.
4. The water requirement of Cement Plant will be about 1000 KLD. Water is planned to be sourced from Mahanadi river. Measures will be taken to minimize the water consumption by carefully selecting the process equipment. Rainwater harvesting measures shall also be taken up.

Table -21

Water Break up

S. No.	Heads	Water Consumption in KLD
1.	Raw Mill	120
2.	Kiln & Cooler	252
3.	Cement Mill	240
4.	Compressor	150
5.	Lab	20
6.	Factory sanitation & potable water	90
7.	WHRs	86
8.	Misc.	42
	Total	1000

Power Requirement and Source

The power requirement for the proposed cement plant will be 35 MVA. This is planned to be purchased from existing power plant of JSPL Raigarh.

(x) QUANTITY OF WASTE TO BE GENERATED (LIQUID AND SOLID) AND SCHEME FOR THEIR MANAGEMENT/DISPOSAL

- Dust collected from various pollution control equipment like Bag house & Bag filters will be recycled into the process.
- Sewage Sludge (~10 MT/annum) will be used as manure in greenbelt.
- Domestic wastewater (about 84 KLD) generated from plant & colony will be treated in STP

(Cap.: 90 KLD) & treated water will be reused for cooling & GB development.

- Boiler Blow down (17.28KLD) generated from plant will be treated in ETP (20 KLD) and treated water will be used for Dust suppression/Green belt development.
- Details of other waste generation with management are given below:

Table 22

Description	Expected Annual Qty	Unit of Measurement	Management proactive to be adopted
Used Oil	2	KL	Sold to authorized recyclers
Used Grease	500	KG	
Lead Acid batteries	100	Number	Exchanged with OEMs
Metal Scrap	10	MT	Recycled through PCB approved Agencies
Rubber Belt Scrap	100	Mtr	Consumed in Kiln
Transformer Oil	2	KL	Giving to PCB approved Agencies
STP Sludge	10	MT	Used as Manure and used for Plantation

4.0 SITE ANALYSIS

(i) CONNECTIVITY

- ❖ The project site is well connected to SH - 16 by a stretch of about 300 m.
- ❖ The nearest railway station is the Kirorimal Nagar Railway Station (~1.0 km in NW direction), Raigarh Railway Station (5.5 km in SE direction) and Bhupdeopur Railway Station (10 km in NW direction).
- ❖ The nearest airport is Jharsuguda Airport (~98 km).
- ❖ The site is well connected with communication facilities like telephone, fax, wireless and telex and as such, no constraints are envisaged in this aspect as the Taluka and District headquarters are near to the site.

(ii) LAND FROM LAND USE AND LAND OWNERSHIP

The project is proposed to be established adjacent to the existing integrated Steel plant which is well connected with road, rail and air. This Plant is proposed in villages at Kosampali, Barmuda, Dhanagar, Saraipali, Tehsil & District: Raigarh (Chhattisgarh).

Total project area is 69.561 ha (171.88 acres) out of which 58.772 ha land has been acquired/ purchased by Jindal Steel & Power Ltd. (JSPL). The land was acquired/ purchased by JSPL for setting up its Cement plant and clinker unit, however JSPL optimised the land and only established 1 MTPA cement grinding unit. The same will be transferred to JPCPL. Out of the remaining land i.e. 10.789 ha required for the proposed project, 6.744 is Government land, 1.174 ha is Forest land and 2.871 is private land.

LAND OWNERSHIP DETAILS:

Table: 23

Land Category	Land acquired/ purchased by JSPL to be transferred to JPCPL (in Ha)	Land to be acquired/ purchased (in Ha)	Total (in Ha)
Forest land	-	1.174	1.174
Govt. land	27.956	6.744	34.7
Private land	30.816	2.871	33.687
Total	58.772	10.789	69.561

The proposed land use breakup of the project area is given below.

Table 24

Plant Area breakup

S. No.	Unit	Area (ha.)
1.	Clinkerization Plant	13.15
2.	Grinding Unit	6.48
3.	Greenbelt / Plantation	22.95
4.	Roads & parking	6.71
5.	Raw material yard	7.99
6.	Railway Siding	7.70
7.	WHRS	0.81
8.	Others, if any	3.77
	Total	69.56

(iii) Topography (Plant area topography shall be included)

The topographic features may be seen from Survey of India OSM Toposheet no. F 44 R1 (64 O/1), F44R5 (64 O/5) & F44 L8 (64 N/8). The topographic map is shown in Fig. 3. The terrain in the area proposed for plant site is generally flat and believed to have firm strata. The plant area shall require nominal to moderate grading and levelling work for the structures and buildings as well as for the infrastructural elements like roads, drain, etc. The land is plain with dendritic seasonal rainwater channels. Land is sloping towards eastern side where Kelo River lies at a distance of about 6 km. The topography, drainage and surrounding features such as features, habitation, roads, rail etc.

(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, WILDLIFE 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

Table: 25

Environmental Settings of the Area

S. No.	Particulars	Details (with approximate aerial distance & direction from the nearest boundary of project site)
1.	Nearest Village	Village Kosampalli (~50 m in East direction)
2.	Nearest Town & City	Raigarh (~5.5 km in SE direction)
3.	National Highway / State Highway	<ul style="list-style-type: none"> ➤ NH-200 (~ 1 km in NW direction) ➤ NH - 49 (~2 km in direction) ➤ SH-16 (~1.0 km in South direction)
	Other Roads	Village roads
4.	Nearest Railway station	<ul style="list-style-type: none"> ➤ Kirarimal nagar Railway Station (1 km in NW direction) ➤ Raigarh Railway Station (5.5km in SE direction) ➤ Bhupdeopur Railway Station (10 km in NW direction)
5.	Nearest Airport	Jharsuguda Airport (~75 km in East direction)
6.	National Parks, Wildlife Sanctuaries, Biosphere Reserves, (PF) etc. within 10 km radius.	No National Park, Wildlife Sanctuary, Biosphere Reserve falls within the 10 km radius study area.
7.	Reserve Forest (RF) / Protected Forest (PF) etc. within 10 km radius.	<ul style="list-style-type: none"> ➤ Boidadar RF (~7.5 km in ENE direction) ➤ Gajmar RF (~8 km in ESE direction) ➤ PF (~8.5 km in ESE direction) ➤ Lamhidarha PF (~7.5 km in ENE direction) ➤ PF (~6 km in NE direction) ➤ Urdana RF (~5 km in ENE direction) ➤ PF (~8.5 km in NNE direction) ➤ Lakha PF (~7.5 km in NNE direction) ➤ Barkachhar RF (~8.5 km in NNE direction) ➤ Dungapani PF (~8 km in NE direction) ➤ PF (~7 km in NE direction) ➤ Barlia PF (~9 km in NE direction)
8.	Water Bodies within 10 km radius study area	<ul style="list-style-type: none"> ➤ Kelo River (12.0 km in NE Direction) ➤ Mond River (6 km in WSW direction) ➤ Kanthi Tal (~3.5 Km in SSW direction) ➤ Tipakhol Tal (~2.5 in NNE direction) ➤ Kokritaral Tal (~2 Km in NW direction) ➤ Ramjharan Nala (~7 Km in West direction) ➤ Pathari Nala (~6.5 km in WSW direction) ➤ Doliva Nala (~4.5 km in WSW direction) ➤ Sanapkhar Nala (~6.5 km in ENE direction)

S. No.	Particulars	Details (with approximate aerial distance & direction from the nearest boundary of project site)
9.	Seismic Zone	Zone - III [as per IS 1893 (Part-I): 2002]

(v) EXISTING INFRASTRUCTURE

Project site

The Project shall be set up adjacent to the JSPL Integrated Steel Plant and Cement Grinding Unit.

15 km radius study area

As per Secondary Sources (i.e. Bhuvan), there are 15 Schools, 11 Hospitals & Health Care Facilities, 08 temple, 15 playground/garden, 09 Banks are available within 15 km radius study area.

(vi) SOIL CLASSIFICATION

The major soils in the district are (1) Alfisols (Red gravelly/sandy), (2) Ultisols (Red & Yellow lateritic) and (3) Inceptions (Shallow black). The soils of the district have a large aerial variation. The red colored residual soils are derived from the lateralization of shale and sandstones and the areas covered by such type of soil are known as “Bhata”. The black coloured soils are locally known as “Kanhra” and pale yellow sandy loamy soils are locally known as “Matasi” and “Dorsa”.

(vii) CLIMATIC DATA FROM SECONDARY SOURCES

The area experiences dry climate during summer and temperature rises to about 45 to 47°C at during summer spread over from March - June. The winters are moderately cool and during December-January, the temperature drop down to 8°C. The rainy season extends from July to September with mean average annual rainfall of 1200 mm approx.

Temperature

The area has generally hot climate. In summers the maximum temperature ranges between 25° C to 47°C and in the winter from 8°C to 15°C.

Rainfall

The average annual rainfall of this area is about 1200 mm approx.

Relative Humidity

The annual relative humidity varies between 30 to 90%.

Seismology

The proposed site area falls in cusp region between Seismic Zones II & III. For the purpose of plant design, the plant shall be designed considering Seismic Zone III for which the zone factor is 0.16 [as per the latest version of IS 1893 (Part I)]. This aspect shall be duly considered and taken care of while designing the structures.

(viii) SOCIAL INFRASTRUCTURE AVAILABLE

Primary schools are situated in almost all villages while medical facilities are also available. Nearest town is Raigarh city which is almost 5 km away from the proposed site of the plant.

Summary of Raigarh District, Chhattisgarh

Population Growth Rate

The change of 18.05 percent in the population of the district is recorded when compared to population as reported in the previous census of India in 2001.

Density 2011

The total area of Raigarh district is 7,086 square kilometres. The density of Raigarh district for 2011 is 142 people per sq. km. In 2001, the density was 120 people per sq. km.

Literacy Rate 2011

Average literacy rate of Raigarh in 2011 was 70.89% for Rural and 87.22% for Urban.

Sex Ratio 2011

As regards the Sex ratio in Raigarh, it stood at 985 female members per 1000 male members. The average national sex ratio in India is 940 as per latest reports of Census 2011.

Child Population 2011

The total child population of 0-6 years age group was 195069.

Urban Population 2011

As per provisional reports of Census India, population of Raigarh in 2011 is 137,126; of which male and female are 70,197 and 66,929 respectively. Although Raigarh city has population of 137,126; its urban / metropolitan population is 150,019 of which 76,865 are males and 73,154 are females.

Rural Population 2011

As per 2011 census, 83.51 % population of Raigarh districts lives in rural areas of villages.

Description	2011	2001
Population	14.94 Lakhs	12.66 Lakhs
Actual Population	1,493,984	1,265,529
Male	750,278	634,597
Female	743,706	630,932
Population Growth	18.05%	18.72%

Status of Infrastructural Facilities

Roads and Type

The project site is supported by good roads and the Government has adopted the policy to connect all the villages with more than 5000 inhabitants to the main roads. The general status of the roads is good however internal road connectivity within village needs to be improved for all weather in core as well as buffer zone villages.

Transport System:

It was found that different means of transportation have been used by the villagers to access these destination points Mandi Samities, Warehouses, local market sites and District head quarter or city or town. In project area most commonly used means of transportation has been changed from bullock cart to tractors and trolleys, four wheelers, motor cycles and bicycles to access the various places of interest.

The proponent will, however, develop their own transport system to meet variety of requirements.

Markets

Raigarh district is governed under nine number of Tehsils and nine blocks, having marketing facilities with access and communication network for transport. These market places have enough facilities for sale/purchase of both food and the articles of daily use. Besides there are agriculture produce marketing samities which are accessible to the community of project area.

These are used for the sale of agricultural produce. Besides these, a substantial number of shops/outlets for the supply of the agricultural inputs like seeds, fertilizers and pesticides to the farmers to meet their requirements are already in operation around the project area.

Present marketing infrastructure is approachable due to availability of good road network, but still marginal and small farmers, landless laborers and other resource poor are not able to take the advantage of the marketing facilities to improve their incomes. Hence there is a need to connect effective market linkages by promoting group marketing practices or by developing easily accessible market facilities near the project area.

Storage

As the project area grows a substantial quantum of agricultural crops, storage facilities and temporary godowns either at home or at farms are used by the cultivators for the current produce. These are the temporary storage structures and always have a threat of natural calamities. It is perceived that modern storage facilities need to be developed looking to the market and visualizing the rise in incoming produce for marketing and storage.

Cooperatives and Self-help Groups

Various types of cooperative societies dealing with production in agriculture, agro-based industries, and seed production are available in the area. Apart from this village based cooperatives, a few number of self-help groups (SHG) are formed under different schemes in the project area. These groups are practicing thrift and credits at primary level. However it is realized that they need to be integrated with income generation activities in big way by strengthening them and building their capabilities.

Communication System and Networks

Postal Services

Postal services are the important mode of communication in rural areas. Nearest post office is located in village Kosampali, about 3 km from the proposed site. All the villages under study are covered by postal services.

Information and Communication Facilities:

During recent times, the means and modes of communication have changed drastically. In the project area modern means of communication (mobiles, internet etc.) are available and have apparently taken over from the traditional means of communication (telegraph, land lines etc.).

Village Economy and Service Providers:

A complex system of village economy is prevalent in the project area. This is based on land, water, cattle and vegetative resources. The efforts should be made towards their healthy development and conjunctive use, in such a way that the entire environment of the village gets enriched while ensuring management of capabilities of other mutually supporting sub-systems at sufficiently high levels.

There are different departments functional in the project area viz. Agriculture, Horticulture, Animal Husbandry, Fisheries, Watershed and Cooperatives etc. An integrated approach is needed to boost their competencies in managing and developing communities.

Livelihood Support Structure:

The marketing system is not perfect due to many reasons such as, poverty and other socio-economic conditions of the community. As a result, the produce in the village is either consumed or only finds the local market for trade. The marketing infrastructure is ill equipped which leaves the community in disadvantage and finally in commercial loss. Thus, there is need to improve and strengthen the marketing system so that a remunerative price is ensured for the agricultural produce, animal produce and produce of other subsidiary income generating activities. In the villages where the different types of infrastructural facilities are not available, villagers need to travel to certain distances to have access to these facilities.

Agro Based Industries:

The development of any industry is dependent on the availability of inputs, power, connectivity and market in the area. For studying the development of agro-based industries, data regarding the establishment of agro-based industries in the vicinity of project has been collected and studied from the discussions with farmers it is gathered that small scale or cottage industries are scattered and scanty and carried on by different castes at their homes and own risks for their own benefits. The members involved are mostly their own family members or sometimes hired labour. The capital investment in such business is usually very meagre specific to tools purchase and raw material. Use of machine power is very limited and they depend mostly on manual operations. The sale of product is also confined to local market and adjoining villages.

Subsidiary enterprises like fisheries, dairy, poultry, goat rearing, etc. is not picking up in the area. There exists a vast scope for fruit and vegetable cultivation owing to availability of water. Promotion of these activities in the area is considered crucial for improving the health of agro-based industries. There is potential for development of few industries in the project area e.g.

processing units for cereal & pulses, dairy, poultry, goat rearing, fisheries, fruits and vegetable preservation units, flour grinding, bakeries, carpentry, etc.

Fuel Energy:

Use of traditional sources of energy e.g. cooking coal, kerosene, cow dung cake, fuel wood etc. continues to be the major sources of energy for rural families in the project area. Data collected from the respondents clearly indicates the extensive use of cow dung cake, fire wood and Kerosene for fuel. Use of electricity and LPG in the study area was also noted. This trend is

picking up in the area. There are no users of biogas, electricity and solar energy for cooking purpose.

Community Centres:

With the advent of panchayat raj system, almost all the panchayat are having suitable places for interaction in the community for various purposes. In most of the villages, though there are no distinctly designated community centers but arrangements are temporarily made in existing public buildings and places as per the requirement.

Sports:

No adequate sports facility is available in the villages. In most of the villages it has been found that sports facilities are not on priority of the community. Children play games like cricket, football etc anywhere in open fields. School grounds, wherever available, are mostly used by the village children for various sports. These activities are the means of entertainment for them. It is felt that more serious efforts are needed to improve sports at village level.

Civic Amenities and Perspective Changes among Village Communities:

The data on civic amenities in the study area shows improvement in telephone, electrification, piped water supply, hand pumps and toilets etc. The improvement in basic amenities is indication of improvement of living standards and awareness amongst the farmers of the area due to government programs.

Although in the villages of study area improvement can be seen on the front of development of infrastructure- all type of roads, the Govt. supported medical facilities, children's education and electrification yet still there is plenty of scope for more advancement.

Many options are open for villagers for spending their money. Proximity to the urban centers, penetration of media in the village houses, and frequent visits to the relatives working in cities by villagers have transformed a conservative villager into aspiring consumers.

Consumerism appears to be directly related with the income of the villagers also, which hitherto was the characteristics of urban population. The philosophy of simple living seemed to have been replaced by fast life with maximum consumption. Younger generations, irrespective of their family income, are interested in consuming and owning goods which their parents have not even thought of. .

The significant observations on civic amenities can be summarized as under:

- Almost all the villages in the project area has primary level of education
- For secondary and higher education children have to travel to the nearest town places, like Raigarh City.
- Primary health centres are available. A Govt. run hospital is functional.
- Nurses, midwives named as “Asha” Karyakarta visit all the villages on fixed days of the week.
- There are private doctors in town.
- Most of the villagers use hand pumps and dug wells for drinking water
- Cleanliness and soak pits are missing near hand pumps inviting sanitation issues
- Both phone facilities and post facilities are available.

- All the villages are connected through road network but the condition needs immediate attention
- There are few drains both Kachha and Pakka in study area villages
- Electricity is available in all the villages
- Open defecation is common and only few houses are having toilets.

Education:

- Presently illiteracy among the people in project area is quite high. The proposed project will change the income level of these villagers by assured monthly income to families and linking the other members of community to various income generation avenues. The project will indirectly support a much larger number of inhabitants. .
- There will be quicker increase in literacy level, availability of schools, access to schools, increase in number of school going children (particularly girls), decrease in dropout rates, and improvement of learning environment especially in government schools in the project area.

Labour:

- Construction and operation period of project development will increase income of local people as some local unskilled, semiskilled and skilled persons will gain direct or indirect employment.
- Similarly, inhabitants shall get businesses opportunities like tea and food stalls, barber shops, beetle/pan shops, grocery shops, milk vending etc.
- Likely interventions of the project proponent in the core and buffer zone villages for improving the livelihood based on agriculture and allied activities getting enhanced due to influx of people of a different social strata will require more labour for followings jobs: -
- Advent of new small scale engineering work shops
- Advent new fooding joints
- Advent of provision sale outlets
- Enhanced production of agricultural produce
- Enhancement in On field processing of crops and marketing of perishable products like vegetables
- Enhancement Supply of additional inputs like fertilizer, agro-chemicals etc.
- Enhancement in repair and maintenance of agricultural machines, pumps etc. (as mechanization is also likely to increase, which may offset some of the direct labour engagement)
- There will be increase in current sources of income, average household income and expenditure in the project area.

Community Organizations and Credit Institutions

- Panchayat Raj Institutions are in existence in the project area.
- There are limited social/ community in the project area. However it is anticipated that these institutions will be developed over a period of time.

- There will be increase in access to credit owing to increase in income of households in the project area. This will increase the banking and other financial institutions activities in anticipation of the commercial growth of the project area.

Other Benefits

- Appreciation in land value.
- Easy dissemination and assimilation of agricultural and other extension information – due to development induced improvements in education/literacy.
- Benefits by the people, particularly the vulnerable groups from various development programs of the project proponent which will also receive the support of existing government as well as public.

5.0 PLANNING BRIEF

(i) PLANNING CONCEPT (TYPE OF INDUSTRIES, FACILITIES, TRANSPORTATION ETC.) TOWN AND COUNTRY PLANNING/ DEVELOPMENT AUTHORITY CLASSIFICATION.

Proposed industry is cement industry (Red Category). Transportation of raw material and final product will be done via existing road and rail network and cement concrete road will be developed within the plant premises.

(ii) POPULATION PROJECTION

Projected direct and indirect employment generation from the proposed project is approx. around 3,125 for cement plant. Due to the large scale of industry, influx of people is expected for the new ancillary business opportunities to be created by IU project

(iii) LAND USE PLANNING (BREAKUP ALONG WITH GREEN BELT ETC.)

Total Plant area is 69.5961 ha (Cement Plant, CPP & Colony). About 33% i.e., 22.95 ha of the total project area will be covered under green belt & plantation in order to reduce dust & noise pollution levels & to increase aesthetic beauty of the area.

(iv) ASSESSMENT OF INFRASTRUCTURE DEMAND (PHYSICAL & SOCIAL)

Jindal Panther Cement Private Limited has assessed the demand of infrastructure (Physical & Social) in nearby area of the plant site and development activities are being undertaken under corporate social responsibilities program for rural development initiatives for the upliftment of the nearby communities from time to time.

(v) AMENITIES/FACILITIES

Jindal Panther Cement Private Limited will develop the Amenities/Facilities in nearby area of the proposed project site as per requirement of local people of the nearby area under corporate social responsibilities programs.

6.0 PROPOSED INFRASTRUCTURE

(i) Industrial Area (Processing area)

The area is enrich in infrastructure due to several Steel and Power plant operating the existing area, thus it has developed adequate infrastructure in the nearby areas and helped in developing infrastructure in Raigarh city. Further the Companies has been doing rural development activities for up liftmen.

(ii) Residential area

Colony provision is not considered. However Essential staff and workmen of the plant shall be accommodated in the existing colony of JSPL on mutual agreement basis. The colony has essential amenities like banking, health and education facilities.

(iii) Green Belt

The total project area is 69.561 ha, out of which 22.95 ha (approx. 33%) area will be covered under greenbelt development / plantation along the plant boundary and inside the plant. About 2000-2500 trees will be planted per hectare of land

(iv) Social Infrastructure

Proposed project will result in growth of the surrounding areas by increasing direct and indirect employment opportunities in the region including ancillary development and supporting infrastructure.

Strategic objective

Strategic objective in each of the CSR focus /impact areas is as follows:

1. Education:

Improve the quality of elementary education, provide greater access to higher education and enhance the employability prospects of local youth.

2. Healthcare:

Provide affordable, accessible and quality health care to segments of the community residing at the base of the pyramid, women and children.

3. Infrastructure:

Build critical infrastructure projects that have community ‘ownership’, ensure common access, possess robust operations and management systems and improve the community’s environmental health.

4. Livelihood Improvement:

Link individual capacity to opportunity by supporting social initiatives that capitalize on existing assets (skills, natural resources, and others) and thus provide economic security for those at the base of the pyramid

5. Environment:

Achieve clean development through streamlining internal industrial processes and supporting community initiatives for green & clean lifestyle around project areas.

6. Social Upliftment:

Empowerment & Inclusion of vulnerable and Bottom of Pyramid Population in development process by facilitating access to development opportunities.

(v) Connectivity

The project site is well connected to NH-200 (~ 1 km in NW direction) , NH - 49(2 km in direction) and SH-16 (0.78 km in South direction) direction.

- The nearest railway station is the Kirarimalnagar Railway Station (1 km in NW direction).
- The nearest airport is Jharsuguda Airport (~ 98 km in W direction).
- The site is well connected with communication facilities like telephone, fax, wireless and telex and as such, no constraints are envisaged in this aspect as the Taluka and District headquarters are near to the site.

(vi) Drinking Water

Water is planned to be sourced from Mahanadi river and Qty will be 42 KLD. JPCPL will test the water for portability as well as Plant operations. The appropriate treatment systems for equipment usage and drinking treatment system shall be installed.

(vii) Sewerage system

A sewage treatment plant will be established for treating domestic wastewater from the office complexes in the project. The treated waste water will be utilized for horticulture purposes and no wastewater will be discharged outside the plant.

(viii) Solid waste management

No Solid waste is being generated in Cement Plant. Whatever dust is collected in pollution control equipment is being recycled to the process through closed conveying system.

(ix) Power requirement and source

The maximum power demand for the proposed Cement Plant will be 35 MVA. This required power will be purchased by the existing power plants of JSPL, Raigarh on 33KV.

Power Factor Correction

The plant power factor shall be corrected on two levels. The first level includes two centralized power factor and harmonics filtration units connected to the each section of medium voltage busbar e.g. mill motors, as well as high voltage fed variable speed drive systems shall be corrected by central power factor correction and harmonics filtering equipment. An overall power factor of approx. 0.95 shall be achieved (considering MV and LV-compensation).

Lightning Protection

A comprehensive lightning protection system shall be installed to cover all buildings and structures. The Faraday-cage type shall be applied. The lightning protection system shall be connected to the plant grounding system by separate tapping points. Such connections shall be at the outside of the building walls, and shall be individually, directly connected to the foundation grounding.

7.0 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 LABOURERS (A BRIEF OUTLINE TO BE GIVEN).

The private land to be acquired is 2.871 ha only and resettlement of 2 habitations is involved. Hence minimal R&R is required in the project. The affected families will be rehabilitated and resettled as per the existing R&R policy of Chhattisgarh State.

8.0 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).

Estimation Project Implementation Schedule

The implementation schedules have been planned keeping in view the various recommendations mentioned under relevant categories. The delivery schedule for main machinery, procurement and deliveries of auxiliary equipment, duration of civil construction, mechanical erection, etc. have been duly considered while preparing the schedule.

A period of ten months has been estimated for pre project activities (till the placement of order for main machinery) from the date of taking the investment decision. The suggested schedule has been given below.

The implementation period has suggested 36 months for project execution activities after placement of main machinery order till the commissioning of plant.

As per the project implementation schedule the expected implementation time has been estimated as:

- + Pre project activities : 10 months
- + Project execution activities : 36 months

(ii) ESTIMATED PROJECT COST ALONG WITH ANALYSIS IN TERM OF ECONOMIC VIABILITY OF THE PROJECT.

- Total cost of the Project is: Rs. 2119 Crores
- Cost for Environment Protection
 - Capital Cost: **100 crores**
 - Recurring Cost: **5 crores**

9.0 ANALYSIS OF PROPOSAL

(i) FINANCIAL AND SOCIAL BENEFITS WITH SPECIAL EMPHASIS ON THE BENEFIT TO THE LOCAL PEOPLE INCLUDING TRIBAL POPULATION, IF ANY, IN THE AREA.

Growth of infrastructure facilities in various fields together with housing etc. automatically drives forwards the requirement of Cement in the market. Based on the growing demand in the eastern

region of the country for cement, the location of project with reference to these markets is an advantage to cater them.

Proposed project will be beneficial to Raigarh Distt. The proposed project will provide direct and indirect employment opportunities to the people of surrounding region. The process of Industrial development in terms of advent of ancillary units including service industry and development of supporting infrastructure will in turn trigger the upliftment of local population. Opportunities with special benefits in financial and social field will become easily available to the local people. Besides, business opportunities for local community like transport of cement to market, raw material transport, maintenance and housekeeping contract work etc. will become available to the people in the region. Social amenities in the form of medical facilities, education to underprivileged and creation of self-help groups will witness upward growth in quality and magnitude. State Government will also get revenue in terms of various taxes.

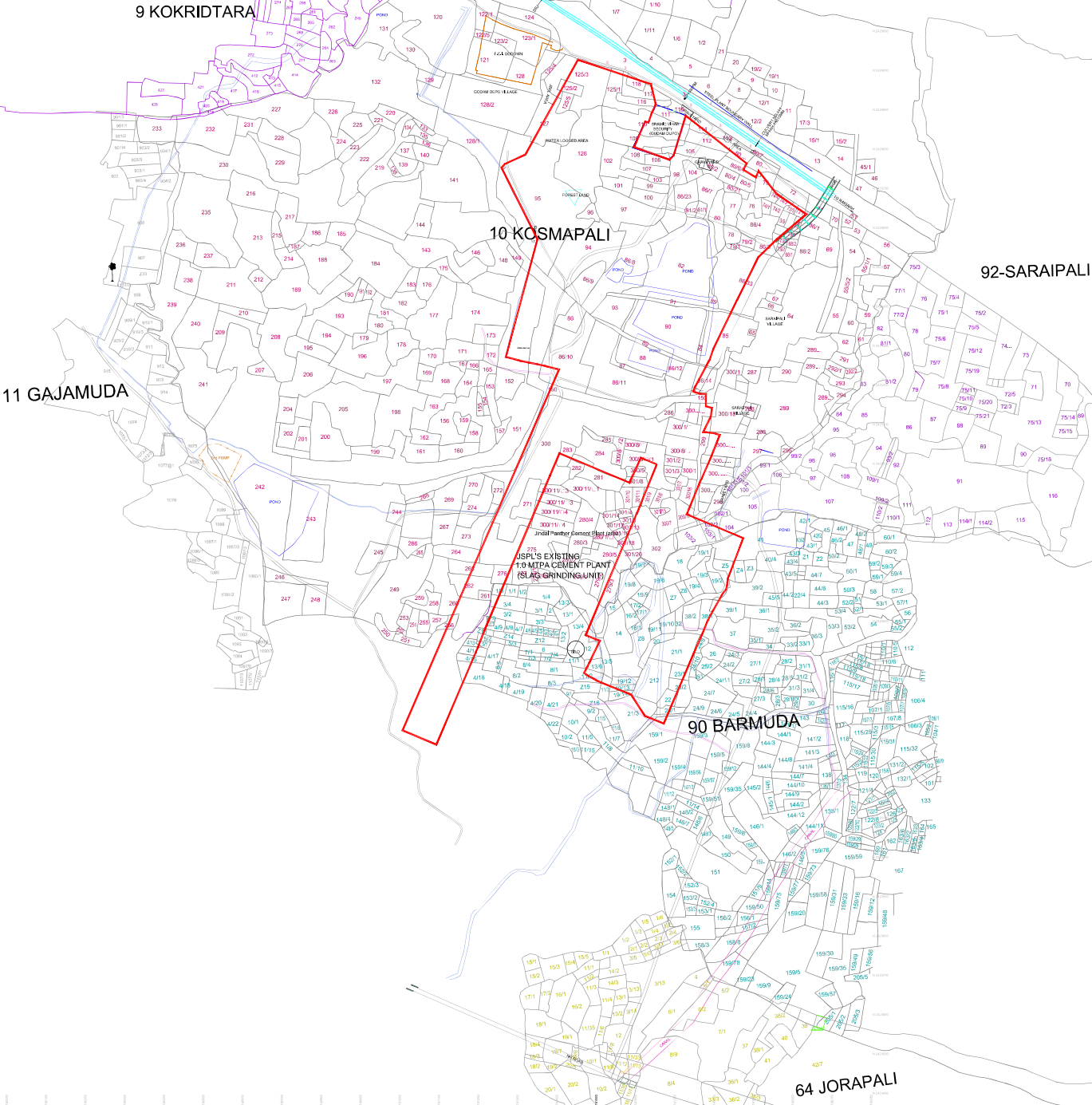
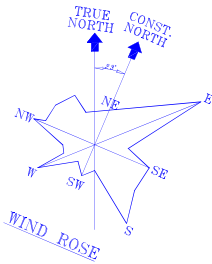
The financial viability also shows a good rate of return from the project. Environment Management Plan (EMP) covering all aspects like planning, designing, construction and operation of the project will be put into service. With proper and effective mitigating measures in place during the implementation and operation period of the proposed project, no major adverse effect on environment is envisaged.

Best available technology and management techniques will also be adopted to ensure good profitability together with insignificant adverse effect on various segments of environment. The project will meet the compliance requirements of MoEF's Charter on Corporate Responsibility for Environmental Protection (CREP).

10. CONCLUSION

Proposed Project will result in growth of the surrounding areas by increased direct and indirect employment opportunities in the region including ancillary development and supporting infrastructure. Special emphasis on financial and social benefits will be given to the local people including tribal population, if any, in the area. Development of social amenities will be in the form of medical facilities, education to underprivileged and creation of self-help groups. No adverse effect on environment is envisaged as proper mitigation measure will be taken up for the same.

Annexure 1



Annexure – 2

Vulnerable Groups in the 15 km radius area of the Project site

S. No.	Name of the Vulnerable Group	Approx. aerial distance from the Plant	Direction from the Plant boundary
Schools			
1.	Govt. Primary School Line Para, Kirodimal Nagar	0.58 km	North West
2.	Govt. High School Kirodimal Nagar	1 km	North West
3.	Jindal Aadarsh Gamiya Bharti School	1 km	North West
4.	Govt. Higher Sec. School Gorra	1 km	South West
5.	Higher Sec. School Tetala	12 km	South
6.	Government Primary School Tarapur	8.1 km	South West
7.	Mahendra Singh Patel Memorial School Tarapur	7.8 km	South West
8.	Govt. School Kurmapali	7.2 km	South West
9.	Govt. S.H School Kotra	5.2 km	South
10.	Govt. High School Jivri	12.2 km	North West
11.	Ideal Public School, Patrapali	1.6 km	North East
12.	G.A.P Public School Kirodimal Nagar	1.6 km	North West
13.	Genius Public School	1.3 km	North West
14.	The Rising Kids School	2.6 km	South West
15.	JPS School Tarkela	5.2 km	South
Hospitals and Health Care Facilities			
1.	Maa Ambay Hospital	1.2 km	North West
2.	Kirodimal Government hospital	5.9 km	South East
3.	Ganga Nursing Home	5.1 km	West
4.	Shri Siddhivinayak maternity home	4.5 km	South East
5.	Divyajyoti netralaya & Surgical Centre	6.27 km	South East
6.	Sanjivni Nursing Home	6.15 km	South East
7.	Uma Memorial Surgical Endoscopy Nursing Home	12.3 km	East
8.	Aishwaraya Nursing Home	4.5 km	South East
9.	AArogyam Nursing Home	4.5 km	South East
10.	Life Care Hospital	6.5 km	South East
11.	Career College Of Nursing Raigarh	10.3 km	South East
Places of Worship			
1.	Shree Rupanadhan Temple	11.8 km	North East
2.	Shiva Temple	0.8 km	North West
3.	Jaganath Temple	2.8 km	North East
4.	Shiv Mandir	1.6 km	North East
5.	Hindu Temple	5.5 km	East
6.	Temple – Geeta lake city	7.4 km	South East
7.	Bajrangbali temple	1.9 km	West
8.	Gahira guru mandir	9.7 km	West

S. No.	Name of the Vulnerable Group	Approx. aerial distance from the	Direction from the
Playground and Garden			
1.	Kids Play Ground	1.2 km	North west
2.	Play Ground	1.0 km	North west
3.	Patrapali Playground	1.7 km	North east
4.	Krishna Vatika Playground	7.5 km	East
5.	Madhuban Playground	6.2 km	South east
6.	Chandmari Playground	6.5 km	South east
7.	Kelo Vihar	7.5 km	South east
8.	Amapali	7.7 km	South east
9.	JSW Ispat Garden	13.5 km	North west
10.	Jindal Hospital Garden	2.2 km	North east
11.	Rose Garden	7.8 km	South east
12.	Judev Garden	7.1 km	South east
13.	Jalsa Marriage Garden	7.7 km	South east
14.	Eco Park Jurda	13.3 km	South east
15.	Pushp Vatika Baal Udhyan	7.0 km	South east
Banks			
1.	Kotak Mahindra Bank	3.5 km	North East
2.	Corporation Bank	4.8 km	East
3.	State Bank Of India	6.1 km	South East
4.	Central Bank	5.4 km	South East
5.	Bank Of India – Raigarh Branch	4.2 km	South East
6.	State Bank Of India ADB Raigarh	6.5 km	South East
7.	Chhattisgarh Rajya Gramin Bank	8.2 km	North
8.	Gramin Bank	4.1 km	South East
9.	ICICI Bank ATM	5.3 km	South East

Source: Bhuvan and Census of India, 2011, Google Earth Pro Version 7.3