PROJECT FEASIBILITY REPORT

for

GREENFIELD INTEGRATED CEMENT MANUFACTURING UNIT AND CAPTIVE POWER PLANT INCLUDING WASTE HEAT RECOVERY PLANT OF 5.28 MTPA CLINKER (2.64MTPA x 2 PHASES) 6 MTPA CEMENT PLANT (3MTPA x 2 PHASES) 80 MW CAPTIVE POWER PLANT (40x 2 PHASES) 30 MW WHR PLANT (15 x 2 PHASES) 500 KVA DG SET

Location: Villages: Devra, Madaiyan, Hardua Ken, Puraina, Sotipura, Taluka : Amanganj Dist. : Panna (MP)

PROJECT PROPONENT

JAYKAYCEM (CENTRAL) LIMITED
KAMLA TOWER, KANPUR (U.P.)

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1. EXECUTIVE SUMMARY

1.1 Introduction

This feasibility report presents a brief summary of the proposed Greenfield integrated cement Project in villages: **Hardua Ken, Puraina, Sotipura, Devra, Madaiyan, Taluka: Amanganj , Dist. Panna (MP).**

Jaykaycem (Central) Limited (JKCCL) , is an associate company of J. K. Organisation, a highly diversified industrial conglomerate with significant presence in a wide ranging array of products and a standing of more than about one hundred years. The company/project proponent with its registered office at Kamla Tower , Kanpur U.P. has proposed to set up a Greenfield Integrated Cement Project of capacity 5.28 MTPA Clinker and 6 MTPA Cement Plant along with 80 MW Captive Power Plant and 30 MW Waste Heat Recovery System in Two Phases in villages Hardua Ken, Puraina, Sotipura, Devra, Madayyan, Taluka: Amanganj , Dist: Panna (MP). The proposed installed capacities of Clinker, Cement, CPP and WHRS envisaged in each phase are shown in the table below:-

Sr.No.	Details of items/products	Phase-II	Phase-II
1.	Clinker (MTPA)	2.64	2.64
2.	Cement (MTPA)	3	3
3.	Captive Power		
3-A.	Thermal Power plant (MW)	40	40
3-B.	Waste Heat Recovery Plant (MW)	15	15

The implementation of 2nd phase of the Integrated Unit is envisaged to commence three years after the completion/commencement of commercial production in 1st phase.

The plant will be located in the district of Panna of Madhya Pradseh State of India. The District of Panna is an industrially backward district vis-à-vis the other district with advanced industrial activity in the state of Madhya Pradesh. Due to this fact the location imbibes many advantages. Jaykaycem (Central) Limited has located large deposits of lime stone and has successfully conducted systematic exploration and appraisal of these deposits. Coal occurs in the nearby districts of Shahdol, Umaria and Anup Pur etc. in the large quantities. From geographical perspective the plant will be located in the center of country with well connected networks of Roads and Rail. The location advantage of the plant makes it possible to dispatch the cement in all the directions giving easy accessibility to the market.

1.2 Promoter's Background

Jaykaycem (Central) Limited (JKCCL) proposes to set up an Integrated Cement Plant of capacity 5.28 MTPA clinker , 3 MTPA cement, 80 MW CPP and 30 MW

WHR Plant at villages **Hardua Ken, Puraina, Sotipura, Devra, Madayyan,** of Tehsil Amanganj, District Panna, Madhya Pradesh.

The company under the banner of J. K. Cement Limited, the promoters for the present project commenced its cement operations in May 1974 at their first plant at Nimbahera in the state of Rajasthan, with a single kiln of production capacity of 0.3 MTPA. Second kiln was added in 1979 with production capacity of 0.42 MTPA and a third kiln in 1982 with a production capacity of 0.42 MTPA.

In 1986 the company upgraded Nimbahera line No.3 by installing separate line calciner (SLC) with complete backward and forward integration of equipment from crusher to packing plant and increased the clinkerisation capacity of the plant from 0.42 MTPA to 1 MTPA. Subsequently from 1988 - 2000 the clinkerisation capacity of all the 3 units were upgraded by carrying out various modifications in the system and production has since been increased to 0.4 MTPA clinker for Kiln -1, 0.6 MTPA clinker for Kiln 2 & 1.6 MTPA clinker for Kiln 3. The present total clinkerisation capacity of the three lines at Nimbahera is 2.6 MTPA cement. Second grey cement plant was started at Mangrol in 2001, with a production capacity of 0.75 MTPA clinker. White cement plant of capacity 0.05 MTPA clinker has started commercial production in 1984 and upgraded to 0.4 MTPA clinker, at Gotan, Rajasthan, India. White cement based wall putty also started getting manufactured and enjoys market leadership in these two commodities.

Company went into a massive expansion by installing a 3.0 MTPA grey cement plant at Mudhol, Karnataka which started commercial production from Sept 2009. A divested plant in Gotan, Rajasthan was taken over by the company, upgraded and put to operations and is producing 0.4 MTPA grey cement. Today the grey cement production capacity of the company is 7.5 MTPA and White Cement is 0.4 MTPA.

The company has also undergone Brownfield expansion of 1.5 MTPA capacity at Mangrol, Rajasthan and a split located grinding unit of 1.5 MTPA capacity at Jhajjar, Haryana.

J.K. Cement Limited is also setting up of a greenfield, dual process, White Cement - cum - Grey Cement plant at Fujairah, UAE. The proposed plant at Fujairah shall have a capacity of 0.6 MTPA White Cement and 1 MTPA Grey Cement. J.K. Cement Limited has a vision to double the grey cement capacity to 15 MTPA by the year 2020-21.

1.3 Basic Details

S. No.	Particulars	Details
1.	Products	5.28 MTPA Clinker (2.64 MTPA X 2 Phases) 6 MTPA Cement Plant (3 MTPA X 2 Phases) 80 MW Captive Power Plant (40x 2 Phases) 30 MW WHR Plant (15 X 2 Phases) 500 KVA DG Set
2.	Raw Materials	Limestone, Iron Ore, Bauxite, Coal, pet coke, Gypsum, Fly ash etc.

3.	Fuel	30% Indian Coal and 70% Pet coke (1:1 ratio) for cement plant and 100% Indian coal for Power Plant
4.	Power	80 MW coal based power plant, 30 MW Waste heat recovery power plant, D G Set 500 MW
5.	Employment Potential	Total 820 nos. of employees is proposed to be appointed in both phases of implementation and operation. In Implementation phases 90 nos. and in operation phases 730 nos. will be appointed in Cement Plant & CPP.
6.	Average elevation of the proposed area	315 Mtr above mean sea level (MSL)
7.	Estimated Project Cost	Phase I Rs. 277434 Lacs & Phase II 281261 Lacs
8.	Soil Type	Loamy, yellowish brown soil
9.	Seismic Zone	Zone – III

1.4 Environmental Aspects

Cement & thermal power plants along with other activities will have aspects of air pollution in terms of Particulate Matter, Sulphur Dioxide, Oxides of Nitrogen and Carbon Monoxide etc. and aspect of water pollution in terms of waste water from utilities and domestic activities. JKCCL envisages comprehensive environment management plan (EMP) to manage the pollution aspects in the proposed integrated cement plant, with a view to improve productivity by adopting techniques to minimize the waste and reutilize whatever waste is generated , under stringent statutory framework.

Technology and Plant Design

The plant is based on dry process technology. The manufacture of various varieties of Cement is a technology driven industrial activity and involves high range of capital expenditure.

Following are the key points for the proposed project

i. The combination of raw materials i.e. Limestone, Iron Ore/Laterite, Bauxite, Clay, Silica (if required) and Coal known as raw mix results from proportioning; will be subjected to grinding to fine powder, homogenization and blending.

ii. Raw mix then will be sent to pre heater, comprising series of vertical cyclones. The emitting hot gases from Kiln are utilized in this stage. It Followed by chemical reactions which take place in rotary kiln in different temperature zones. A series of chemical reactions take place between Calcium and various compounds of Silicon Dioxide from the basic constituents of cement, i.e., Calcium Silicate. Kiln will have 1450^0C as the maximum temperature. Heating will be done by using Coal from the outward end and the kiln feed gets converted into Clinker by the time it reaches the lower part at the far end. Clinker is produced and the process is called as clinkeraisation.

iii. The clinker from kiln is passed on to Cooling towers and is finally subjected to grinding. Finely grounded Gypsum, the additive that functions as retarder is added to make final product, the Cement.

iv. The Cement finally reaches packing plant to be packed in bags of various sizes for shipment to the market.

Air Environment

The entire plant has been designed and would be operated with environment in focus. Reverse Air Bag House (RABH) will be provided for Kiln/ raw mill exhaust gases with suitable height of chimney. A separate stack will be provided for CPP.

Bag House will be provided in cement grinding section of plant. Bag filters will be provided at all the material handling and transfer points;

CPP will house CFBC boilers which are provided with low NOX burners and designed to reduce SO_2 emissions by injecting lime, if required. The boilers are also designed to ensure high thermal efficiency.

Electro Static Precipitators (ESP) have been designed to emit suspended particulate matter less than 50 mg/Nm3 and interlock the plant operations to ensure stipulated emission level at all times.

Water Environment

The water requirement for first phase of Cement Plant, CPP, will be about 3012 KLD for phase-I and around 5700 KLD of water for both the phases including residential colony. In the operational phase, water for the proposed project shall be sourced from Ground water as well as from surface water source. The area is categorized under SAFE category by CGWA. Proper recharge structures shall be provided for augmentation of ground water. Total requirement of water will be met partly from ground water and partly from surface water and the river Ken, flowing in the vicinity. At a later stage the rain water accumulated in the working pit will be motored to Raw Water tank that will serve the purpose of dewatering the pit as well as being used for various other purposes. A detailed Ground water exploration and Hydrological study has already been undertaken to assess the water availability. No wastewater will be generated from the cement manufacturing process.

Effluents generated from softener plant will be neutralized in neutralization pit. The wastewater will be sent to main effluent tank. The boiler blow down and auxiliary cooling tower wastewater will be sent directly to main effluent tank. Main effluent tank serves the purpose of equalization and settling for monitoring the final effluent quality. There will be provision of Multi-grade filter and activated carbon filter s polishing unit. The effluent generated from these sections will be utilized for ash miniaturization, water spraying in coal handling plant, dust suppression on roads and for green belt development etc. Thus, "**Zero Discharge concepts will be followed".**

The waste water generated from cement plant and CPP Shall be treated in the treatment plant 725 KLD in phase -I and similar arrangement shall be provided for phase-II . The sewage generated from the colony shall be treated at another STP of 300 KLD.

Separate storm water drains will be provided and storm water from entire plant will be collected in proper channels and stored in a settling tanks which may be used for dust suppression.

Solid & Hazardous Waste Management

No Solid wastes will be generated from the plant process. All the steel scrap shall be recycled through material suppliers. The fly ash generated will be used for manufacturing of PPC. Bed-ash generated will be used for laying haul roads in Mines, brick manufacturing etc.

Spent and Used Oil – will be used for lubrication of scraper chains/ Drag Chains/ Screw conveyors crapper. It will be given to the authorized recyclers. Lead acid batteries will be exchanged with authorized OEM. The waste resin from the cooling tower and waste carbon from ACF shall be disposed off at TSDF Pithampur (MP).

About 240 TPD of Fly ash at Phase –I and 480 TPD at complete configuration is expected to be generated from CPP. The entire quantity will be utilized for the production of Portland Pozzolana Cement in the cement plant.

The fugitive dust emissions occurring during material handling and material transfer points will be controlled by installing bag filters and water spraying system. Closed conveyor belts are used for material transport within the plant premises.

Noise Environment

The main noise generating sources are compressors, cooling towers, ball mills, blowers from boilers etc. All these sources will be provided with acoustic enclosures to limit the noise levels below 85 dBA. The impact of noise emission from cement plant and CPP will be minimized by the following measures

- Encasement of noise generating equipment;
- Providing noise control cabins in operators rest rooms and work stations;
- Ensuring use of ear muffs whenever employees approach noisy equipment;
- Conducting studies on noise dosimetery and audiometery to assess the noise induced hearing loss in case of exposed employees and take appropriate ameliorative measures, wherever necessary;
- Greenbelt development along the periphery of the plant.

The raw material will be transported by the closed conveyor belt. Additives and the slag are transported by road. Scheduling of truck movement and improving of road maintenance activities will be adopted. This will result in minimizing the impact on the traffic density of the external roads.

Greenbelt Development & Afforestation

It is proposed to develop 33 % of Green belt within the entire premises in scientific manner. The survival rate of more than 85% will be ensured.

Environmental Management Systems (EMS)

The effective implementation of the Environment Management Plan (EMP) during design, construction and operation, of the project will ensure to comply with the given standards and within the specified limits.

1.5 Socio- Economics

JKCCL shall be engaged in social development activities in all the villages surrounding the cement plant and mining lease areas. Social welfare activities will be taken up on a large scale. These activities are proposed in the following focus areas:

- Health Care

- Social well being
- Education, vocational training
- Sustainable Livelihood
- Infrastructure Building
- Afforestation
- Rural water supply and sanitation; and
- Assistance in utilizing government programs.

1.6 Benefits of the Project

The project will be entitled for the following benefits:

1. JKCCL will invest Rs. 277434 Lacs in the first stage and Rs. 281261 Lacs in second stage to establish 5.28 MTPA clinkerisation plant & 6 MTPA cement plant along with 80 MW captive power plant & 15 MW WHRB.
2. The project will generate large number of direct and in direct employment opportunities in the area.
3. The area is devoid of industrial growth and development of area is envisaged from the proposed proposal. Further CSR activities to be taken up by the JKCCL, will upgrade the soico economic profile of the study area.

1.7 Conclusions

The proposed project may have certain level of impacts on the local environment. At the same time it will have beneficial impact also in terms of employment opportunities, developmental opportunities, business promotional activities etc. Community impacts will be beneficial, as the project will generate significant economic benefits in the region.

JKCCL shall to meet the compliance requirements of MoEF's Charter on Corporate Responsibility for Environmental Protection (CREP).

Best Available Technology and Best Management Practices with more environmental friendly process for manufacturing OPC/PPC cements.

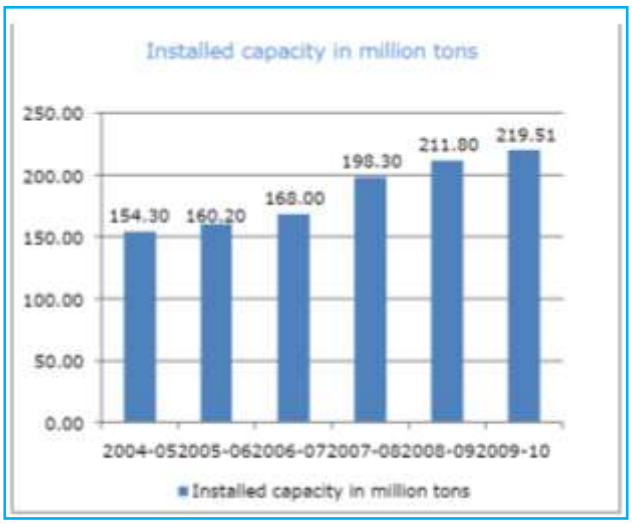
With the effective implementation of the Environment Management Plan (EMP) during the planning, design, construction and operation phases, the project can proceed without any significant negative impact on environment.

2. Introduction of the Project

Cement and steel are the most important support products for the development of physical 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, aluminum 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 considered to be 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 Porbundar 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 is 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.

In India, the Department of Industrial Policy and Promotion (DIPP), under the Ministry of Commerce and Industry, is the nodal agency for the development of cement industries. It is involved in monitoring their performance at regular intervals and suggesting suitable policy incentives, as per the requirement. The Department is responsible for formulation and implementation of promotional and developmental measures for growth of entire industrial sector in general and of some selected industries like cement, light engineering, leather, rubber, light machine tools, etc. in particular. It is involved in framing and administering overall industrial policy and foreign direct investment (FDI) policy as well as promoting FDI inflow into the country. It plays an active role in investment promotion through dissemination of information on investment climate

and opportunities in India as well as by advising prospective investors about various policies and procedures.

Some of the rules and orders, administered by DIPP, relating to the cement industry are:- Cement Control Order, 1967, Cement Cess Rule, 1993, Cement (Quality Control) Order, 1995, Cement (Quality Control) Order, 2003.

In view of the factors described above JKCCL has planned to set up an integrated cement project in Villages: Devra, Harduaken, Puraina, Sotipura & Madaiyan, Taluka : Amanganj , Dist. Panna, M.P.

The products from this project can be viably marketed in state like U.P., M.P. Chhattisgarh and Bihar. They are located in a distance range of 350 – 1000 Kms. In addition to the availability of large reserves of Limestone, the location of the project in a central place has prompted the applicant to undertake proposed project.

2.1 Identification of Project & Project Proponent

Jaykaycem (Central) Limited (JKCCL) proposes to set up a Greenfield Integrated Cement Plant having capacity of 5.28 MTPA of clinker and 6 MTPA of cement in two phases, in villages Devra, Harduaken, Puraina, Sotipura & Madaiyan, Taluka : Amanganj , Dist. Panna, Madhya Pradesh. A Captive Power Plant (CPP) of 80 MW and Waste Heat Recovery System (WHRS) of 30 MW in two phases are also envisaged. During first phase, clinkerization plant of 2.64 MTPA, cement plant of 3 MTPA, CPP of 40 MW and WHR plant of 15 MW is proposed to be commissioned within 03 years of time span.

The Organization under the banner of J. K. Cement Limited, the promoters for the present project commenced its cement operations in May 1974 at their first plant at Nimbahera in the state of Rajasthan, with a single kiln of production capacity of 0.3 MTPA. Second kiln was added in 1979 with production capacity of 0.42 MTPA and a third kiln in 1982 with a production capacity of 0.42 MTPA.

In 1986 the company upgraded Nimbahera line No.3 by installing separate line calciner (SLC) with complete backward and forward integration of equipment from crusher to packing plant and increased the clinkerisation capacity of the plant from 0.42 MTPA to 1 MTPA. Subsequently from 1988 - 2000 the clinkerisation capacity of all the 3 units were upgraded by carrying out various modifications in the system and production has since been increased to 0.4 MTPA clinker for Kiln -1, 0.6 MTPA clinker for Kiln 2 & 1.6 MTPA clinker for Kiln 3. The present total clinkerisation capacity of the three lines at Nimbahera is 2.6 MTPA cement. Second grey cement plant was started at Mangrol in 2001, with a production capacity of 0.75 MTPA clinker. White cement plant of capacity 0.05 MTPA clinker has started commercial production in 1984 and upgraded to 0.4 MTPA clinker, at Gotan, Rajasthan, India.

2.2 Brief Description of Nature of The Project

The proposed cement plant will be operated on dry basis, which offers more advantages, particularly in fuel & water conservation. The proposed plant comprises 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 Ordinary Portland Cement (OPC) and Pozzolona Portland Cement (PPC).

Particulate	Details
Capacity	Integrated Cement Plant of capacity 5.28 MTPA of clinker and 6 MTPA of cement, A Captive Power Plant (CPP) of 80 MW and Waste Heat Recovery System (WHRS) of 30 W
Cost of Project	Rs. 5586.95 Crore for both phases Phase I Rs. 277434 Lacs & Phase II 281261 Lacs
Type of Fuel	30% Indian Coal and 70% Pet coke (1:1 ratio) for cement plant and 100% Indian coal for Power Plant
Source of Fuel	Coal from SECL and pet coke from Bharat Oman Ltd, Bina and RIL, Jamnagar Gujarat
Water Requirement	3012 KLD for integrated plant and colony
Source of Raw water	Surface water from Ken River, and Ground water and at a later stage the rain water accumulated in working pit in the mining area.
Major Equipments	Kiln, Coal Mill, raw mill, Cooler, cement mills , Boilers (CPP and WHR Plants) and Turbo Generator
Type of Boiler	Circulating Fluidized Bed Combustion
Pollution control equipment	ESP and bag Filters
Level of particulate Matter after APC	< 50 mg/ NM^3
Cost of Pollution Control Equipments	Approximately Rs. 99.78 Crore for each phase (total = Approximately Rs. 199.56 crores)
Total Employment generation	Total 820 nos. of employees are proposed to be in employment in implementation and operation phases. In Implementation phases 90 nos. and in operation phases 730 nos. will be taken.
Ash Generation	240 TPD in each phase
Fly Ash Silo Capacity	2 X 5000 T In first Phase and 2X5000 T in second phase

2.3 Need for the Project

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.

With the economic reforms initiated by government in 1990, Government interference, especially in the pricing, and controlling the industry is minimal, which is evident from the continuous growth the cement industry has achieved. 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 136 kg., this leaves a large opportunity for growth. The policy and regulatory frame work 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. Raw materials are available in villages Kakra – Kamtana etc, Tehsil Amanganj, district Panna, M.P. It is located adjacent to the proposed cement plant.

Moreover, in the Centre 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 Centre Western region.

Most cost effective choice for Cement manufacture includes to produce 90% PPC and 10 % OPC grade cement.

1. The technology adopted is with the State of Art technology using 6 stage double string Preheater with precalciner, third generation cooler, low NOX burner, high efficiency fans with high efficient bag filters, a reverse bag house (RABH) will be used in place of gas conditioning tower to conserve water and avoid trippings due to CO.
2. Company has chosen the site of village Devra, Madaiyan, Hardua Ken, Puraina, Sotipura located adjacent to the mining lease area of the proponent, ensuring the availability of its to major raw materials in the close proximity, availability of utility resources and infrastructure facilities, as per the guide lines of MoEF.
3. The company proposes to undertake comprehensive EMP, which will not only meet the compliance requirement but also increase the productivity.

Demand in Target Market

The geographical markets **JCCL**'s plants can cater, include the followings:

1. Uttar Pradesh (UP)

West UP comprising Gautam Buddha Nagar, Ghaziabad, Aligarh, Hathras, Baghpat, Bijnor, Bulandshahr, Jyotiba Phule Nagar, Agra, Mathura, Moradabad, Meerut, Muzaffarnagar, Saharanpur.

Central UP comprising Auraiya, Bahraich, Banda, Barabanki, Chitrakoot, Etawah, Farrukhabad, Fatehpur, Hamirpur, Hardoi, Jalaun, Jhansi, Kannauj, Kanpur, Lakhimpur, Lalitpur, Lucknow, Mahoba, Mainpuri, Rae Bareli,
Shajahanpur, Sitapur, Unnao

North-East UP comprising Shravasti, Ambedkar Nagar, Balrampur, Basti, Deoria, Kushinagar, Faizabad, Gonda, Gorakhpur, Maharajganj, Sant Kabir Nagar, Siddharthnagar

South-East UP which includes Allahabad, Azamgarh, Jaunpur, Kaushambi, Mirzapur, Pratapgarh, Sant Ravidas Nagar, Sonbhadra, Sultanpur, Varanasi, Chandauli, Ghazipur, Mau, Ballia

2. Madhya Pradesh (MP)

East MP comprising Tikamgarh, Chhatarpur, Panna, Satna, Rewa, Sidhi, Umaria, Shahdol, Dindori

Central MP comprising Sagar, Vidisha, Damoh, Raisen, Narsimhapur, Jabalpur, Mandla, Katni, Chhindwara, Seoni, Balaghat

North MP comprising Guna, Shivpuri, Datia, Sheopur, Gwalior, Morena, Bhind

West MP comprising Neemuch, Mandsaur, Ratlam, Ujjain, Rajgarh, Shajapur, Bhopal, Sehore, Dhar, Indore, Dewas, Badwani, West Nimar, East Nimar, Jhabua, Hoshangabad, Betul

3. Bihar

East Bihar comprising Araria, Banka, Bhagalpur, Jamui, Katihar, Khagaria, Kishanganj, Lakhisarai, Madhepura, Munger, Purnia, Saharsa, Supaul

North Bihar comprising Begusarai, Darbhanga, Madhubani, Muzaffarpur, Samastipur, Sitamarhi

South Bihar comprising Aurangabad, Bhojpur, Buxar, Gaya, Kaimur (Bhabua), Nawada, Rohtas, Sheikhpura

West Bihar comprising Gopalganj, Jehanabad, Nalanda, Pashchim Champaran, Patna, Purba Champaran, Saran, Sheohar, Siwan, Vaishali

The details of demand are presented in the table below:

Market	**Consumption (mio t)**	**Share of target market**
Central UP	8.3	17%
North East Up	3.2	7%
South East UP	4.7	10%
West UP	11.4	23%
Uttar Pradesh	**27.5**	**57**
Central MP	2.72	5%
East MP	3	5%
West MP	5.3	11%
North MP	1.7	4%
MP	**12.1**	**25%**
East Bihar	2	4%
North Bihar	1.7	3%
South Bihar	1.7	3%
West Bihar	3.6	7%%
Bihar	**8.9**	**18%**

UP is the biggest cement market in this target region with an estimated annual consumption of around 28 MTPA, which is around 57 % of the consumption in the target region.

2.4 Demand Supply Gap

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 cement consumption has increased more than 22% in 2009-10 from 2007-08. In cement consumption, the state of Maharashtra leads with 12.18% consumption, followed by Uttar Pradesh. In terms of cement production, Andhra Pradesh leads the list with 14.72% of production, while Rajasthan remains at second position. The Indian cement industry that withstood the global financial meltdown and recorded a 7.9 % growth during the year 2008-09, a drop of just 0.2 % from the previous year's growth of 8.1%, when the economical growth plunged to 6.7% against a sustained growth of 9% during the previous 3 years.

The production of cement in India grew at a rate of 12.68% during 2009-10 against the total production of 140.36 MT in the previous fiscal year, riding on the back of development of infrastructure projects and other construction activities supported by the stimulus packages provided by the Government. (source: CMA annual report 2009-10).

It will be relevant to know that Indian Cement Industry has exported cement 1.6 million tons as against 3.20 million tons and clinker 3.14 million tons as against 2.90 million tons during previous year 2008-09. This clearly indicates that cement demand is growing.

Market Prices

Cement retail prices of PPC in the target market are depicted and is given below.

The cement consumption in the target market for FY 15 has been estimated as 21.04 MTPA. This demand has been estimated on the basis of Cement Manufacturers Association (CMA) data and the data from our market visit, as CMA data does not report dispatches from ACC and Ambuja plants. Supplies from mini cement plants have not been considered Prices in state are higher due to the presence of major consumption centers 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

Market	Future Growth Rate
Uttar Pradesh	9%
Madhya Pradesh	8%
Bihar	9%
Chhattisgarh	6%
Jharkhand	7%

Table: Future growth rates of different markets

Based on the above given region wise future CAGR, Table shows the trend of future cement demand in different markets of the target region.

Market	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22
Central UP	9.28	9.70	10.67	11.84	13.18	14.66	16.30	18.26
North East UP	4.10	4.29	4.59	4.96	5.45	6.05	6.72	7.59
South East UP	5.08	5.30	5.73	6.25	6.99	7.76	8.61	9.47
West UP	12.14	12.68	14.02	15.28	16.35	17.50	18.72	19.80
Uttar Pradesh	30.60	31.98	35.01	38.34	41.98	45.97	50.35	55.12
Central MP	3.05	3.17	3.39	3.63	3.89	4.16	4.45	4.86
East MP	2.30	2.39	2.54	2.69	2.85	3.02	3.20	3.52
West MP	6.39	6.64	7.37	8.18	9.08	10.08	11.19	12.20
North MP	2.06	2.15	2.33	2.54	2.77	3.00	3.24	3.49
Madhya Pradesh	13.80	14.35	15.64	17.05	18.59	20.26	22.08	24.07
East Bihar	2.58	2.71	2.92	3.16	3.41	3.68	3.98	4.28
North Bihar	2.29	2.40	2.60	2.80	3.03	3.27	3.53	3.80
South Bihar	2.30	2.41	2.66	2.92	3.21	3.52	3.87	4.27
West Bihar	4.23	4.44	4.93	5.48	6.08	6.74	7.46	8.28
Bihar	11.40	11.97	13.11	14.35	15.72	17.21	18.84	20.63
North	1.52	1.57	1.66	1.76	1.87	1.98	2.10	2.23
Central	4.33	4.46	4.80	5.15	5.54	5.96	6.40	6.88
South	0.62	0.64	0.68	0.72	0.76	0.80	0.85	0.90
Chhattisgarh	6.48	6.67	7.14	7.64	8.17	8.74	9.36	10.02
North Jharkhand	1.86	1.93	2.06	2.20	2.35	2.52	2.71	2.91
South Jharkhand	2.64	2.75	2.99	3.26	3.55	3.85	4.17	4.52
Jharkhand	4.50	4.68	5.05	5.46	5.90	6.37	6.88	7.43
Total	66.78	69.65	75.94	82.83	90.36	98.55	107.51	117.27

Table: Cement Demand Forecast

From an estimated level of around 67 mio t in FY 15, cement demand in the target region is likely to reach around 117 MTPA in FY 22 growing at a CAGR (Cumulative Average Growth Rate) of around 8% pa.

Demand

The cement consumption of India based on the market information and Holtec estimates, for FY 15 is estimated to be 276 MTPA. Its progression over the past is given in the table that follows. The compound annual growth rate (CAGR) during this period is around 8% pa. The consumption given in the table below is inclusive of the consumption of cement produced by mini cement plants.

Figures in MTPA

Year	**Domestic Dispatches by large plants**	**Dispatches by mini cement plants**	**Total Domestic Cement Consumption**	**Growth year on year (%)**
FY 04	117.4	6.1	123.5	-
FY 05	125.4	6.1	131.5	6%
FY 06	139.5	6.1	145.6	11%
FY 07	154.0	6.0	160.0	10%

FY 08	169.2	6.0	175.2	9%
FY 09	183.3	6.0	189.3	8%
FY 10	203.6	6.0	209.6	11%
FY 11	215.8	6.0	221.8	6%
FY 12	235.1	6.0	241.1	9%
FY 13	248.1	6.0	254.1	5%
FY 14	255.8	6.0	261.8	3%
FY 15	270.1	6.0	276.1	5%

Table: Past National Cement Consumption in the last 10 years

Source: CMA data and Holtec Analysis

FY=Financial Year

Demand Supply Gap

Effective capacity is estimated after making the following adjustments:

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

  Estimated future capacities are given in the table below:

Year	Effective Capacity in MTPA
FY 16	390.0
FY 17	417.7
FY 18	434.5
FY 19	446.8
FY 20	453.9
FY 21	457.3
FY 22	457.3

Table : Estimated Future Effective Capacity at National Level

Based on projected demand and supply figures worked out in previous sections, the demand supply gap is shown in below:

Year/Item	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21
Total Effective Capacity	390	418	435	447	454	457
Less Est. Exports (Cement equivalent)	3	3	3	3	3	3
Domestic Supply	387	415	432	444	451	454
Domestic Demand	284	308	333	361	390	423
Surplus/ (Deficit)	**103**	**107**	**98**	**83**	**61**	**32**

Table : Future Demand Supply Gap

A cement surplus situation is envisaged in the coming years and this is likely to result in some plants working at lower capacity utilization.

2.5 Imports Vs Indigenous Production

The proposed cement project is only for indigenous production

2.6 Export Possibility

Not envisaged

2.7 Cement Demand in Domestic Area

The demand supply gap is given in the table below:

Achievable Volumes and Market Shares

The plant is envisaged to be commissioned in two phases with clinker capacity of 2.64 MTPA each in April 2018 and July 2021 respectively. Based on proposed product mix 30% OPC and 70% PPC and balance 15% clinker sale at Panna, the cement capacity works out to be 6 MTPA (to be commissioned in two phases of ~3 MTPA each). Based on the CA analysis, the estimated achievable volumes and market shares of **JKCCL** in 1st Phase is given in the following table:

Market	**Market size FY19 (in mio t)**	**Achievable Sales Volumes (in mio t)**	**Market Share**
Uttar Pradesh	41.98	1.53	4%
Madhya Pradesh	18.59	0.63	3%
Bihar	15.72	0.46	3%
Jharkhand	5.90	0.03	0.4%
Total	**82.19**	**2.65**	**3%**

Table : Achievable Volumes for JKCCL (FY 19): 1st Phase

JKCCL is estimated to have achievable sales volumes of 2.65 MTPA in FY19, which is the first year of operation of the plant in 1st Phase. Based on the CA analysis, the estimated achievable volumes and market shares of JCL in FY22 i.e. after commissioning of 2nd Phase is given in the following table:

Year	**Achievable Volumes (in** MTPA**)**	**Capacity (in MTPA)**	**Capacity Utilization**
FY 19	2.65	3.00	88%
FY 20	2.90	3.00	97%
FY 21	3.00	3.00	100%
FY 22	5.23	6.00	87%
FY 23	5.60	6.00	93%
FY 24 onwards	6.00	6.00	100%

Table : Year wise achievable volume (1st Phase & 2nd Phase)

JKCCL is estimated to sell 100% of its capacity from third year of its operations under both phases.

Net Realization

The average realization is given in the following table:

Figures in Rs. per bag

Particular	1st Phase	2nd Phase
Retail Price	323	329
Freight	67	73
VAT	41	42
Excise	34	15
Margin	15	15
Average Net Realization (Rs per bag)	165	165
Average Net Realization (Rs per t)	3,307	3,294

Table : Ex factory Realization for PPC

OPC is proposed to be priced Rs 5 per bag higher than PPC.

Product Mix

JKCCL proposes to produce have a product mix of 30% OPC and 70% PPC.

Overall Conclusion

The markets of interest for JKCCL are essentially Uttar Pradesh, Madhya Pradesh, Bihar and Jharkhand. It is estimated that JKCCL would be able to sell its entire production in both phases (~3 MTPA each in both phases respectively) from third year of operation.

The average net realization is estimated to be Rs. 3,307 per t for PPC in 1st Phase and Rs. 3,294 per t after commissioning of 2nd Phase. OPC is proposed to be priced Rs. 5 per bag higher than PPC.

2.8 Employment generation (Direct & Indirect)

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

Phase	Manpower		
	General shift	Shifts	Total
Implementation Phase	90	-	**90**
Operation phase	500	230	**730**

Total no. of persons will be Approx 90 persons in implementation phase from JCL & remaining person may be taken from contractor viz fabrication, erection & commissioning etc.

In operation phase the total no. of persons will be Approx 730 persons, JKCCL & remaining person may be taken from contractor works viz Maintenance, Packing etc.

3.0 PROJECT DESCRIPTION

3.1 Type of Project

This proposed project will be an interdependent project. Location of Cement plant is decided by the limestone availability and support in terms of infrastructure factors like road, rail, water and power.

3.2 Location

The plant location falls under industrially backward area. The proposed area is covered in parts of Survey of India Toposheet no. 54 P/15 within latitude 24°19' 10.76" N and Longitude 79°58' 51.05" E

Co-ordinates of Proposed Site

Co-ordinate	1. 24°19'55.86"N - 79°57'32.81"E 2. 24°19'49.35"N- 79°57'50.07"E 3. 24°19'46.56"N - 79°58'28.88"E 4. 24°19'56.25"N - 79°58'29.58"E 5. 24°19'56.39"N - 79°58'50.87"E 6. 24°19'33.64"N - 79°58'51.05"E 7. 24°19'10.76"N - 79°58'33.49"E 8. 24°19'13.79"N - 79°58'1.54"E 9. 24°19'26.63"N - 79°57'36.60"E

Location map of the project are depicted in **Figure-1**

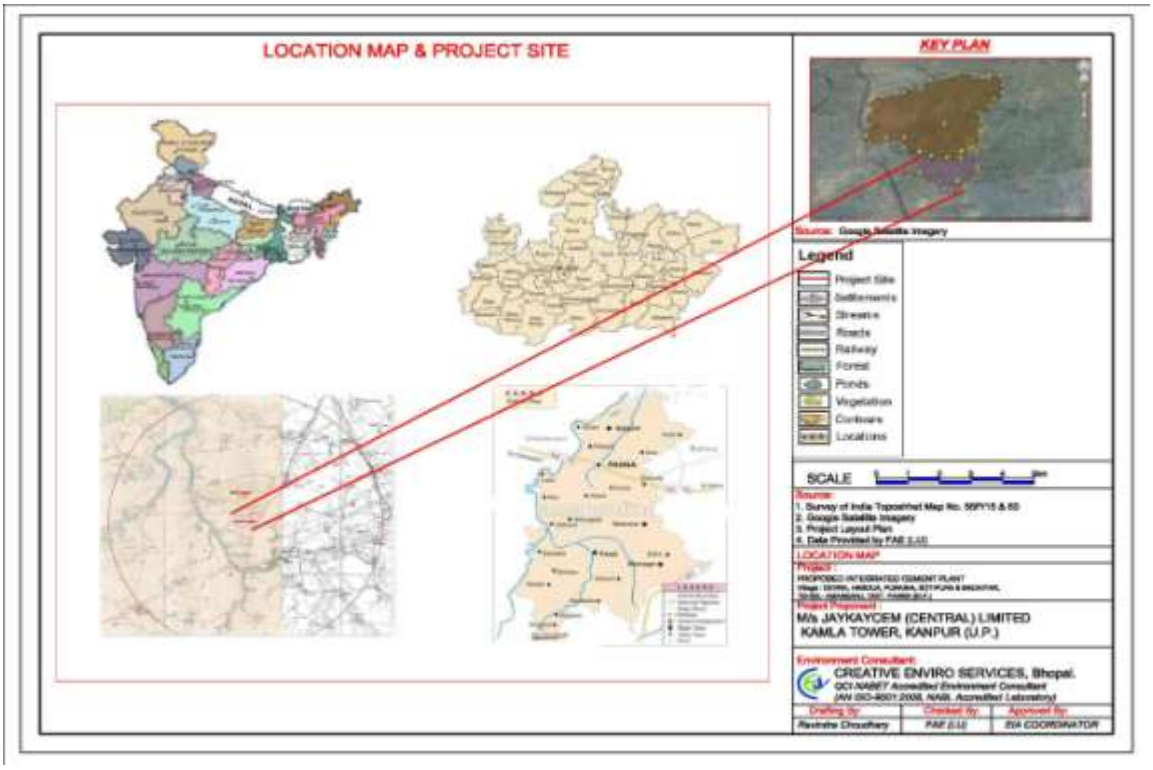


Figure-1 Location of Map of Proposed Site

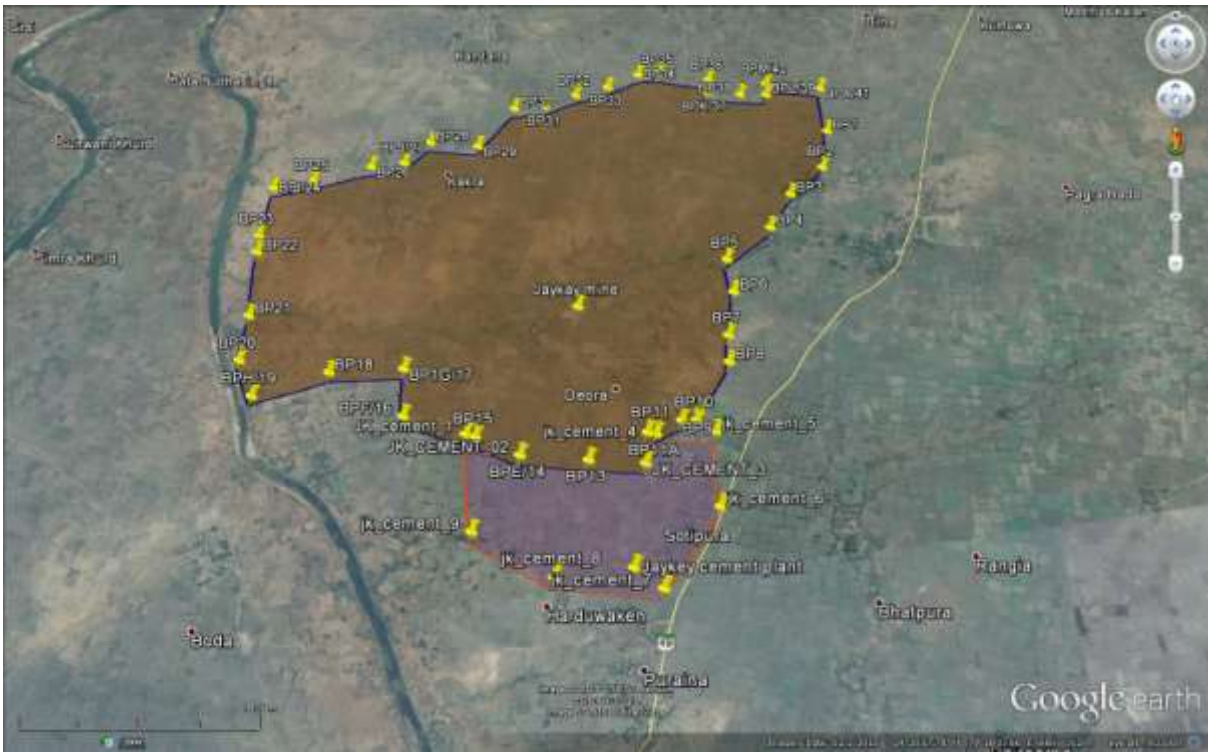


Figure-2 Google View of Proposed Plant & Mine

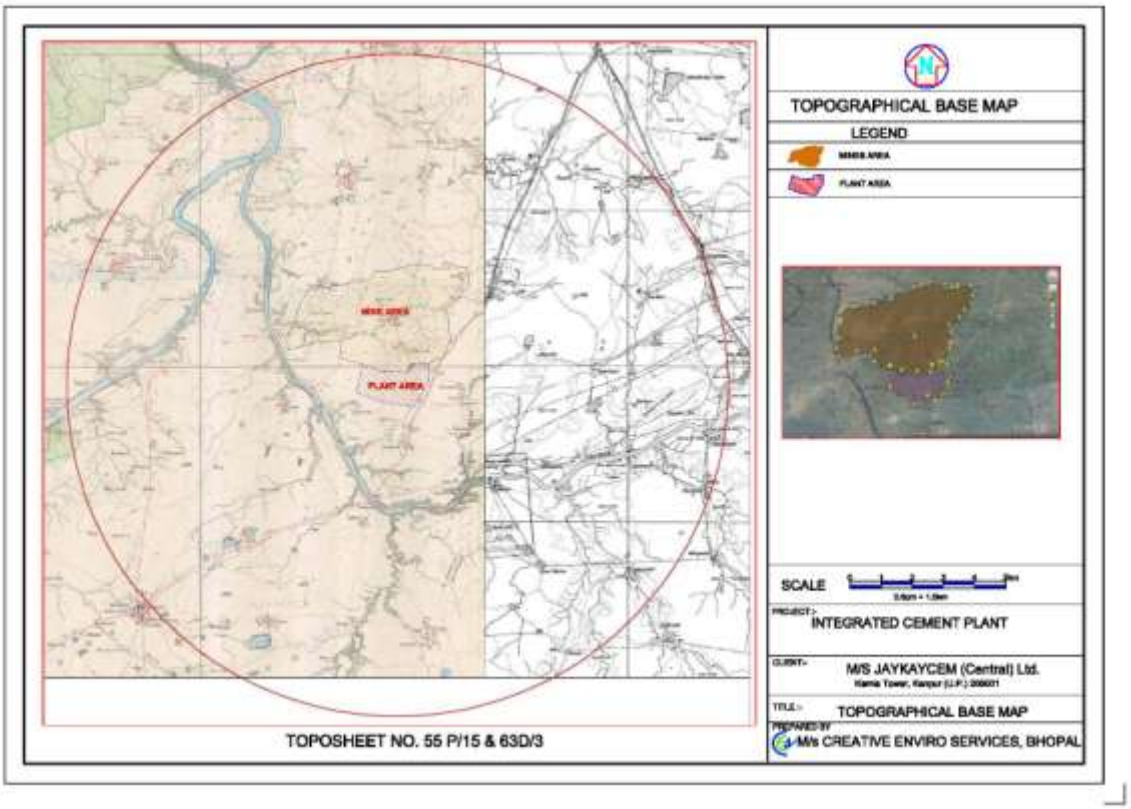


Fig-3 Topographical Map of The Proposed Site

Fig 4 Layout Of The Plant

3.3 Details of alternate site:

The proposed integrated cement plant is pit head type and proposed to be located to the adjacent of the lime stone lease (1594.34 ha) of JKCCL at villages Kakra- Kamtana , hence alternate site has not been identified. Pl refer Fig 2 whereas location of Plant and Lime stone lease has been shown.

3.4 Size of Magnitude of Operation

In view of the improved and better market prospects in future for Cement, JKCCL is planning to set Green Field Cement Plant with the name of JayKayCem (Cemtral) Limited at Village- Harua Ken, Puraina, Sotipura, Madaiyan & Dewra Tehsil Amanganj Dist. Panna (MP).

Cement is an important construction ingredient around the world, and as a result, cement production is a significant source of global carbon dioxide (CO_2) emissions, making up approximately 2.4 percent of global CO_2 emissions from industrial and energy sources.

Cement is produced in large, capital-intensive production plants generally located near limestone quarries. These sources are the principal raw materials used in the cement production process. Because the production plants are expensive, the number of plants in a country is generally limited (less than 100). Carbon dioxide is emitted as a by-product of clinker production, an intermediate product in cement manufacture, in which calcium carbonate (CaCO3) is calcinated and converted to lime (CaO), the primary component of cement. CO2 is also emitted during cement production by fossil fuel combustion. However, the CO2 from fossil fuels is specifically accounted for in emission estimates for fossil fuels.

Plant Design Norms

The conventional industrial norms for plant sizing shall be applicable in all areas. The rich expertise available in JKCCL for higher productivity, lower energy consumption, environmental sustainability and conservation of raw materials shall also be utilized.

Days for Storages

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

S. No	Department	Storage capacity		Days
		Phase-I	Phae-II	
1	Limestone Pre-blending covered Stockpile	2X65000 T	2X65000 T	5 days

2	Iron Ore	2500 T	2500 T	15 days
3	Bauxite	4500T	4500 T	15 days
4	Raw meal Silo	1X27000 T	1X27000 T	1.5 days
5	Clinker Silo	1X60000 T	1X60000 T	7 days
6	Coal stock pile	1X5000 T	1X5000 T	15 days
7	Pet Coke Stock Pile	1X5000 T	1X5000 T	15 days
8	Cement storage	3X12000 T	3X12000 T	4 days
9	Fly ash storage	2X5000 T	2X5000 T	5 days
10	Gypsum storage	1X5000 T	1X5000 T	15 days
11	L/s Additives	1X750 T	1X750 T	15 days

Sizing Norms for Main Machinery

S. No	Department	Operating			Design Factor
		Hrs/ Day	Days/Year	Hrs/Year	
1	Corrective & Additive	10	330	3300	1.15
2	Coal Crusher	10	330	3300	1.15
3	Raw Mill (VRM/RP/BM)	21	330	6930	1.15
4	Kiln	24	330	7920	1.0
3	Coal mill	21	330	6930	1.15
4	Cement Mill	21	330	6930	1.15
5	Packing Plant	15	360	5400	1.25

Size of Major Equipments

Equipment	No.	Capacity
Limestone Stockpile (Circular/Linear)	1 in each phase	2000 tph
Lime Stone pre blending Stock pile	2 in each phase	2X 65000 t
Bauxite , Iron Ore, gypsum crusher	1 in each phase	Common crusher of 100 tph
Coal Crusher	1 in each phase	175 tph
Vertical roller Coal Mill	1 in each phase	75 tph
Raw Mill (Closed Circuit Roller Press)	2 in each phase	2X350 tph
Raw Meal Blending & Kiln Feed	1 in each phase	1X27000 t
Kiln, Pre-heater Six stage, Pre calciner , clinker cooler	1 in each phase	

Cement Grinding System	1 in each phase	2X250 tph
Packers	1 in each phase	3X240 tph

3.5 Process Description

General

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

$CaCO_3$ + heat CaO + CO_2

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

Limestone will be mined from the captive quarry by blasting. It will be transported to the Limestone crusher, which will be either near to the mining lease or near to plant site (adjacent). At crusher limestone which is in the form of boulders are crushed to -40mm.

Limestone Storage

A slewing stacker (Circular/ Linear) piles will store the crushed limestone. The stacking will be carried out in a Chevron configuration creating hundreds of thin layers of material to form the pile. A bridge reclaimer, cutting simultaneously across all the layers, will carry out reclaiming of the stored material. This cross cutting makes the reclaimed limestone much more homogenous compared to the incoming material whose quality depends considerably on the quarry.

Raw Mill Feeding

The reclaimed limestone will be transported to a buffer bin from which is extracted, weighed and fed to a rubber belt conveyor for onward transport to the raw mills. Simultaneously, additives like Bauxite and iron ore are weighed out in proportion to the limestone and fed to the same belt conveyor.

Raw Mill Grinding

The raw material will be dried and pulverized in two vertical roller mills/Roller Press fitted with high efficiency dynamic separators. Apart from energy conservation and the ability to handle large amounts of moisture in the raw materials, the vertical roller mill/Roller Press also scores over the ball mill in terms of lower space requirements, lower noise levels and faster response to change due to a lower material retention time in the mill.

For drying of raw material, hot exhaust gases from the kiln will be used, thus improving the fuel economy of the plant. After utilization in the raw mill, the gases will be de-dusted in a bag house before being released to the atmosphere. The bag house has been chosen instead of an electrostatic precipitator, as the bag house is more dependable, especially during the period when the kiln operation is not steady.

The ground raw meal is transported to the homogenizing and storage silo by Air Slides and Elevators. Compared to the earlier system of pneumatic transport, the mechanical transport is highly energy-efficient and has therefore been selected.

Homogenizing and Storage Blending Silo

The raw meal will be stored in a single large silo. The raw meal is extracted from the bottom through several outlets simultaneously in a predetermined pattern. The extracted raw meal will then be vigorously mixed in a bin behaving as a batch-mix reactor. The computer controlled extraction sequence combines with the batch-mix reactor to give a homogenizing factor as high as 1:10 for the complete system.

The high degree of homogeneity in the raw meal lies well within the present philosophy of kiln control, which depends upon a steady kiln feed to achieve a high sustainable kiln output. The extracted raw meal is weighed and transported to the cyclone pre-heater by belt bucket elevators. Once again the mechanical means of transport has been selected to save energy costs.

Cyclone pre-heater

The cyclone pre-heater is cross current heat exchanger to prevent the raw meal using the hot kiln exhaust gases. In this case, it consists of two strings, each string having six stages of cyclones. The two string pre-heater enables us to reduce the size of the cyclones while keeping the pressure drops across the pre-heater as low as possible. Thus the operation pressures for the induced draft fans are kept low during normal operation, leading to energy saving. Additionally, this aids in forcing the kiln later to a higher output, albeit at a higher pressure drop across the pre-heater.

The total kiln feed is divided in two ways and fed individually to the first stage of each string. From here, the raw meal moves down through each stage, getting progressively heated by exhaust gases. In the second string pre calciner is installed after the fifth stage and the sixth stage of kiln string is fed to the two calciners. Here the raw meals undergo

calcinations, a process in which carbon dioxide is liberated from the calcium carbonate. The raw meal is finally extracted from the gas streams in the two six stage cyclones of the calciner strings.

Kiln

The calcined raw meal will be now fed to the kiln. As it travels down the inclined and continuously rotating kiln, its temperature rises until it reaches about 1400 degrees Celsius in the burning zone. To achieve this rise, Pulverized coal is fired through the outlet end of the kiln with a special multi fuel firing burner. At this temperature, the raw meal melts, providing a fluid liquid phase for the clinkering kiln, is a small portion where the molten clinker cools down marginally and forms nodules.

Cooler

The hot clinker drops in to the grate cooler where clinker will be carried on wide grate sections. From underneath the grates, ambient air is pushed up through holes in the grate, through the clinker bed. The heat from the clinker is passed through the air, most of which is then utilized as secondary air for combustion of coal inside the kiln. The excess air will be de-dusted in an electrostatic precipitator.

The grate cooler has been designed with new grate plates, which require substantially lower volumes of air for same cooling effect. Thus the secondary air entering the kiln is at higher temperature than before, giving rise to heat economy in the clinkering process. The amount of excess air for de-dusting is also reduced correspondingly.

Coal Grinding

Coal of all types will be ground in a vertical roller mill, chosen for its efficient energy utilization and high drying capacity. The mill is also fitted with a high efficiency dynamic separator. The pulverized coal is collected in a bag filter which is selected instead of an electrostatic precipitator, for its reliability as well as safety.

The fine coal will be stored in two bins from which it is extracted, weighed and pumped into the kiln and the two calciners, ILC and SLC.

Clinker Storage

The cooled clinker will be transported to a silo for storage by a Deep Pan Conveyor. For clinker storage, silo & a closed yard are proposed for storage of clinker.

Clinker will be extracted from the bottom of silo through six extractors and transported to the cement mill hoppers by a Deep Pan Conveyors/ Rubber Belt Conveyor.

Cement Grinding

Grinding of finish cement will be carried out in a roller press and ball mill combination/VRM in closed circuit operation. The choice of a VRM or roller press and ball mill combination has been arrived based on energy consumption of this system versus the

traditional ball mill system. The roller press offers considerable saving in the grinding energy required to pulverize cement.

Clinker from the silo or storage yard will be temporarily stored in hoppers, from where both will be extracted in the required proportion, mixed and fed to the roller press. The pressed material is then fed to a grit separator. The coarse output is returned to the roller press for further processing forming a closed circuit. The fine output is fed to the high efficiency separator. The coarse output from this separator is fed to the ball mill for finish grinding. The output from the mill is transported back to the high efficiency separator thus forming the second closed circuit. The fine output from the high efficiency separator is transported to cement silos by bucket elevators.

In JBCCL cement PPC will be prepared through modern technology of fly ash collection, transportation and storage i.e. transportation in closed bulkers and unloading pneumatically. Slag also fed to mill through belt conveyors for PSC Cement requirement

Cement Storage and Packing

Cement will be stored in silos. It is extracted from the bottom of the silos by Air Slides / Screw conveyors and packed into 50 KG bags by electronic packers. The electronic packer offers a higher degree of accuracy and reliability than the mechanical packers. The packed cement will be loaded on rail as well as truck by bag loading machine.

Waste Heat Recovery Power Plant

30 MW Waste Heat Recovery Power Plant (15 MW in each phase) will be installed by utilizing the Waste Hot Gases from the Preheater and Cooler. This power will be use for captive consumption.

Captive Power Plant

80 MW CPP (40 MW in each phase) has been found to be the most suitable configuration and hence same has been adopted. To reduce water consumption use of air cooled condensers have been proposed for condenser cooling.

Power will be generated at 11/6.6 KV. It will be transmitted Main Receiving Station for usage. Imported Coal will be used. Same will be sourced from nearby port. Two boilers each of capacity 180 TPH at 100 Kg/cm2 pressure and 540 deg C temperatures will be provided. Boiler shall be suitable for firing Indian coal.

Power Plant Process Details

Thermodynamic Cycle

It is proposed to have steam cycle with regenerative feed heating system. Main steam from the boiler, after expansion through Turbine, would be exhausted into main condenser where exhaust steam would be cooled by circulation of required quantity of cooling air and the condenser vacuum would be maintained by main air ejectors. For quick air evacuation at start up of the unit, the cycle would be provided with one hogging air ejector.

The turbine would be provided with the facility of being bypassed through the bypass valve.

The feed heating system would consist of low-pressure (LP) heaters, deaerator and high pressure (HP) heaters. In addition, a drain cooler, a gland steam condenser will be provided. The condensate from the condenser hot well would be pumped by condensate extraction pumps to deaerator through ejector, gland steam condenser, drain cooler and LP heaters. The feed water after being de-aerated in the deaerator would be pumped by boiler feed pumps to the boiler through a set of H.P. heaters. Feed water would be heated up in the heaters progressively by steam bled from extraction points of the Turbine. Condensate drain from HP heaters would be cascaded down to the deaerator and drain from LP heaters would be cascaded down to the condenser through the drain cooler.

The auxiliary steam would be tapped from Main steam line (MS) through adequately sized pressure reducing and de-superheating stations for supplying steam for Turbine gland sealing and hogging air ejector.

Plant Layout

As Attached in **Fig-4**

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 50mg/Nm^3 dust on dry basis. A common high temperature resistant reverse air bag house is envisaged for raw mill and kiln gases. All covered sheds/Silos shall be provided for Raw materials and Finished Products.

Pollution Control Equipment

Section	Stack height in mtr	Stack dia in mtr	Gas temp in degree	Control equipment	TPM (mg/Nm3
Raw Mill/Killn	150	5	100-120	Bag filter	50
Clinker Cooler	40	6.5/5.0	90-100	ESP	50
Coal Mill	30	2	50-60	Bag filter	50
Cement Mill Ventilator	30	1	60-70	Bag filter	50

Cement Mill Separator	30	1	60-70	Bag filter	50
Packing Plant	40	1	50-60	Bag filter	50
CPP	110	8.0/6.0	100-120	ESP	50

3.6 Raw materials Sources & Transportation

The additives for correction of raw material such as Bauxite and Iron ore are available in the nearby area and is planned to be outsourced.

Material	Sources	Transportation	Requirement
Limestone	From adjacent captive Limestone Mines	By covered Conveyor belt	12064 TPD
Bauxite	Maihar Dist Satna	100 km By Truck / Rail	300 TPD
Iron ore	Sihora And Katni District	130 km By Truck / Rail	150 TPD
Gypsum	Bikaner Rajasthan	1000 km By Truck / Rail	330 TPD
Flyash	Own generation from CPP and Purchase from Thermal Power plant of Birsingpur & Anuppur	200-300 km by Closed Tankers	1840 TPD
Coal/ Pet Coke	From Coal Linkage – SECL Sohagpur	375 km By Truck/Rail	300 TPD coal fro clinker
	Pet Coke from Bina Refinery and RIl Jamnagar	250/1200	650 TPD coal for CPP
			660 TPD pet coke

Coal Properties

Details of the fuel (Coal & Pet Coke) to be used and its average properties are given below.

S. No.	Item	Indian Coal	Pet Coke
Proximate Analysis			
2	Inherent Moisture, %	1.88	0.32
3	Ash Content, %	36.80	1.985
4	Volatile Matter, %	29.27	9.30
5	Fixed Carbon, %	35.94	80.65
6	Sulpher %	0.5	6.95
7	Gross Calorific Value, Kcal/kg	4350	7938

JKCCL has targeted to restrict the generation of flyash up to a maximum of 35% of coal consumption. The total generated Flyash shall be used for manufacturing of PPC and bed ash for laying haul roads at Mines.

Raw Mixing for Clinker Manufacturing

The proposed raw mixing in clinker manufacturing, based on the test results of the bulk samples, considered is –

Material	Ratio	Material required for 1 ton of Clinker
Cement Grade Lime Stone	77%	1.2050 ton
Blend able Grade Lime Stone	10%	0.1565 ton
Bottom Shale	9.70%	0.1520 ton
Iron Ore	1.10%	0.0175 ton
Bauxite	2.20%	0.0345 ton

Clinkerisation factor: 1.56 MT of raw material for 1 MT clinker Production. **Raw Mixing for Finished Product (Cement)**

The details of the proposed product mix and the expected quantity of different type of cements to be produced based upon the total clinker produced in the proposed Cement Grinding Mills are as given below.

Proposed Product Mix				
S. No	Item	Unit	Cement	
			OPC	PPC
1	Clinker	%	92	67
2	Gypsum	%	3	3
3	Fly ash	%	-	30
4	Lime Stone	%	5	-

Finish Product

Product mix considered for project is:

OPC (Ordinary Portland cement)**/ PPC** (Pozzolona Portland cement)**: 10:90**

Total Clinker Production : 5.28 MTPA

Total Cement (OPC/PPC) Manufacturing for Sale : 6 MTPA

Balance clinker for Sale : 0.4 MTPA

Mode of transport all finish products are by road.

3.7 Resource Recycling

No solid waste will be generated from cement plants. Entire quantity of fly ash generated from CPP will utilized Portland Pozzolana Cement production in the cement plants.

The fugitive dust emissions occurring during material handling and material transfer points will be controlled by installing bag filters and water sprinkling. Closed conveyor belts are used for material transport within the plant premises.

3.8 Water Requirement & Supply

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

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

The water requirement for first phase of Cement Plant, CPP, will be about 3012 KLD for phase-I and around 5700 KLD of water for both the phases including residential colony. However, corrective measures shall be taken to minimize the water consumption by carefully selecting the process equipment. Rain water harvesting measures shall also be taken up.

Water Balance for Cement Plant (for Phase-I)

Heads	Water Consumption in KL	Waste Water Generation
Raw Mill	250 KLD	_
Kiln	300 KLD	_
Cement Mill	250 KLD	_
Compressor	150 KLD	_
Cooler	300 KLD	_
Lab	20 KLD	10 KLD
Factory, plantations, sanitations and spray on roads	200 KLD	50 KLD
Crusher	130 KLD	
Total	**1600**	**60**

Water Balance for CPP (for Phase-I)

Heads	Water Consumption in KL	Waste Water Generation in KL	Remark
Boiler	180	123	Cement and other use
Cooling Tower	225	67	CPP coal yard and other use

WTP & Lab	245	122	Cement plants and other use
Total	**650**	**312**	

Water Balance for WHRB (for Phase-I)

Heads	**Water Consumption in KL**	**Waste Water Generation in KL**	**Remark**
Boiler	126	53	Cement plant and other use
Cooling Tower	184	65	Cement plant and other use
WTP & Lab	120	67	Cement plant and other use
Total	**430**	**185**	
Grand Total for All Above	**2680**	**557**	

The waste water generated from cement plant and CPP Shall be treated in the treatment plant 725 KLD in phase -I and similar arrangement shall be provided for phase-II . The Water requirement from the colony is estimated as 332 KLD and out of which 282 KLD waste water will be generated. sewage generated from the colony shall be treated at another STP of 300 KLD.

3.9 Waste Generation and Waste Management

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

Description	**Expected Annual Qty**	**Unit of Measurement**	**Mode of Disposal**
Used Oil	2	KL	Disposed off 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
Flyash	72000	MTPA	Used for Manufacturing of PPC
Bottom Ash	8000	MTPA	Used for Manufacturing of Bricks

Waste Water from Cement plant & CPP Waste water from Colony	597 282	KL	The waste water generated from cement plant and CPP Shall be treated in the treatment plant 725 KLD in phase -I and similar arrangement shall be provided for phase-II . The sewage generated from the colony shall be treated at STP of 300 KLD
Transformer Oil	2	KL	Giving to PCB approved Agencies
STP Sludge	10	MT	Used as Manure and used for Plantation

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 12000 Liter/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

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.

4. SITE ANALYSIS

4.1 Connectivity

The proposed plant site is located at a distance of about 14 km from Amanganj and can be approached from Amanganj by traveling on State Highway SH-49 (connecting Damoh - Hata - Amanganj - Panna – Ajaygarh, in M.P. to Naraini in U.P. The proposed plant site is located at about 700 m from state highway (SH-49) in the west direction. Considering the short distance between Mines and the proposed plant site, it is envisaged that crusher

shall be located in the mine area. The northern boundary of proposed site of the plant adjoins the southern boundary of granted Limestone mining lease.

No railway station is located in the vicinity of the proposed cement plant. In separate arrangement to be taken up in future, after the completion of the present project, a Cement grinding unit is being considered to be located in village Rupaund tehsil Badwara District Katni. Rupaund railway station is located at a distance of about 115 km South East direction from the presently proposed plant site in villages Harduwa Ken etc. Rupaund station falls under South East Central Railway and its Divisional headquarter is located at Bilaspur. Rupaund is considered for developing the railway siding in future.

4.2 Details of land of proposed plant

The Project shall be set up in 199.84 ha (say 200 Ha) of land . No forest land is involved, Mostly Single Crop, Low yield Agriculture and waste land have been chosen for the project. The details of the land has been given as below :

Khasra Wise Details Of The Land For Proposed Cement Plant, Whrs, Thermal Power & Colony

Village - Hardua ken			
Sr. No.	**Khasra no.**	**Area (in Hect.)**	**Status of Land**
1	58	1.14	Private land
2	59/1	0.39	Private land
3	59/2	0.40	Private land
4	311/1	0.27	Private land
5	311/2	0.28	Private land
6	311/3	0.27	Private land
7	311/4	0.26	Private land
8	312	0.56	Private land
9	313	0.56	Private land
10	321/1	0.25	Private land
11	321/2	0.24	Private land
12	321/3	0.24	Private land
13	321/4	0.24	Private land
14	308	0.27	Private land
15	309	0.15	Private land
16	310	0.17	Private land
17	314	0.92	Private land

18	320	1.03	Private land
19	307	0.27	Private land
20	315	0.03	Private land
21	306	0.16	Private land
22	293	0.05	Private land
23	294	1.20	Private land
24	305	0.11	Private land
25	316/1/ka	0.20	Private land
26	316/1/kha	0.51	Private land
27	316/2	1.00	Private land
28	318	0.45	Private land
29	319	0.41	Private land
30	292	0.01	Private land
31	323/1/ka	0.49	Private land
32	323/1/kha	0.03	Private land
33	323/2	0.53	Private land
34	322/1	0.80	Private land
35	322/2	1.80	Private land
36	322/3	1.26	Private land
37	324	0.61	Private land
38	325/1	0.46	Private land
39	325/2	0.47	Private land
40	325/3	0.47	Private land
41	333/1	2.22	Private land
42	333/2	0.80	Private land
43	331/1	0.35	Private land
44	331/2	0.36	Private land
45	330/1	0.39	Private land
46	330/2	0.39	Private land
47	330/3	0.40	Private land
48	326	0.82	Private land
49	327/1	0.16	Private land
50	327/2	0.17	Private land
51	343	0.10	Private land
52	345	0.79	Private land
53	317	0.40	Private land
54	328/1	0.67	Private land
55	328/2	0.81	Private land

56	332	0.31	Private land
57	335	0.71	Private land
58	336	0.14	Private land
59	337	0..93	Private land
60	334	0.24	Private land
61	340	0.50	Private land
62	341/1	1.19	Private land
63	341/2	0.40	Private land
64	342	0.13	Private land
65	338	0.74	Private land
66	339	0.53	Private land
67	377	0.55	Private land
68	378	1.30	Private land
69	817/1	0.09	Private land
70	817/2	0.09	Private land
71	817/3	0.10	Private land
72	817/4	0.10	Private land
73	850	0.65	Private land
74	851	0.02	Private land
75	852	0.28	Private land
76	853	0.73	Private land
77	854	0.36	Private land
78	855	0.06	Private land
79	856	1.28	Private land
80	857	0.33	Private land
81	858	0.80	Private land
82	859	0.31	Private land
83	860	0.40	Private land
84	861	1.89	Private land
85	862	1.15	Private land
86	863	0.79	Private land
87	864	0.89	Private land
88	865	0.77	Private land
89	866	2.07	Private land
90	867	1.25	Private land
91	868	0.64	Private land
92	869	1.25	Private land
93	870/1	0.60	Private land

94	870/2	0.61	Private land
95	871	0.81	Private land
96	872	0.85	Private land
97	873/1	0.39	Private land
98	873/2	0.60	Private land
99	847/1	1.24	Private land
100	874/2	1.24	Private land
101	821/1	0.06	Private land
102	821/2	0.06	Private land
103	821/3	0.06	Private land
104	821/4	0.17	Private land
105	822/1	0.27	Private land
106	822/2	0.27	Private land
107	822/3	0.27	Private land
108	822/4	0.82	Private land
109	830	0.04	Govt. (Par)
110	831	1.01	Private land
111	832	0.04	Govt. (Par)
112	833	1.11	Private land
113	834	3.01	Private land
114	838	1.13	Private land
115	839	0.54	Private land
116	840	0.56	Private land
117	841	0.56	Private land
118	842/1	1.00	Private land
119	842/2	0.26	Private land
120	843	0.96	Private land
121	844	0.96	Private land
122	845/1	0.34	Private land
123	845/2	0.20	Private land
124	845/3	0.20	Private land
125	845/4	0.20	Private land
126	846/1	0.28	Private land
127	846/2	0.27	Private land
128	847	0.20	Private land
129	848/1	0.80	Private land
130	848/2	0.60	Private land
131	849	2.41	Private land

132	329	1.50	Private land
133	346	0.03	Govt. (Banjar)
134	344	0.05	Govt. (Par)
135	820	1.08	Govt. (Road)
136	818/1	1.32	Private land
137	818/2	0.40	Private land
138	819/1	0.60	Private land
139	819/2	0.60	Private land
140	819/3	0.61	Private land
141	798	0.38	Private land
142	797	0.03	Govt. (Par)
143	796/1	0.18	Private land
144	796/2/ka	0.21	Private land
145	796/2/kha	0.40	Private land
146	823	1.24	Private land
147	824	0.08	Govt. (Par)
148	825	0.04	Private land
149	826/1/ka	0.60	Private land
150	826/1/kha	0.44	Private land
151	826/2	0.40	Private land
152	827	0.96	Private land
153	828	1.08	Private land
154	829	0.02	Govt. (Par)
155	835	0.58	Private land
156	836	0.66	Private land
157	837	0.94	Govt. (Road)
158	875	3.58	Private land
159	876	0.48	Private land
160	877	0.87	Private land
161	878	0.06	Private land
162	879	0.78	Private land
163	880	0.46	Private land
164	881	0.45	Private land
165	882	0.32	Private land
166	883	0.30	Private land
167	884	0.41	Private land
168	888	0.05	Govt. (Par)
169	887	1.01	Private land

170	786	0.77	Private land
171	787	1.23	Private land
172	788	0.65	Private land
173	789/1	0.29	Private land
174	789/2	0.30	Private land
175	790/1	0.34	Private land
176	790/2	0.34	Private land
Total area (in hect.)		**102.95**	
Total area of Govt. Land (in hect.)		**2.36**	
Total area of Private land (in hect.)		**100.59**	

Village – Devra			
Sr. No.	**Khasra No.**	**Area (in Hect.)**	**Status of Land**
1	801	0.08	Private land
2	802	0.12	Private land
3	803	0.46	Private land
4	836	0.32	Private land
5	837	0.05	Private land
6	838	0.81	Private land
7	839	0.09	Private land
8	840	0.74	Private land
9	841	0.02	Private land
10	842	0.15	Private land
11	843	2.41	Private land
12	844	1.59	Private land
13	845	1.52	Private land
14	846	0.09	Private land
15	847	0.24	Private land
16	848	0.35	Private land
17	849	0.06	Private land
18	850	0.59	Private land
19	851	0.04	Private land
20	852	0.03	Private land
21	853	0.02	Private land
22	854	0.30	Private land
23	855	0.06	Private land
24	856	0.37	Private land
25	857	0.03	Private land

26	858	0.34	Private land
27	859	0.92	Private land
28	860	0.34	Private land
29	861	0.03	Private land
30	862	0.05	Private land
31	863	0.62	Private land
32	864	0.56	Private land
33	865	0.08	Private land
34	866	0.61	Private land
35	867	0.05	Private land
36	868	0.62	Private land
37	869	0.04	Private land
38	870	0.66	Private land
39	871	0.07	Private land
40	872	0.06	Private land
41	873	0.41	Private land
42	874	0.32	Private land
43	875	0.07	Private land
44	876	0.42	Private land
45	877	0.02	Private land
46	878	0.49	Private land
47	879	0.06	Private land
48	880	0.37	Private land
49	881	0.95	Private land
50	882	0.25	Private land
51	883	0.25	Private land
52	884	0.39	Private land
53	885	0.04	Private land
54	886	0.06	Private land
55	887	0.61	Private land
56	888	0.04	Private land
57	889	0.66	Private land
58	890	0.10	Private land
59	891	0.65	Private land
60	892	0.09	Private land
61	893	0.52	Private land
62	894	0.09	Private land
63	895	0.46	Private land

64	896	0.10	Private land
65	897	1.17	Private land
66	898	0.05	Private land
67	899	0.06	Private land
68	900/1	0.04	Private land
69	900/2	0.06	Private land
70	900/3	0.06	Private land
71	901	0.91	Private land
72	902	0.12	Private land
73	903	0.85	Private land
74	904	0.15	Private land
75	905	0.74	Private land
76	906	0.05	Private land
77	907	0.07	Private land
78	908	0.69	Private land
79	909	0.05	Private land
80	910	0.46	Private land
81	911	0.49	Private land
82	912	0.06	Private land
83	913	0.65	Private land
84	914	0.06	Private land
85	915	0.51	Private land
86	916	0.02	Private land
87	917	0.08	Private land
88	918	0.22	Private land
89	919/1	1.47	Private land
90	919/2	0.29	Private land
91	944	0.04	Private land
92	945	0.05	Private land
93	946	0.06	Private land
94	947	0.58	Private land
95	948	0.06	Private land
96	949	0.60	Private land
97	950	0.23	Private land
98	951	0.08	Private land
99	952	0.07	Private land
100	953	0.53	Private land
101	954	0.03	Private land

102	955	0.40	Private land
103	956	0.03	Private land
104	957	0.75	Private land
105	958	0.41	Private land
106	959	0.02	Private land
107	960/1/ka	0.27	Private land
108	960/1/kha	0.20	Private land
109	960/2	0.03	Private land
110	961	1.24	Private land
Total area (in hect.)		**38.07**	
Total area of Govt. Land (in hect.)		**Nil**	
Total area of Private land (in hect.)		**38.07**	
Village – Maddiyan			
Sr. No.	**Khasra No.**	**Area (in Hect.)**	**Status of Land**
1	41	0.11	Private land
2	42	1.70	Private land
3	57	1.46	Private land
4	58	0.60	Private land
5	59	0.76	Private land
6	60/1	1.45	Private land
7	60/2	0.40	Private land
8	60/3	0.40	Private land
9	61	1.15	Private land
10	62	1.02	Private land
11	63/1	0.43	Private land
12	63/2	0.60	Private land
13	64	0.60	Private land
14	65	0.28	Private land
15	66	0.38	Private land
16	67	0.28	Private land
17	68/1	0.40	Private land
18	68/2	0.39	Private land
19	69/1	0.65	Private land
20	69/2	0.65	Private land
21	70/1	0.24	Private land
22	70/2	0.53	Private land
23	71	1.23	Private land

24	72	0.70	Private land
25	73	0.12	Private land
26	74	0.35	Private land
27	75	0.85	Private land
28	76	1.36	Private land
29	77/1	0.55	Private land
30	77/2	0.40	Private land
31	78	0.98	Private land
32	79	1.20	Private land
33	80	0.18	Private land
34	81	0.13	Private land
35	82	0.59	Private land
Total area (in hect.)		**23.12**	
Total area of Govt. Land (in hect.)		**Nil**	
Total area of Private land (in hect.)		**23.12**	

Village – Sotipura			
Sr. No.	**Khasra No.**	**Area (in Hect.)**	**Status of Land**
1	1/1.	0.34	Private land
2	1/2.	0.35	Private land
3	2	0.88	Private land
4	3	0.77	Private land
5	4	1.21	Private land
6	5	0.32	Govt. (Charnoi)
7	6/1.	0.25	Private land
8	6/2.	0.24	Private land
9	7/1.	0.80	Private land
10	7/2.	0.87	Private land
11	8	1.14	Private land
12	9	0.61	Private land
13	10	0.51	Govt. (Charagah)
14	11	1.05	Private land
15	12	0.93	Private land
16	13	1.73	Private land
17	14	0.91	Private land
18	15/1	0.62	Private land
19	15/2	0.62	Private land

20	16	0.41	Private land
21	17	1.00	Private land
22	18	0.59	Private land
23	19	0.84	Private land
24	20/1	0.83	Private land
25	20/2	0.40	Private land
26	21	0.77	Govt. (Charnoi)
27	22/1	0.23	Private land
28	22/2	0.23	Private land
29	23	0.68	Govt. (Charnoi)
30	24	0.42	Govt. (Charnoi)
31	25	0.40	Govt. (Khalihan)
32	26	0.87	Govt. (Charnoi)
33	27/1.	0.44	Private land
34	27/2.	0.40	Private land
35	28	0.39	Private land
36	29/1	0.23	Private land
37	29/2	0.23	Private land
38	30	0.93	Govt. (Charnoi)
Total area (in hect.)		**24.44**	
Total area of Govt. Land (in hect.)		**4.90**	
Total area of Private land (in hect.)		**19.54**	

Village – Puraina			
Sr. No.	**Khasra No.**	**Area (in Hect.)**	**Status of Land**
1	837	0.02	Private land
2	838	0.25	Private land
3	839	0.04	Private land
4	840	0.64	Private land
5	841	0.04	Private land
6	842	0.25	Private land
7	843	0.03	Private land
8	844	0.10	Private land
9	845	0.25	Private land
10	846	0.50	Private land
11	847	0.34	Private land
12	848	0.71	Private land
13	849	0.05	Private land

14	850	0.04	Private land
15	851	0.66	Private land
16	852	0.05	Private land
17	853	0.07	Govt. (Par)
18	854	0.04	Govt. (Par)
19	855	0.65	Private land
20	856	1.21	Private land
21	857	1.70	Private land
22	858	0.09	Private land
23	859	0.07	Private land
24	860/1	0.38	Private land
25	860/2	0.37	Private land
26	861	0.05	Govt. (Par)
27	862/1	0.03	Private land
28	862/2	0.60	Private land
29	863	0.07	Private land
30	898	1.79	Private land
31	899	0.17	Private land
Total area (in hect.)		**11.26**	
Total area of Govt. Land (in hect.)		**0.16**	
Total area of Private land (in hect.)		**11.10**	
Total Land (in all five villages) required for the Cement Plant, WHRS,Thermal Power & Colony			
Private Land - 192.42 Hect.		**Government Land - 7.42 Hect.**	
Grand Total - 199.84 say 200 Hect.			

Land use breakup:

Sr. No	**Description**	**Land In Sq mtr**	**Percentage (%) of Total Land**
1	Built Up area (including utilities for cement plant	510879.66	25.56
2	CPP/WHR	105215.76	5.27
3	Road area	57404.66	2.87
4	Township	269353.99	13.48
5	Green Belt Development	660000.00	33.03

6	Open Land	395545.93	19.79
Total		**1998400.00**	**100**

4.3 Environmental Settings in and around 10 Kms radius from the proposed site

S. No	Particulars	Details
1	Latitude	$24^0$19′10.76″- $24^0$19′56.39″ N
2	Longitude	$79^0$57′32.81″ - $79^0$58′51.05″- E
3	Height above mean sea level	317mRL
4	Nearest City	Amanganj – 13.15 km Semariya – 9.75km
5	Nearest Railway Station	Khajuraho Railway Station - 53.25Km
6	Nearest Airport	Khajuraho -55.50 km
7	Nearest Highway	Panna- Amanganj- Simariya SH-49 – 0.3Mtrs
8	Nearest Village	Sotipura, Hardua, Puraina
9	Hills/Valley	None within 10km radius
10	Ecological Sensitive Zone	None within 10km radius
11	Reserve Forest	Pagra PF – 8.0km - SW
12	Historical Place	No
13	Nearest River/ Nalla	Ken River – 0.9 km – West Sonar River - 5.6 km –WNW Devra Nala – 1.10km- N Jonaro Nadi - 2.80km – S Karhawani N - 6.50km – NNE
	Co-ordinates	1. 24°19'55.86"N - 79°57'32.81"E 2. 24°19'49.35"N- 79°57'50.07"E 3. 24°19'46.56"N - 79°58'28.88"E 4. 24°19'56.25"N - 79°58'29.58"E 5. 24°19'56.39"N - 79°58'50.87"E 6. 24°19'33.64"N - 79°58'51.05"E 7. 24°19'10.76"N - 79°58'33.49"E 8. 24°19'13.79"N - 79°58'1.54"E 9. 24°19'26.63"N - 79°57'36.60"E

4.4 Topography

The terrain in the area proposed for plant is largely flat without major undulations. Topographically the proposed area slopes gently from North to South, with level difference range of 319M to 315M. There is no perennial / seasonal nala or river flowing within the proposed plant area.

4.5 Existing Infrastructure

Road

Well connected with state highway 49 by a stretch of about 300 mt and the national highway by about 48 Km.

Rail line

Nearest rail head is Damoh on Katni-Bina section of western railway and is located about 85 Kms.

Other infrastructure are available at Amanagnj and district head quarter Panna.

4.6 Soil Classification

The rocks exposed in the area under consideration apparently belong to the Lakheri formation of the Bhander Group. In the proposed area, the rocks include a conformable package of limestone, calcareous silt/ sandstone and shale. Soil is the most important feature of physiography, the formation of which largely depends upon the topography, rock types and drainage. The cropping pattern in the area is governed by the thickness of soil mantle, its texture and consistency.

The numerous varieties of soils known by many local names they are grouped under the representative classes.

4.7 Climate

The area witnesses subtropical climate and receives an average rainfall of 1200 mm annually. The variation in temperature is from 25^0 to about 46^0 C in summers and 8^0 to about 22^0C during winter. The wind generally blows in northeast direction. From November to February the area experiences winter, while April to June the region experiences the summer. The monsoon sets in by June and retreats by September. Relative humidity averages from 30% to 90% during the year. Proposed operation will adopt all type of mitigating measures thus the adverse effect on environment may be minimized.

Year	Annual rainfall	Temperature ^{0}c	
	In mm	Maximum	Minimum
1997	1093.3	45.8	4.3

1998	1144.2	46.2	4.2
1999	1140	45.7	4.8
2000	1280	46.5	4.6
2001	1180	46.5	4.2
2002	1400	46.5	4.6
2003	1210	47.6	4.1
2004	1234	47.2	4.0
2005	1240	47.1	4.1
2006	1130	48.0	4.0
2007	1248	47.2	4.5
2008	1885	44.6	5.8
2009	1145	44.9	6.2
2010	1080	44.3	5.8
2011	1120	44.6	6.2
2012	1105	43.9	4.8
2013	1089	44.2	4.1
2014	1102	45.2	4.5

Temperature

The area has generally hot climate. In summers the maximum temperature ranges between 25^0 C to 46 ^{0} C and in the winter from 8^0C to 12^0C.

Rainfall

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

Relative Humidity

The annual relative humidity varies between 30 to 90%.

Seismology

The proposed plant site area falls in Seismic Zone III. This aspect shall be duly considered while designing the structures.

4.8 Social Infrastructure

The Site is surrounded by Sotipura, Hardua, Puraina Kakra, Kamtana, Saptai, Judi, Devri Purohit and Devra villages scattered all around. Primary schools are situated in almost all villages while medical facilities are available in Amanganj. Nearest town is Amanganj which is almost 7 km away from the proposed site for the plant.

Demographic Data Of The Villages In And Around The Study Area

S. No.	Village Name	Tahsil/Dist	No Of Households	Population			SC		ST		Literates	
				Total	M	F	M	F	M	F	M	F
1	Amanganj (NP)	Gunnor/Panna	2135	11609	6233	5376	1189	1041	226	202	4127	2776
2	Badkhera Kalan	Pawai/Panna	132	734	403	331	137	103	5	4	288	211
3	Balgaha	Gunnor/Panna	160	814	412	402	0	0	286	279	157	59
4	Bamhori	Gunnor/Panna	378	1937	1002	935	346	299	6	1	476	215
5	Baraunha	Gunnor/Panna	90	424	225	199	0	0	225	199	41	14
6	Bhainswahi	Gunnor/Panna	109	531	277	254	107	107	1	1	178	126
7	Bhatpura	Pawai/Panna	12	67	35	32	0	0	0	0	28	20
8	Bilha	Pawai/Panna	77	508	268	240	8	12	11	9	195	139
9	Bilha(Dharmpur)	Gunnor/Panna	147	684	365	319	54	51	4	1	156	66
10	Birasan	Pawai/Panna	131	661	343	318	108	100	0	0	205	114
11	Boda	Pawai/Panna	296	1433	776	657	241	202	36	25	542	317
12	Chandanpur	Pawai/Panna	115	520	270	250	148	142	0	0	169	125
13	Chikhla	Pawai/Panna	245	1251	662	589	195	160	0	0	200	112
14	Dagdha	Gunnor/Panna	67	353	180	173	42	42	0	0	116	74
15	Devra	Pawai/Panna	148	787	429	358	122	97	9	9	333	211
16	Dharampura (Kunwarpur)	Gunnor/Panna	66	402	208	194	77	63	0	0	110	63
17	Ganyari	Pawai/Panna	257	1266	654	612	210	213	0	0	254	85
18	Ghatari (Amanganj)	Gunnor/Panna	182	971	490	481	157	149	0	0	246	108
19	Gudmania	Pawai/Panna	122	643	330	313	89	73	0	0	246	156
20	Hinauta Dubey	Gunnor/Panna	50	237	124	113	7	6	0	0	92	54
21	Hinauti	Gunnor/Panna	349	1771	935	836	361	352	0	0	510	236
22	Itaura	Gunnor/Panna	7	55	34	21	0	0	0	0	22	8
23	Itauri	Gunnor/Panna	124	663	330	333	136	132	0	0	153	74
24	Jhagra	Gunnor/Panna	80	474	261	213	78	51	0	0	145	77
25	Jharkuwa (Kudra)	Gunnor/Panna	173	841	425	416	95	99	0	0	219	125

26	Jhirata	Pawai/Panna	162	689	368	321	28	35	0	0	209	63
27	Jijgaon	Gunnor/Panna	148	663	345	318	92	91	0	0	229	155
28	Judi	Gunnor/Panna	44	260	134	126	15	11	0	0	66	40
29	Kakarhai(Panna)	Gunnor/Panna	54	304	146	158	17	19	0	0	83	47
30	Kakra	Gunnor/Panna	112	500	263	237	29	25	0	0	93	47
31	Kalyanpura	Gunnor/Panna	8	38	19	19	0	0	0	0	16	8
32	Kamtana	Gunnor/Panna	722	3774	1979	1795	507	420	244	238	980	558
33	Kanchaura	Gunnor/Panna	59	304	161	143	76	69	0	0	64	24
34	Karia	Pawai/Panna	403	2105	1094	1011	230	211	0	0	759	507
35	Khalon	Pawai/Panna	106	488	263	225	74	65	0	0	156	69
36	Kinna	Pawai/Panna	6	31	19	12	6	3	0	0	5	0
37	Koni	Pawai/Panna	248	1211	616	595	189	195	0	0	385	206
38	Kudra	Gunnor/Panna	162	785	397	388	200	215	25	18	177	95
39	Kuluwa	Gunnor/Panna	19	93	53	40	18	18	0	0	30	14
40	Kumhari	Pawai/Panna	149	787	415	372	38	24	94	94	298	240
41	Maddayan	Gunnor/Panna	60	295	153	142	0	0	0	0	110	83
42	Mahalrampur	Gunnor/Panna	49	235	120	115	31	40	0	0	93	54
43	Maharajganj	Pawai/Panna	17	79	38	41	0	0	0	0	32	31
44	Mahguwan	Gunnor/Panna	106	433	213	220	91	94	68	81	122	70
45	Mahuwa Dando	Gunnor/Panna	130	570	315	255	37	29	175	141	210	137
46	Majhgawa Shekh	Gunnor/Panna	90	502	267	235	86	73	0	0	157	64
47	Majhgawan Pahad	Pawai/Panna	87	405	217	188	129	117	9	6	126	61
48	Majra	Pawai/Panna	20	122	66	56	15	13	0	0	34	16
49	Mania	Pawai/Panna	71	324	169	155	72	70	0	0	125	94
50	Mukeha	Gunnor/Panna	133	653	339	314	122	109	12	8	126	55
51	Pagra	Pawai/Panna	98	459	244	215	41	36	0	0	125	43
52	Pagra Bada	Gunnor/Panna	436	2175	1155	1020	364	334	0	0	743	437
53	Palohi	Pawai/Panna	145	740	400	340	99	87	0	0	204	95
54	Patna Kalan	Pawai/Panna	110	548	296	252	121	109	0	0	164	82
55	Patna Kalan	Pawai/Panna	285	1484	785	699	396	338	0	0	506	298

56	Pipariya Khurd	Gunnor/Panna	36	236	131	105	0	0	0	0	58	30
57	Pipra Narayanpura	Pawai/Panna	108	598	313	285	34	32	0	0	205	133
58	Puraina	Pawai/Panna	281	1519	809	710	215	194	0	0	545	346
59	Purwa	Pawai/Panna	56	282	149	133	17	18	0	0	114	68
60	Raiguwan	Pawai/Panna	141	798	435	363	125	126	2	3	214	90
61	Rampur	Gunnor/Panna	334	1610	834	776	34	28	399	394	381	151
62	Rangia	Pawai/Panna	10	85	37	48	11	12	0	0	21	26
63	Sanaura	Gunnor/Panna	57	313	168	145	42	26	59	47	95	59
64	Saptai	Gunnor/Panna	50	205	106	99	0	0	16	21	59	20
65	Saptaiya	Gunnor/Panna	30	115	65	50	53	41	0	0	29	13
66	Sarsela	Pawai/Panna	69	330	178	152	52	48	0	0	101	59
67	Sata Budhasingh	Pawai/Panna	300	1592	867	725	213	167	0	0	429	213
68	Simariya Garhi	Pawai/Panna	818	4102	2198	1904	637	534	7	6	1206	723
69	Simra Kalan	Pawai/Panna	56	291	148	143	22	28	0	0	75	52
70	Simra Khurd	Pawai/Panna	13	51	32	19	9	4	0	0	13	7
71	Singhaura	Gunnor/Panna	170	815	411	404	55	53	128	125	193	129
72	Siri	Gunnor/Panna	527	2719	1427	1292	378	364	342	298	766	365
73	Sirsi	Pawai/Panna	139	694	373	321	46	40	46	42	216	101
74	Sotipura	Pawai/Panna	6	37	20	17	0	0	0	0	17	13
75	Sunwani Kalan	Pawai/Panna	513	2465	1341	1124	379	307	12	7	815	439
76	Sunwani Khurd	Pawai/Panna	103	531	271	260	18	20	35	39	181	132
77	Surajpura	Pawai/Panna	83	426	239	187	9	12	13	10	121	40
78	Tahanga	Pawai/Panna	68	338	184	154	87	69	0	0	78	41
79	Tighra	Pawai/Panna	293	1416	787	629	227	190	0	0	456	249
80	Udla	Pawai/Panna	248	1183	626	557	71	71	223	217	290	115
81	Umri	Pawai/Panna	210	1122	596	526	53	51	0	0	384	224
	Total		**14760**	**75345**	**39874**	**35471**	**9826**	**8784**	**2959**	**2752**	**22804**	**13148**

Sr. No.	Village Name	Tahsil	Total Workers		Main Workers		Cultivators		Agriculture Labours		HH Industry		Other Workers		Marginal Workers		Non Workers	
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1	Rampur	Gunnor	473	342	455	101	172	15	113	56	14	6	156	24	18	241	361	434
2	Baraunha	Gunnor	122	130	109	104	5	1	100	102	0	0	4	1	13	26	103	69
3	Kalyanpura	Gunnor	14	8	14	8	14	8	0	0	0	0	0	0	0	0	5	11
4	Majhgawa Shekh	Gunnor	138	139	138	132	97	97	33	32	0	0	8	3	0	7	129	96
5	Mahuwa Dando	Gunnor	145	112	145	111	58	16	83	95	0	0	4	0	0	1	170	143
6	Balgaha	Gunnor	212	131	208	118	70	25	116	74	6	1	16	18	4	13	200	271
7	Siri	Gunnor	747	526	715	481	383	232	176	167	35	26	121	56	32	45	680	766
8	Mahguwan	Gunnor	117	50	117	48	57	4	39	40	7	4	14	0	0	2	96	170
9	Hinauti	Gunnor	518	368	471	190	212	92	62	33	10	12	187	53	47	178	417	468
10	Hinauta Dubey	Gunnor	58	35	57	33	29	16	18	16	0	0	10	1	1	2	66	78
11	Sanaura	Gunnor	83	39	82	39	55	24	22	15	0	0	5	0	1	0	85	106
12	Singhaura	Gunnor	222	134	199	119	79	22	105	87	1	0	14	10	23	15	189	270
13	Kanchaura	Gunnor	82	13	79	1	45	0	2	0	1	0	31	1	3	12	79	130
14	Jijgaon	Gunnor	179	101	157	23	75	7	42	9	1	2	39	5	22	78	166	217
15	Kamtana	Gunnor	1029	618	994	500	450	144	386	317	57	27	101	12	35	118	950	1177
16	Kakra	Gunnor	133	112	124	17	58	4	60	13	0	0	6	0	9	95	130	125
17	Saptai	Gunnor	51	48	49	1	25	0	22	1	0	0	2	0	2	47	55	51
18	Pipariya Khurd	Gunnor	77	52	77	51	37	7	40	44	0	0	0	0	0	1	54	53
19	Itaura	Gunnor	16	4	14	0	11	0	0	0	0	0	3	0	2	4	18	17
20	Dharampura (Kunwarpur)	Gunnor	108	58	106	52	78	7	28	45	0	0	0	0	2	6	100	136

Sr. No.	Village Name	Tahsil	Total Workers		Main Workers		Cultivators		Agriculture Labours		HH Industry		Other Workers		Marginal Workers		Non Workers	
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
21	Bilha(Dharmpur)	Gunnor	203	73	182	41	119	28	62	13	0	0	1	0	21	32	162	246
22	Kulhuwa	Gunnor	27	15	23	13	17	7	5	5	1	1	0	0	4	2	26	25
23	Jhagra	Gunnor	120	106	110	38	80	28	8	5	1	0	21	5	10	68	141	107
24	Judi	Gunnor	62	52	61	3	52	3	6	0	0	0	3	0	1	49	72	74
25	Pagra Bada	Gunnor	600	395	538	95	395	51	56	25	6	4	81	15	62	300	555	625
26	Maddayan	Gunnor	86	72	68	8	63	6	4	2	0	0	1	0	18	64	67	70
27	Bamhori	Gunnor	575	511	505	141	289	91	70	28	29	11	117	11	70	370	427	424
28	Bhainswahi	Gunnor	142	93	141	67	85	42	28	14	0	0	28	11	1	26	135	161
29	Dagdha	Gunnor	83	62	83	21	66	9	1	0	7	5	9	7	0	41	97	111
30	Saptaiya	Gunnor	42	34	7	0	3	0	1	0	0	0	3	0	35	34	23	16
31	Kudra	Gunnor	217	200	202	10	149	4	44	6	1	0	8	0	15	190	180	188
32	Jharkuwa (Kudra)	Gunnor	233	159	218	47	153	33	27	8	0	0	38	6	15	112	192	257
33	Itauri	Gunnor	187	123	175	55	131	42	34	13	0	0	10	0	12	68	143	210
34	Ghatari (Amanganj)	Gunnor	263	232	232	95	74	8	86	75	5	0	67	12	31	137	227	249
35	Mukeha	Gunnor	200	124	177	92	122	58	39	29	0	1	16	4	23	32	139	190
36	Kakarhai(Panna)	Gunnor	85	92	77	89	65	78	10	11	0	0	2	0	8	3	61	66
37	Mahalrampur	Gunnor	62	59	49	30	36	25	8	5	0	0	5	0	13	29	58	56
38	Amanganj (NP)	Gunnor	2886	563	2568	329	428	28	93	47	201	33	1846	221	318	234	3347	4813
39	Khalon	Pawai	154	113	132	29	88	12	32	17	0	0	12	0	22	84	109	112
40	Jhirata	Pawai	196	61	132	10	111	6	10	2	6	0	5	2	64	51	172	260
41	Surajpura	Pawai	146	115	136	36	83	22	48	14	0	0	5	0	10	79	93	72
42	Sunwani Kalan	Pawai	742	504	556	99	297	39	116	33	43	14	100	13	186	405	599	620

Sr. No.	Village Name	Tahsil	Total Workers		Main Workers		Cultivators		Agriculture Labours		HH Industry		Other Workers		Marginal Workers		Non Workers	
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
43	Simra Khurd	Pawai	19	13	16	8	13	7	3	1	0	0	0	0	3	5	13	6
44	Simra Kalan	Pawai	80	64	72	36	53	22	17	12	0	0	2	2	8	28	68	79
45	Sunwani Khurd	Pawai	149	103	138	62	86	28	38	31	0	0	14	3	11	41	122	157
46	Sirsi	Pawai	192	181	191	43	77	14	69	24	0	0	45	5	1	138	181	140
47	Raiguwan	Pawai	227	201	220	15	199	9	16	5	1	0	4	1	7	186	208	162
48	Udla	Pawai	335	183	167	30	87	3	9	7	3	2	68	18	168	153	291	374
49	Patna Kalan	Pawai	133	28	102	6	71	1	8	3	0	0	23	2	31	22	163	224
50	Sata Budhasingh	Pawai	483	266	468	256	229	98	205	148	15	10	19	0	15	10	384	459
51	Koni	Pawai	339	132	324	29	194	8	53	12	7	3	70	6	15	103	277	463
52	Boda	Pawai	391	210	224	26	187	18	22	6	0	0	15	2	167	184	385	447
53	Maharajganj	Pawai	27	30	25	16	18	10	7	5	0	1	0	0	2	14	11	11
54	Pagra	Pawai	150	140	145	114	50	42	92	72	0	0	3	0	5	26	94	75
55	Ganyari	Pawai	352	73	314	40	219	7	60	22	32	11	3	0	38	33	302	539
56	Simariya Garhi	Pawai	1131	490	1067	368	325	110	322	172	57	28	363	58	64	122	1067	1414
57	Chikhla	Pawai	375	338	369	325	229	205	135	120	0	0	5	0	6	13	287	251
58	Tahanga	Pawai	110	77	101	75	77	63	18	11	3	1	3	0	9	2	74	77
59	Majra	Pawai	41	35	38	15	33	14	4	1	0	0	1	0	3	20	25	21
60	Birasan	Pawai	197	173	179	98	146	73	28	23	0	0	5	2	18	75	146	145
61	Majhgawan Pahad	Pawai	102	56	71	29	10	3	2	0	0	0	59	26	31	27	115	132
62	Pipra Narayanpura	Pawai	170	142	44	3	30	0	4	1	0	0	10	2	126	139	143	143
63	Gudmania	Pawai	180	53	165	5	127	2	30	2	2	0	6	1	15	48	150	260

Sr. No.	Village Name	Tahsil	Total Workers		Main Workers		Cultivators		Agriculture Labours		HH Industry		Other Workers		Marginal Workers		Non Workers	
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
64	Patna Kalan	Pawai	449	396	352	146	217	56	85	79	17	6	33	5	97	250	336	303
65	Kinna	Pawai	10	6	3	0	2	0	1	0	0	0	0	0	7	6	9	6
66	Karia	Pawai	577	413	443	61	321	27	77	30	14	2	31	2	134	352	517	598
67	Mania	Pawai	82	68	62	0	61	0	1	0	0	0	0	0	20	68	87	87
68	Palohi	Pawai	200	10	200	8	166	5	26	3	0	0	8	0	0	2	200	330
69	Umri	Pawai	274	270	271	176	139	47	129	128	1	0	2	1	3	94	322	256
70	Tighra	Pawai	366	329	313	142	284	125	29	14	0	0	0	3	53	187	421	300
71	Purwa	Pawai	81	28	80	3	71	2	4	0	4	0	1	1	1	25	68	105
72	Devra	Pawai	236	59	124	5	97	2	9	0	0	0	18	3	112	54	193	299
73	Sotipura	Pawai	12	12	7	0	7	0	0	0	0	0	0	0	5	12	8	5
74	Rangia	Pawai	19	23	10	1	10	1	0	0	0	0	0	0	9	22	18	25
75	Bhatpura	Pawai	18	13	13	0	10	0	1	0	0	0	2	0	5	13	17	19
76	Puraina	Pawai	407	216	330	99	240	87	24	3	8	2	58	7	77	117	402	494
77	Kumhari	Pawai	261	213	237	2	184	1	50	0	0	0	3	1	24	211	154	159
78	Bilha	Pawai	165	110	159	7	140	2	15	4	0	0	4	1	6	103	103	130
79	Sarsela	Pawai	118	83	104	36	80	25	18	11	3	0	3	0	14	47	60	69
80	Chandanpur	Pawai	139	91	118	11	94	4	20	3	3	1	1	3	21	80	131	159
81	Badkhera Kalan	Pawai	211	123	171	5	152	0	8	1	5	0	6	4	40	118	192	208
	Total		**20848**	**12370**	**18274**	**5871**	**9662**	**2463**	**3875**	**2452**	**607**	**214**	**4130**	**742**	**2574**	**6499**	**19026**	**23101**

Summary of Panna District, Madhya Pradesh

Population Growth Rate

The change of 18.62 percent in the population of the district is recorded when compared to population as reported in the previous census of India in 2001, while the increase has been 24.50 percent to its population in 1991.

Density 2011

The total area of Panna district is 7,135 square kilometres.

The density of Panna 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 Panna in 2011 was 66.08 compared to 61.36 of 2001, with split in gender reveals as male 75.63% and female 55.55%. For 2001 census, the figures stood at 73.33 and 47.97. Total literate in Panna District were 565,120 of which male and female were 339,312 and 225,808 respectively.

Sex Ratio 2011

As regards the Sex ratio in Panna, it stood at 907 female members per 1000 male members compared to 2001 census figure of 901. The average national sex ratio in India is 940 as per latest reports of Census 2011. Child sex ratio is 910 girls per 1000 boys compared to figure of 932 girls per 1000 boys of 2001 census data.

Child Population 2011

In census enumeration, data regarding child under 0-6 age were also collected for all districts including Panna. There were total 160,884 children under age of 0-6 against 171,060 as per 2001 census, with male and female 84,216 and 76,668 respectively. Child Sex Ratio as per census 2011 was 910 compared to 932 of census 2001. In 2011, Children under 0-6 amounted to 15.83% compared to 19.97% in 2001 census in Panna District.

Urban Population 2011

As per the 2011 census, 125,321 people, amounting to 12.33% of the total population, comprising 65,935 males and 59,386 females live in urban areas. Sex Ratio in urban region of Panna district is 901 as per 2011 census data. Similarly child sex ratio - male to female in Panna district was 1000 to 910 in 2011 census. Child population (0-6) in urban region was 15,616 of which males and females were 8,178 and 7,438 respectively.

Average literacy rate in Panna district as per census 2011 is 80.62 % of which males and females are 87.04 % and 73.49 % respectively. In terms of number 88,447 persons, amounting to 80.62%, are literate in urban region of which males and females are 50,269 and 38,178, amounting to 87.04 % and 73.49 % respectively in terms of percentage.

Rural Population 2011

As per 2011 census, 87.67 % population of Panna districts lives in rural areas of villages. Total population in Panna district living in rural areas is 890,707 of which males and females are 466,931 and 423,776 respectively, with sex ratio of 908 females per 1000 males. Child sex ratio of Panna district is 910 girls per 1000 boys. Child population in the age bracket of 0-6 is 145,268 in rural areas with males being 76,038 and females 69,230. The child population comprises 16.28 % of total rural population of Panna district. Literacy rate in rural areas of Panna district is 63.95 % as per census data 2011. Gender wise, male and female literacy stood at 73.94 and 52.92 percent respectively. In total, 476,673 people were literate of which males and females were 289,043 and 187,630 respectively.

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 1000 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 like 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

Panna district is governed under eight number of Tehsils and five 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 labourers 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 Kamtana, about 7 kms from the proposed site. All the villages under study are covered by postal services. Besides, there are a large number of PCOs are also available.. However during field discussions, need for improvement of these services was desired.

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. Noticeable number of respondents in core and buffer zone expressed that credit lending institutions are not adequate and access to available credit institutions is also difficult due to non availability of right information to avail credits. These facilities call for a concerted effort for up gradation.

Table: Credit Availability from different Sources

Sr. No.	Institutions	Core Zone				Buffer Zone			
		Yes	%	No	%	Yes	%	No	%
1	Cooperative Bank	53	6.99	705	93.01	45	13.12	298	86.88
2	Government Institutions	13	1.72	745	98.28	6	1.75	337	98.25
3	Government Credit Society	100	13.19	658	86.81	116	33.82	227	66.18
4	Village Lender	106	13.98	652	86.02	12	3.50	331	96.50
5	Credit Lender	157	20.71	601	79.29	38	11.08	305	88.92
6	Friends	261	34.43	497	65.57	109	31.78	234	68.22
7	Relatives	278	36.68	480	63.32	93	27.11	250	72.89
8	Others	53	6.99	705	93.01	45	13.12	298	86.88

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.

Table: Use of fuel energy in the project area villages

Sr. No.	Energy Source	Unit	Availability
1	Fire Wood	Kg.	796974
2	Rock oil	Lit.	22020
3	Electricity	Unit	4185300
4	Biogas	Hours	3
5	Solar Energy	Days	0
6	Smokeless Chullaha	No.	1500
7	Cow Dung Cake	No.	276000

8	LPG	No.	1800
9	Other	No.	0
	Total		**5283597**

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 centres 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 programmes.

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 centres, 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 Amanganj.
- Primary health centres are available. A Govt. run hospital is functional in Amanganj.
- Nurses, midwifes named as "Asha" Karyakarta visit all the villages on fixed days of the week.
- There are private doctors in town like Amanganj and Panna.

- 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 phases 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. PLANNING BRIEF

5.1 Planning Concept

Successful implementation of the project is dependent on proper planning of simultaneous and interacting activities, from the preparation of Concept to the commissioning of the project. Delay in implementation results in cost over-runs as well as loss of opportunity. This chapter covers the objectives, methodology, project activities envisaged, implementation strategies, critical activities & project implementation schedule.

Objective

The objectives of implementation planning are:

- To elaborate the implementation programme and time schedule.

- To formulate strategies for successful implementation.

Project Activities Pre-project activities

All activities up to the finalization of orders for main machinery are considered as pre-project activities. Briefly, these are as follows:

- Management decision to go ahead with the project.
- Submission of application for financial loan to the financial institutions - Arrangement of internal financial resources.
- Appointment of project consultant.

Approval from competent authorities in respect of:

The following

- Environmental clearance from Central Government - State Pollution Control Board clearance.
- Sanction and supply of power from State Government.
- NOC from Grampanchyat
- El (Electrical & Instruments) Basic engineering including preparation of main machinery tender specifications.
- Drawing and preparation of bulk samples for technological tests by main machinery suppliers.
- Floating tender enquiries, evaluation and placement of order for main machinery.
- Land acquisition and site development including leveling of land, soil testing, construction of roads, construction of boundary walls, gates and arrangement of water etc.

Project execution activities

The project execution activities, after placement of orders for main machinery, in brief are as under:

- Detailed engineering of the project.
- Procurement of auxiliary equipment and systems.
- Civil construction activities.
- Logistics planning for supply of raw materials and other related input materials.
- Entering into long term contracts with respective contractors for supply of raw materials etc.
- Erection of machinery including installation of electrical equipment and instrumentation.
- Trial runs and Commissioning.
- Commercial production and shipment of Cement to the market.

Project Implementation Strategy

Following implementation, any one of the following strategies for project execution can be adopted for execution of the proposed project:

- **Turnkey**
- **Semi - turnkey with limited package**

5.2 Population Projection

Description	2011	2001
Actual Population	1,016,028	856,558
Male	532,866	450,549
Female	483,162	406,009
Population Growth	18.62%	24.50%
Area Sq. Km	7,135	7,135
Density/km2	142	120
Proportion to Madhya Pradesh Population	1.40%	1.42%
Sex Ratio (Per 1000)	907	901
Child Sex Ratio (0-6 Age)	910	932
Average Literacy	66.08	61.36
Male Literacy	75.63	73.33
Female Literacy	55.55	47.97
Total Child Population (0-6 Age)	160,884	171,060
Male Population (0-6 Age)	84,216	88,544
Female Population (0-6 Age)	76,668	82,516
Literates	565,120	420,622
Male Literates	339,312	265,457
Female Literates	225,808	155,165
Child Proportion (0-6 Age)	15.83%	19.97%
Boys Proportion (0-6 Age)	15.80%	19.65%
Girls Proportion (0-6 Age)	15.87%	20.32%

Description	**Rural**	**Urban**
Population (%)	87.67 %	12.33 %
Total Population	890,707	125,321
Male Population	466,931	65,935
Female Population	423,776	59,386
Sex Ratio	908	901
Child Sex Ratio (0-6)	910	910
Child Population (0-6)	145,268	15,616

Male Child(0-6)	76,038	8,178
Female Child(0-6)	69,230	7,438
Child Percentage (0-6)	16.31 %	12.46 %
Male Child Percentage	16.28 %	12.40 %
Female Child Percentage	16.34 %	12.52 %
Literates	476,673	88,447
Male Literates	289,043	50,269
Female Literates	187,630	38,178
Average Literacy	63.95 %	80.62 %
Male Literacy	73.94 %	87.04 %
Female Literacy	52.92 %	73.49 %

5.3 Land Use Breakup of the proposed Area:

Please refer section 4.2.

5.4 Infrastructure Demand

Infrastructure is the underlying platform and hidden capital required to operate the facilities for society in general, various Information, Communication, Technology and Telecommunication environment. Without a solid infrastructure, environment would be unreliable, which might in turn place your business at risk of downtime and may bring business to a grinding halt.

5.5 CSR Strategy

Proposed Programme under CSR

1. **Infrastructure Creation:**

a. Drinking Water Infrastructure:

b. Irrigation Infrastructure:

- Enhancement and safe guarding of surface water bodies
- Soil and water conservation activities

c. Sanitation Facilities:

- Construction of closed drainage lines with proper disposal facilities.

d. Other infrastructure:

- Street lights provision.

2. **Education Program:**

- Provision of individual kits (bags, uniform)
- Develop volunteers to provide extra tuitions after school hours.

- Promotion of science and mathematics clubs in schools.
- Provision of transport facilities for secondary and college going students.
- Computer and English training courses for secondary school students.
- Provision of a scholarship scheme for bright students/ students from marginalized groups.
- Promotion of good secondary school with school bus facility to a cover a number of villages.
- Proposal for setting up Alternative School for drop outs for vocational skills.
- Provision of computers in schools.

4. **Health Program:**

- Proposal to increase the number of mobile units and also link them with referral facility.
- Provision of Group medical insurance
- Specific program for respiratory diseases and kidney stone.
- Proposal to develop a specific program for health care facilities for elderly persons.

4. Livelihood Program:

- Training and development of small scale job execution facilities
- Training and development of the inhabitants service industry related activities
- Focus on 2-3 crops for agriculture and horticulture
- Focus more on drip/sprinkler irrigation and supply of improved seed varieties.
- The fodder supply to cattle in the village, available local fodder, etc.
- Development of fodder plots to encourage fodder purchase locally. This would also give additional income to some groups.
- Exploration of alternative job options for fishing community.
  Business potential survey in the region and develop youth training curriculum on those lines.
- Proposal for vocational training, business development courses for youth. They shall be supported to access bank loan/Govt schemes for setting up their own enterprise and/or also provided with job counselling services.
- Support for product development and marketing to local artisans.

6. PROPOSED INFRASTRUCTURE

6.1 Industrial Infrastructure for the proposed plant

Presently the area is devoid of industrial growth. With proposed integrated cement plant, ancillaries units may develop in the area. The project shall provide enough infrastructure for the employees and nearby population.

- **Water**: Water treatment and distribution from central pumping station head has been considered. Water requirement is estimated around 3012 m3/day in phase -1 (which includes plant, colony, CPP). A suitable rain water harvesting scheme is proposed to save and store water.
- **Air Conditioning**: Central air conditioning for the CCR's has been considered.
- **Compressed Air**: Two centralized compressor houses have been envisaged (along with some local compressors).
- **Workshop**: A reasonably good workshop facility has been envisaged for mechanical, electrical & control and mining machinery in the plant.
- **Stores**: Adequate storage facility for spares of the machinery as well as consumables has been envisaged. Covered as well as open space has been provided.
- **Laboratory & Engineering Office**: A well equipped Laboratory shall be provided (along with Engineering office) in the CCR building.
- **Security & Time Office**: Security, Time office and Administration building has been proposed.
- **Weighbridges:** weigh bridges with centralized control has been proposed for incoming and outgoing materials.
- The plant shall have high level automation for Plant Quality Control system with automated sample collection for raw materials, clinker, fuel followed by testing by combined XRF & XRD analyzer for on-line quality control of product.

6.2 Residential Area

Essential staff and workmen of the plant shall be accommodated in the colony proposed within the site and will have banking, health and education facilities

6.3 Green Belt

JCCL shall develop a total of 66 ha (33.02%) area as green belt with approx 1,25 ,000 number of trees. The green belt shall be developed in block wise at Plant, Colony, along the roads, along the boundary and other utilities area.

6.4 Social Infrastructure

JKCCL will focus on specific areas that it believes can have a significant impact on an individual's quality of life and potentially provide multiple indirect benefits. The proponent intends to achieve significant results by focusing on areas that have a significant effect on an individual's quality of life. We elaborate these areas as quality Education, Healthcare, and Infrastructure, supporting livelihood which help Social

upliftment of vulnerable and deprived group of persons in clean and green Environment.

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.

6.5 Connectivity

The proposed plant site is located at a distance of about 7.5 km from Amanganj and can be approached from Amanganj by traveling on State Highway SH-49 (connecting Damoh - Hata - Amanganj - Panna – Ajaygarh, in M.P. to Naraini in U.P. The proposed plant site is located at about 300 m from state highway (SH-49) in the west direction. Considering the short distance between Mines and the proposed plant site, it is envisaged that crusher shall be located in the mine area. The northern boundary of proposed site of the plant adjoins the southern boundary of granted Limestone mining lease.

No railway station is located in the vicinity of the proposed cement plant. In separate arrangement to be taken up in future, after the completion of the present project, a Cement grinding unit is being considered to be located in village Rupaund. Rupaund railway station is located at a distance of about 115 km South East direction from the presently proposed plant site in villages Harduwa Ken etc. Rupaund station falls under

South East Central Railway and its Divisional headquarter is located at Bilaspur. Rupaund is considered for developing the railway siding in future.

6.6 Drinking Water

JKCCL 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.

6.7 Sewerage System

The sewage treatment system shall be installed to treat the sewage generated from domestic water consumption in cement plant and colony. The treated water shall be used for green belt development in the Plant and Colony. The waste water generated from cement plant and CPP Shall be treated in the treatment plant 725 KLD in phase -I and similar arrangement shall be provided for phase-II . The sewage generated from the colony shall be treated at STP of 300 KLD The sludge generated from the STP shall used as manure for plantation.

6.8 Industrial and Solid Waste management

Please refer to paragraph 3.9.

6.9 Power Requirement & Supply

Power Requirement and Source

The maximum power demand for the proposed Plant, Mines and Colony has been estimated at about 86 MW for both phase. The power requirement is proposed to be met through installation of Captive Power Plant (CPP) and Waste Heat Recovery based power plant (WHRS). Accordingly 40 MW CPP together with 15 MW power generation through WHRS is proposed in each phase, totaling to 80 and 30 MW respectively in total of two phases. For emergency power requirement, grid connectivity has been envisaged. Nearest 132 KV grid substation of Madhya Pradesh Power Transmission Company Limited (MPPTCL) is located at Pawai at a crow fly distance of about 20 km from the proposed plant site. The construction power has been envisaged to be made available by providing 2 or 3 DG sets of 500/250 KVA. Or from 11 KV line as could be feasible.

Power Distribution

Primary Medium Voltage (6.6 kV) Power Distribution System

The power to plant loads shall be distributed via Load Centers, located close to the electrical loads in different process departments

A process-conform subdivision of power distribution shall limit the interdependencies between departments. A power failure or maintenance shutdown in one department shall not affect other plant sections. Power to various decentralized consumers spread over the plant layout shall be provided by means of cables installed on cable trays placed on utility bridges and/ or support structures of conveying equipment inter-connecting the major plant departments.

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 at LV & MV Bus (considering MV and LV-compensation).

Low Voltage Power Distribution and MCC (415 V 50 Hz)

The low voltage power distribution scheme has to comply with the process requirements. Independent process departments shall receive independent power supplies and distributions. Process departments are generally determined by material storage facilities. Power will be distributed from the primary power distribution system to distribution of transformers arranged in separate rooms located adjacent to the decentralized electrical rooms of various plant sections. These transformers will supply power to low voltage distribution switchgears, to which all consumers, such as lighting, motor control centers (MCC), large low voltage motors, low voltage power factor correction equipment and non- process equipment (e.g. auxiliary buildings), will be connected. The low voltage distributions systems will be equipped with controlled capacitor banks arranged in the different electrical rooms close to the MCC's. The entire power distribution system (HV, MV and LV) shall be designed to guarantee selective fault isolation, isolating a faulty circuit from the remainder of the electrical system and thereby eliminating unnecessary power outages.

The low voltage power distribution switchgear and the MCC shall be located in decentralized electrical rooms in the respective plant buildings. All electrical rooms shall be generously sized and provide enough space for future modifications and additions. In order to fulfill the operational requirements and to allow fully automatic control and supervision (digital and analogue) through PLC from the Central Control Room, all LV-Distribution equipment and MCC's shall be equipped with I/O-units as an integral part of the LV- Distribution or MCC-panels. The I/O-units shall provide a compatible standard bus system and protocol for the signal exchange with the Process Control System applied. The I/O-unit hardware shall be located in a separate section of the LV-or MCC-panel. The status of each individual input or output at the I/O-unit shall be visible from outside the panel

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).

Electrical System Components

Drives

The type of drives considered is based on following requirements:

- Speed/ torque characteristics of the driven equipment
- Enclosure protection depending upon the work environment
- Performance characteristics i.e. high power factor and efficiency at operating point
- Accuracy and range of speed control required for specific application

All motors, generally above 225 kW shall be connected to 6.6 kV distribution and all motors below 225 kW shall operate on 415 V. In addition to this all motors above 132 kW rating shall have starting current limiting device and shall be provided with soft starters to ensure smooth start. Power saving equipment like medium voltage AC variable frequency (MVAC) drives and low voltage AC variable frequency (LVAC) has been taken into consideration to minimize energy costs as to achieve precise speed control

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. Rehabilitation And Resettlement

The proposed project does not require any Rehabilitation and resettlement (R&R) Plan. However if such a matter arises and is to be necessarily adopted in future, the same shall be complied by JKCCL as per the Central/State Govt. policies. Compensation for the farmers losing their land is given on mutual negotiations. This practice will be stringently adhered to in future also. In addition, majority of workers will be deployed from the nearby villages as per their eligibility.

8. PROJECT SCHEDULE & COST

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. The detailed time schedule for project execution after placement of main machinery order up to commissioning of the plant, in the form of bar charts is given below.

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

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

Basis of Estimates:

The estimated project cost for installation of total 5.28 MTPA capacity clinker production,6 MTPA Cement productions, 80 MW CPP with 30 MW Waste Heat Recovery in two phases, has been considered on the basis of existing prevailing rates in the market, though there were indications of reduction in cost per ton due to entry of Chinese vendors. There is certain case where the cost per ton is less than that what has been considered. The total investment cost estimate for the proposed project works out to **Rs. 277434 Lakhs in Phase-I** and **Rs. 281261Lakhs in Phase-I.** The estimated Investment Cost for the project has been based on the requirement of fixed and non-fixed assets

Project Cost Estimate

An abstract of the cost estimate for the installation is being furnished below. The cost estimate includes all items.

Sn	Description	Total cost (Rs. in Lacs)	
		1 st phase	2nd Phase
1.	Land and site development	62,642	76,979
2.	Civil works and Structures	45,073	39,928
3.	Plant and Machinery including Mining Equipments	77,924	76,097
4.	Engineering & Know How	1,000	400
5.	Expense on Training	100	50

6.	Miscellaneous Fixed Assets including CPP, WHR. Railway Siding at Rupaund for Clinker Loading in future.	42,229	40,178
7.	Pre-Operative Expenses including Interest during Construction period	28,638	29,915
8.	Contingency	17,430	17,714
9.	Margin Money for working Capital	2,397	
	Total Project Cost	**277,434**	**281,261**

UNIT COST OF PRODUCTION IN BOTH PHASES									
S.NO	**Description**	**Unit**	**Rs/Unit**	**Qty/ Unit**	**Qty/ Unit**	**Qty/ Unit**	**Cost (RS/T)**	**Cost (Rs/T)**	**Cost (Rs/T)**
				Clinker	**OPC**	**PPC**	**Clinker**	**OPC**	**PPC**
1.0	Raw Materials & Consumables								
1.1	Limestone	Tonnes	159	1.36	1.25	0.91	216.62	199.29	145.14
1.2	Bauxite	Tonnes	850.00	0.03	0.03	0.02	29.27	26.92	19.61
1.3	Iron Ore	Tonnes	700.00	0.02	0.02	0.01	12.05	11.09	8.07
1.4	Bottom Shale	Tonnes	55.00	0.15	0.14	0.10	8.35	7.68	5.59
1.5	Fly Ash	Tonnes	1,050.00			0.30	0.00	0.00	315.00
1.6	Limestone In Opc	Tonnes	159.10		0.05		0.00	7.96	0.00
1.7	Gypsum	Tonnes	2,750.00		0.03	0.03	0.00	82.50	82.50
1.8	Consumables						38.50	55.00	55.00
	Sub Total (1)						304.79	390.44	630.91
2.0	Utilities								
2.1	Power	KWH	2.90	55.00	82.00	70.00	159.50	237.80	203.00
2.2	Coal	Tonnes	6,283.75	0.11	0.097	0.071	663.94	610.83	444.84
2.2	Water						1.00	1.00	1.00
	Sub Total (2)						824.44	849.63	648.84
3.0	Wages & Salaries Incl.						37.68	53.83	53.83
4.0	Factory Overheads						70.00	100.00	100.00
5.0	Administrative						35.00	50.00	50.00
	Sub Total (1 + 2 + 3 +						1,271.91	1,443.90	1,483.59

6.0	Packing Expenses							190.00	190.00
	TOTAL UNIT CASH COST OF PRODUCTION						**1,271.91**	**1,633.90**	**1,673.59**

9. ANALYSIS OF PROPOSAL (Final Recommendation)

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 central, northern and 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 industrially backward- virtually non-industrial district of Panna. 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 phases 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).