

# **PRE-FEASIBILITY REPORT**

**FOR  
PROPOSED STANDALONE CEMENT GRINDING UNIT OF 2.0  
MTPA CAPACITY WITHIN THE PREMISES OF UDUPI POWER  
CORPORATION LIMITED (UPCL)  
AT**

**Village Yellur; Taluka & District Udipi (Karnataka)**



**adani™**

**ADANI CEMENTATION LIMITED  
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Ahmedabad, Gujarat – 380009**

**January' 2017**

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## Executive Summary

<b>Company</b>	:	Adani Cementation Limited (ACL)			
<b>Project Concept</b>	:	Udupi Cement Grinding Plant (UCGP)			
	:	2 MTPA Portland Pozzolana Cement (PPC), Ordinary Portland Cement (OPC), Portland Slag Cement (PSC) Grinding Unit (in 2 phases - Phase-1: 1MTPA & Phase-2: 1MTPA)			
<b>Plant Location</b>	:	The UCGP is proposed within the premises of 'Udupi Power Corporation Limited' located near village Yellur, Taluka & District Udupi (Karnataka)			
<b>Toposheet No.</b>	:	D43016			
<b>Geographical Coordinate</b>	:	Latitude : 13 <sup>0</sup> 09'17.04" to 13 <sup>0</sup> 09'33.49"			
	:	Longitude : 74 <sup>0</sup> 48'16.49" to 74 <sup>0</sup> 48'29.78"			
<b>S. No. in the Schedule</b>	:	3 (b) - Category as per EIA Notification 2006			
<b>Land Area</b>	:	35 Acres of land as allocated by UPCL			
<b>Water Requirement</b>	:	300 m <sup>3</sup> /Day (It will be sourced from KIDC supply water under an agreement subject to approval from the concerned regulatory authorities)			
<b>Material transportation, Sources and Distances from site.</b>	:	<b>Material</b>	<b>Source</b>	<b>Distance in Km</b>	<b>Mode of Transport</b>
	:	Clinker	i. Imported (West Asia) ii. Domestic (Gulbarga, Nalgonda-Kadappa Cluster) iii. In-house clinker manufacturing unit at Lakhpat.	30 Km (from Mangalore Port)	Road/Rail
	:	Gypsum	Imported / Domestic Sources		
	:	Limestone	Domestic (Gulbarga, Nalgonda-Kadappa Cluster)		
	:	Fly Ash	UPCL or any other Thermal plant.	0 Km	Pneumatic Conveyor
<b>Basic for assessment</b>	:	Product Mix		OPC	PPC
	:	Clinker		96%	61%
	:	Fly ash		-	35%
	:	Gypsum		4%	4%
<b>Power Requirement</b>	:	15 MVA			
<b>Man Power Requirement</b>	:	Construction: 500 Persons			
	:	Operation : 65 Persons			
<b>Nearest Rly. Stn, / Airport</b>	:	Railway Station	: Nandikur Rly. Stn. (0.8 km SW)		
	:	Airport	: Mangalore (23.4 km, South)		
<b>Nearest town/city/DH</b>	:	Mangalore (25 km)			
<b>Project Implementation period</b>	:	<b>24 Months:</b>			
	:	6 Month	: Main Machinery Ordering Phase and		
<b>Cost of the Project</b>	:	18 Months : Construction Phase			
	:	INR 556.25 Crore			
<b>MISC Details</b>	:	The existing private railway siding of UPCL shall be utilized after obtaining necessary approvals from Indian Railways			

## **Introduction of the project/ background information**

### **2.1 Introduction**

Adani Cementation Limited (ACL) proposes to set up a Cement Grinding Unit with capacity of 2.0 MTPA within the plan boundaries of Udupi Power Corporation Ltd (UPCL) in the Village Yellur, District- Udupi, Karanataka. The project is proposed to be executed in 2 phases of 1 MTPA each.

### **2.2 Background**

#### **Promoter**

Adani Cementation Limited is subsidiary of Adani Enterprises Limited (AEL) founded in 1988. Adani has grown to become a global integrated infrastructure player with businesses in key industry verticals - resources, logistics, energy and agro. The integrated model is well adapted to the infrastructure challenges of the emerging economies. It has combined market capitalization in excess of US\$ 20 billion, a sales turnover of US\$ 9 billion, employing over 10,000 people and having diverse interests in global trading, development and operation of Ports, IDC terminal, establishment of SEZ, Oil refining, logistics, gas distribution, Power Generation, Power Transmission and Power Trading etc. Adani Port at Mundra promoted by the ADANI Group is operational since 1998. ADANI Group is manned by experienced and highly qualified professionals including technocrats of repute. The team has demonstrated capabilities in conceptualization and implementation large projects excellent records of establishing benchmarks in the industry. ADANI Group has rich and extensive experience of liaison with government agencies, import, funding etc. With this track record of the organization in tying up finances, flow of funds will not pose any problem for implementation of the proposed project of its Cement Division.

Adani Cementation Ltd (ACL) has been formed for development of a number of Cement Projects (Integrated Cement Plant, Grinding Units & Limestone Mine)

### **2.3 Proposed Location**

State Karnataka is located at South West direction of India. The Capital & largest City is Bengaluru. Karnataka is bordered by the Arabian Sea towards West, Goa to the North West, Maharashtra to the North, Telangana to the North East, Andhra Pradesh to the East, Tamil Nadu to the South East, Kerala to the South West.

The state of Karnataka has an area of 191,976 sq. km. and a population of 61130704 (as per 2011 Census). It is divided in 30 districts. The State has a population density of 320 inhabitants per sq. km. Ranked 8th in population density in India. Karnataka had an estimated GSDP (Gross State Domestic Product) of about US\$58.23 billion in the 2008-09 fiscal year. The state registered a GSDP growth rate of 7% for the year 2007-2008. Karnataka's contribution to India's GDP in the year 2004-05 was 5.2%.

Karnataka Government has plan to establish following industrial corridor Under new Industrial Policy 2014-19:

- Chennai-Bangalore-Chitradurga
- Bangalore-Mumbai economic corridor
- State industrial corridor: Bangalore-Mandya-Mysore-Chamrajnagar,

- Chitradurga-Bellary-Gulbarga-Bidar, Dharwad-Koppal-Raichur, Bangalore-Hassan-Mysore, Tumkur-Shimoga-Honnavar, Raichur-Bagalkot-Belgaum
- Proposed to notify Special investment region (Dharwad, Gadag, Haveri and Belgaum Districts, Development of areas as industrial nodes)
- Up-gradation of Infrastructure in existing industrial areas and estates
- Industrial township areas in Mysore, Peenya, Bommasandra, Belgaum, Hubli Establishment of Industrial Areas and Estates

Looking in to the potential market ACL has committed to contribute to enhance the cement capacity in the State of Karnataka while protecting environment of the region.

## **2.4 Need for the project and its importance to the country and region**

Industrialization is the better way for growth & employment & also it is a strategic location connecting Indian markets. The industrialization and infrastructure growth have to go hand in hand. Cement is major component in infrastructure growth. Total Cement production in the area and nearby state does not match the demand growth and hence new capacities have to come up concurrently. The proposed plant will ensure that the supply situation in Karnataka is comfortable in the coming times, as growth is expected to propel demand.

Adani group is known for its environment friendly initiatives across sectors it operates in and strong reputation for sustainable growth. In line with the existing agenda to make India Power sufficient in the future sustainably cement manufacturing unit are being planned close to coal based thermal power plants the group operates. Disposal of fly ash is an environmental concern which is faced all coal based thermal power generating plants. Cement grinding can consume up to thirty five percent of fly ash produced in the power plants and thus reduce environmental concern.

The cement projects planned by group would also generate immense employment opportunities and significant contribution to the state & central exchequer., improvement of socio economics of the area by way of education, vocational training, animal husbandry, improving infrastructure facilities such as roads, transport, improvement in drinking water supply, medical facility etc. The Adani Group is committed to the development of the country and will put all efforts for comprehensive development of this area also as being practiced by us at other establishments.

### *2.4.1 Future Demand & Domestic / export Markets*

The total market size of Karnataka, Kerala and Goa is estimated at approximately 18 million tons being catered from Gulbarga and Yeraguntla-Nalgonda clusters. The key players operating in this region are ACC, Ultratech, Orient, Bharti, Dalmia and others. The demand in these markets is expected to growth at par with the GDP growth rate (~7.5%) of the country.

Optimized logistics have been a key challenge for the players in this region and low cost logistics both in term of inbound for raw material and distribution cost will be the key success factor in this region. Leveraging on the existing railway infrastructure and utilization of low cost sea logistics is expected yield greater advantage.

#### 2.4.2 Imports vs. Indigenous production

Raw & Chemical Gypsum sourced from the nearest markets available

#### **Export Possibility**

Currently there are no export plans from the project. Major production will be consumed in the state of Karnataka and Kerala.

#### **Domestic/ Export Markets**

The proposed cement production will cater to the cement demands in the state of Karnataka, Kerala and Goa.

### **3.0 Project Description**

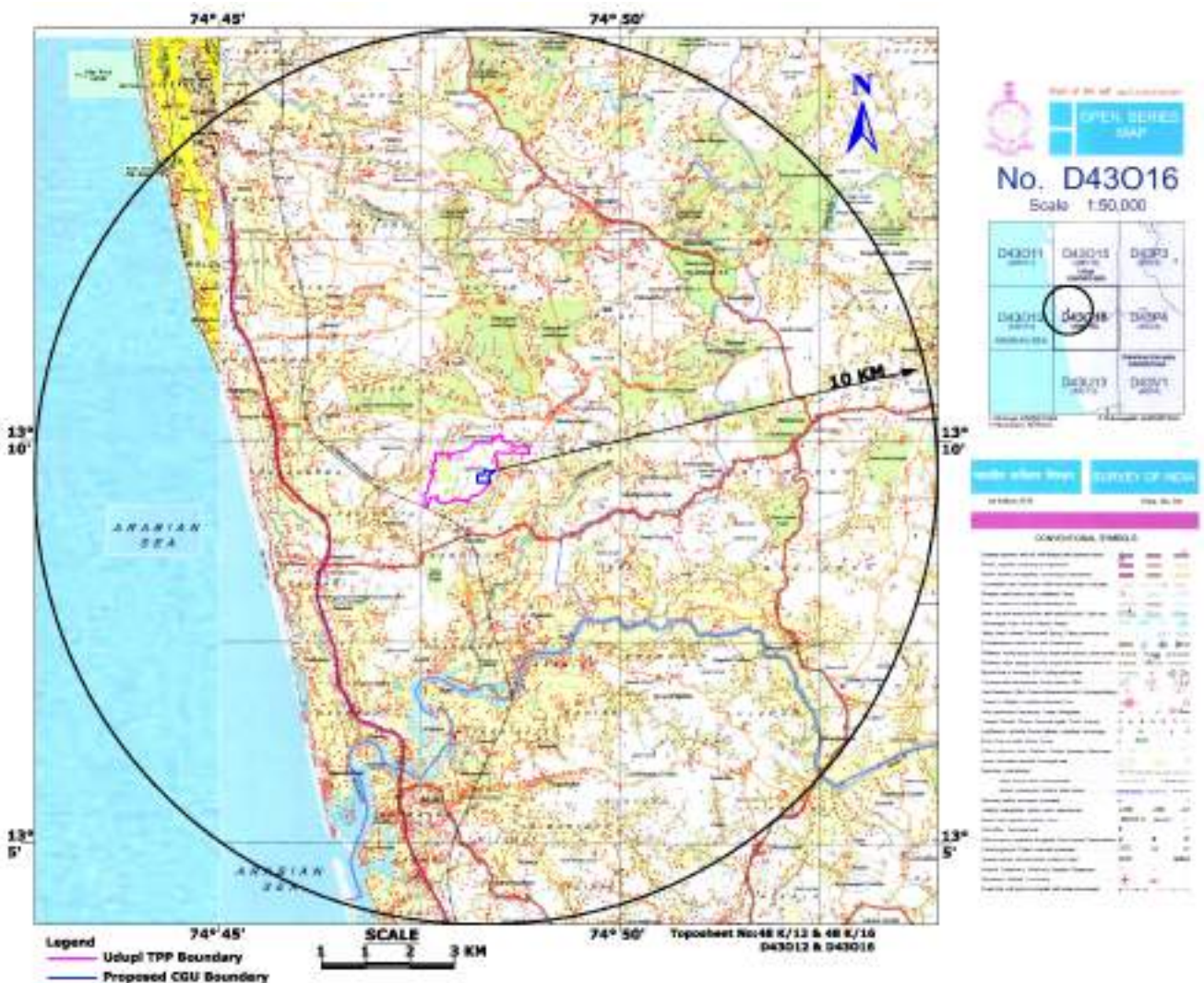
This section covers aspects of plant location and requirements/ availability of infrastructural facilities such as land, access & approach, raw materials, utilities and communications for the proposed grinding unit at Village- Yellure, District- Udupi in Karnataka.

Adani Cementation Limited (ACL) proposes to set up a green field Cement Grinding Unit with capacity of 2.0 MTPA within the premises of Udupi Power Corporation Ltd (UPCL) in the Village Yellur, District- Udupi, Karanataka. The project is proposed to be executed in 2 phases of 1 MTPA each. The location of the project site in the index map, Google image and study area map of 10 km radius from the project boundary is shown in **Figure-1** to **Figure-3**. The Contour Map and plant layout of cement grinding unit is shown in **Figure-4** and **Figure-5**.

The selected plant site is located within the existing plant premises of UPCL. The site has following facilities: The land is already under possession of Adani Power Limited and hence no R&R issues.

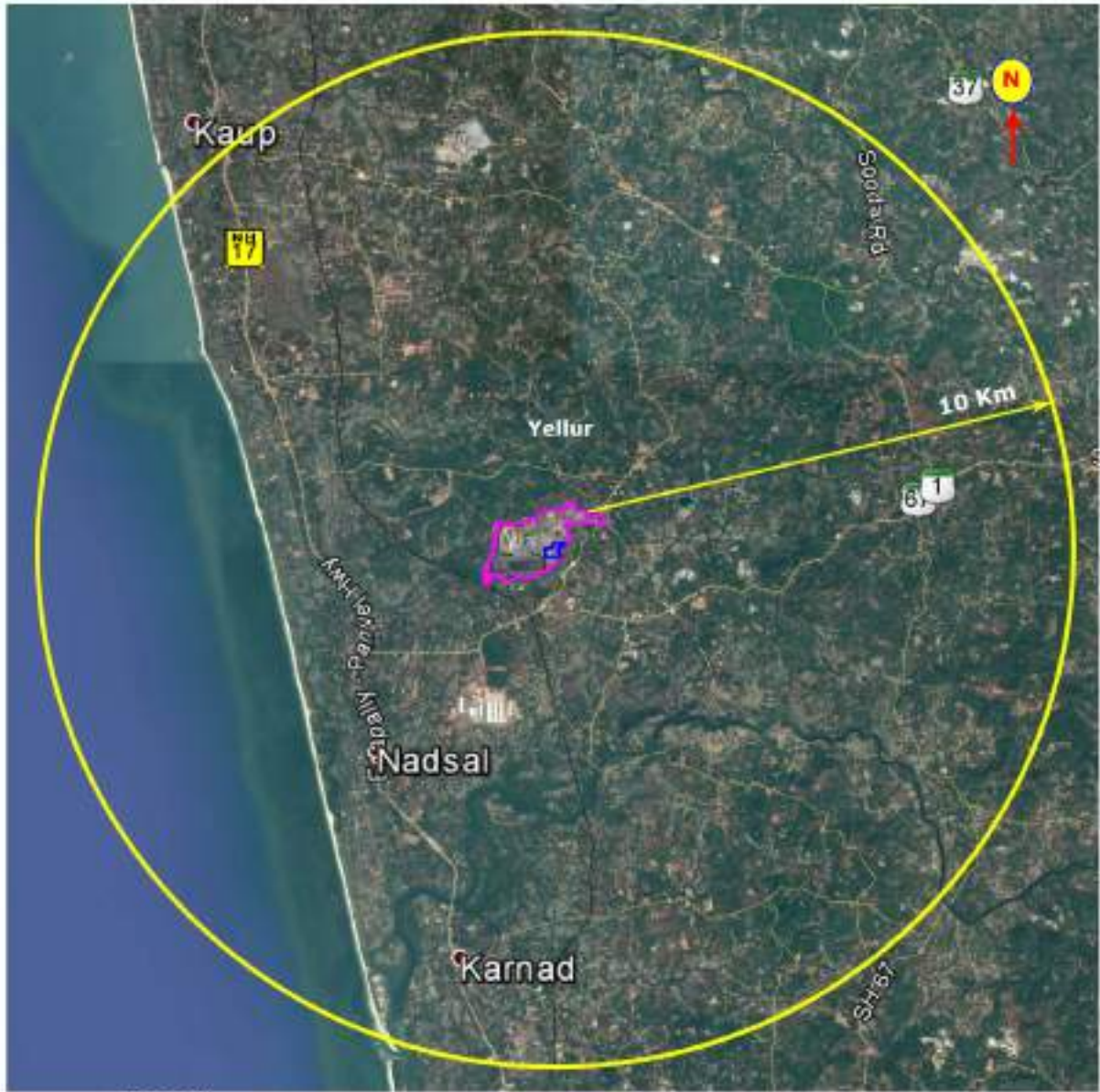
- Proximity to the sources of raw material such as fly ash and Gypsum
- Availability of common Infrastructure facilities / utilities (water / power etc.),
- Availability of land, approach roads & accessibility
- Suitable topography of land and geological aspects
- Proximity to rail head, sea port and transport logistics
- Safe from site flooding possibility
- Located in Seismic Zone – III associated with moderate seismic potential
- No archeologically important heritage monuments are located within 10 km radius.
- No declared biodiversity parks/sanctuaries are in the surroundings of site.

**Figure 1: Site Location Map**







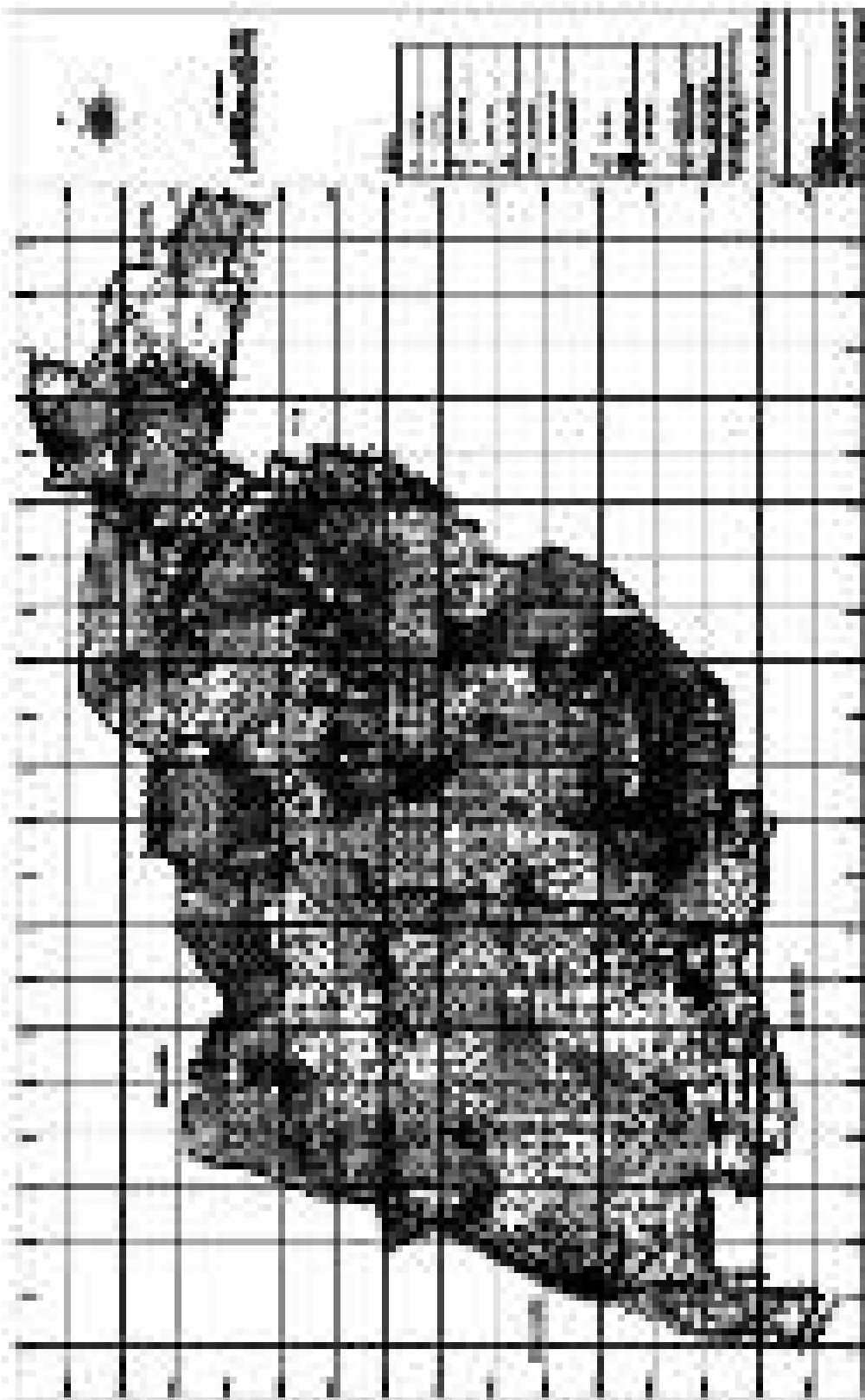
**Figure 2: Satellite View with 10 KM Radius**



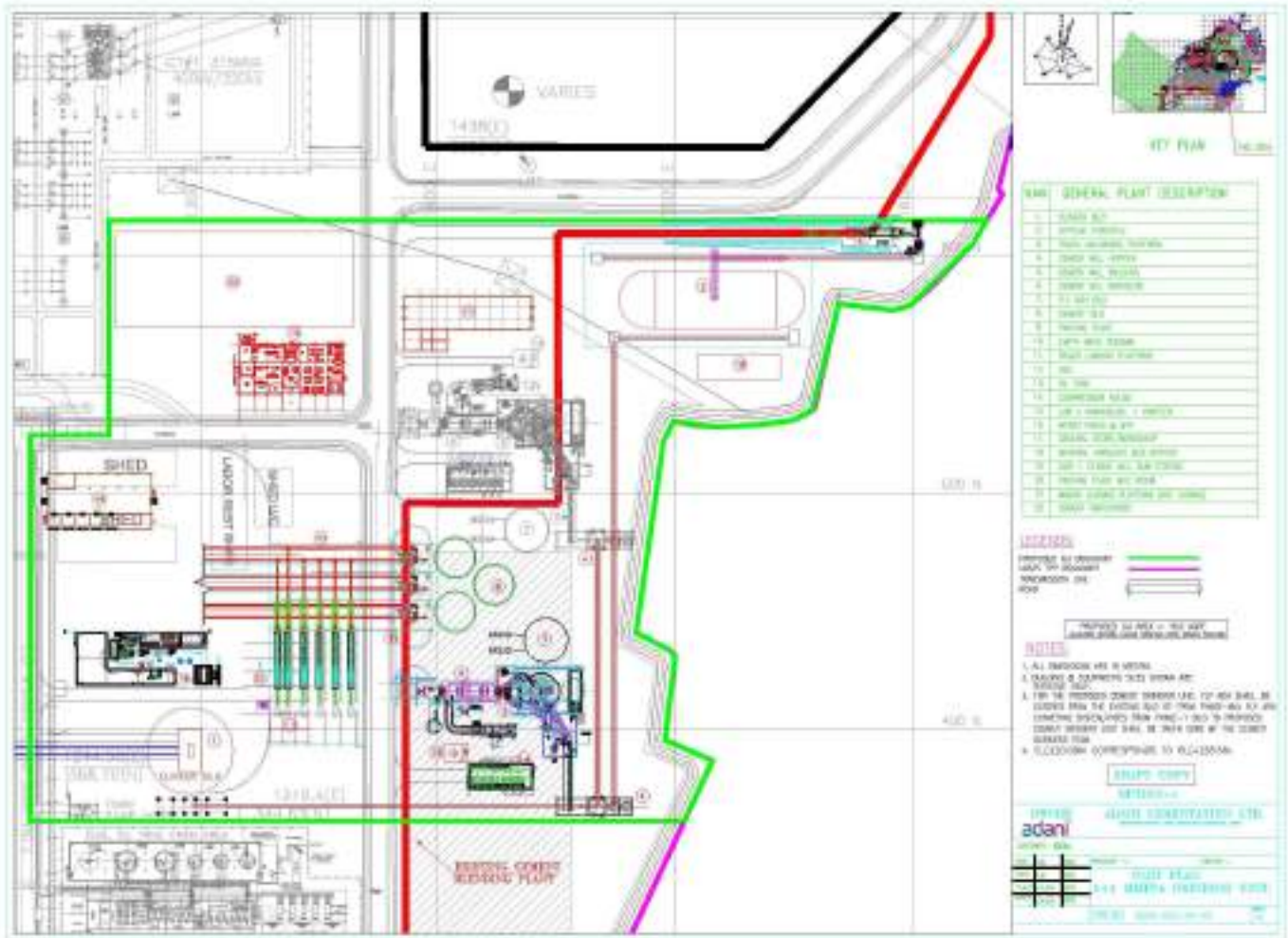
**Legend**

-  Udupi TPP Boundary
-  Proposed CGU Boundary

**Figure 3: Contour Map**



**Figure 4: Plant Layout**



### **3.1 Geographical Co-ordinates**

- Latitude : 13<sup>0</sup>09'17.04" to 13<sup>0</sup>09'33.49"
- Longitude : 74<sup>0</sup>48'16.49" to 74<sup>0</sup>48'29.78"

### **3.2 Plant location**

The Cement Grinding unit is proposed to be located within the premises of the Udupi Power Plant of Udupi Power Corporation Limited (UPCL) is located in the Udupi District (erstwhile Dakshina Kannada District) of Karnataka, comprising villages of Yelluru, Tenka, Santhuru and Bada and is about 35 km north of Mangalore City in Karnataka State, India. It is flanked by Konkan Railway on the west, local roads to Mudarangadi village on the east and north and Padubidri-Karkala state highway on the south. The area where the power plant is located has been declared as an industrial area under Section 3 (1) of the Karnataka Industrial Area Development Act (KIADA), 1966 in the Gazette of the Government of Karnataka.

The site is about 40 m above MSL and falls under seismic zone III. The maximum ambient temperature is about 34°C and the annual mean relative humidity is 89%. The nearest seaport is at Mangalore (New Mangalore Port).

### **4.0 Project description with process details**

#### **4.1 Introduction**

In this section, the details of plant capacity, size and type of main machinery & storages, design of various systems. The coverage includes process, mechanical, civil, electrical & instrumentation engineering aspects. Based on the technical concept, plant layout is enclosed. The process flow of cement grinding unit is given in **Figure-6**.

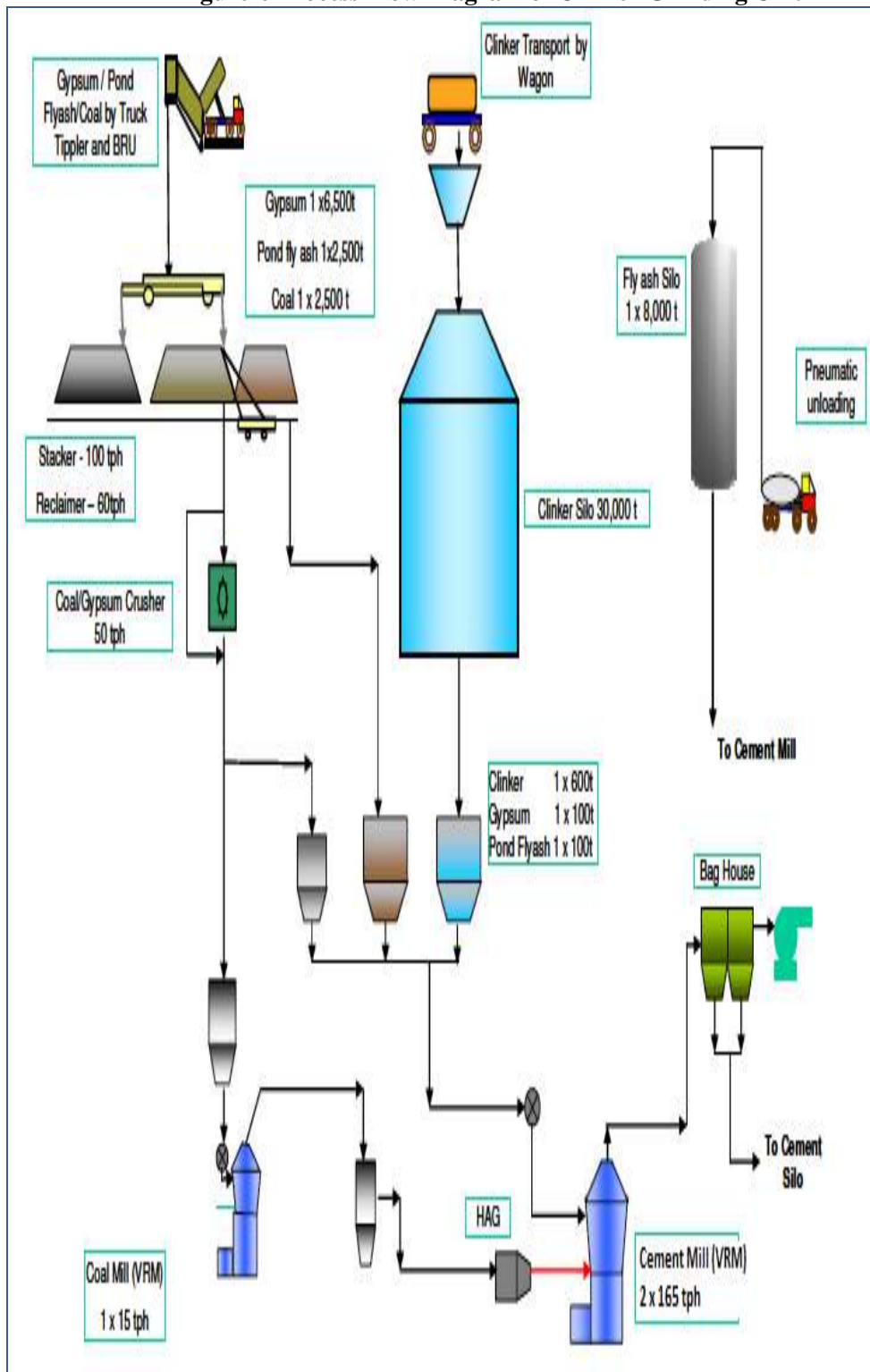
For preparing the technical concept, the requirements of quality, pollution control, plant maintenance and utility services have also been considered.

#### **4.2 Raw Materials**

The raw materials of cement have clinker 61 %, Gypsum 4 % and Fly ash 35 %. These values have been used as a basis for this report.

- Moisture in gypsum 12%
- Moisture in Fly ash 1%
- Moisture in Clinker 1%

Figure-6 Process Flow Diagram of Clinker Grinding Unit



### 4.3 Main Machinery Sizing

S. No.	Department	Operating Per day	Days operating per Year	Safety Factor
1	VRM	21	330	1.15
2	Packing Plant	16	365	1.25

### 4.4 Main Storages

Sr. No	Department	Grinding Unit Stock in Days
1	Clinker Storage	10
2	Cement Storage	3
3	Gypsum Storage	15

### 4.5 System Detail

#### 4.5.1 Clinker transport & storage

Clinker shall be sourced from international locations, transported by way of ships unloading at Mangalore Port. From Mangalore port the clinker shall be transported by road or rail network to the cement grinding unit. Domestic sources like Gulbarga, Nalgonda and Kadappa clusters are also in consideration. Inhouse clinker manufacturing unit at Lakhpat is also proposed. The clinker will be unloaded through truck tippers/wagon tippler and a surface feeder. Which is further conveyed to clinker storage silo of capacity 30,000 Ton.

#### 4.5.2 Gypsum transport & storage

Gypsum received will be transported through road/rail and unloaded by truck tippler/wagon tippler to belt conveyor and stacked in the covered gypsum stock yard (6500 t). The required quantity of gypsum shall be fed to steel hoppers through series of belt conveyors.

#### 4.5.3 Fly ash

Fly ash can be sourced from Udupi Power Plant (UPCL) of Adani power or any other Thermal plant in the vicinity through the pneumatic conveying system into the silo/hopper (2500 t).

#### 4.5.4 Cement grinding

Clinker and Gypsum shall be filled in to the respective hoppers through suitable material handling system. Adani Cement proposed to install 2 x 165 TPH Vertical roller mills for PPC Grinding. A common arrangement for two cement mills is considered for clinker storage, gypsum crusher, additive storages, PPC storage and packing plant. Clinker unloading and bagged cement loading by trucks for road transport is proposed along with bagged cement loading facility for dispatch by railways

A high efficiency circulating fan will be operated to collect the ground material in the system. The collected ground material will be taken into the cement silos with the help of series of air slides and bucket elevators.

To minimise the pollution, the exhaust of circulating fan is connected with bag filter. Product collected at bag filter shall be transported to the cement silo through a set of air slides and bucket elevator.

#### **4.5.5 Cement storage**

Two nos. of RCC silo each of capacity 8000 t shall be constructed for storage of cement.

#### **4.5.6 Cement packing**

The cement from silos will be extracted and fed to the installed 3 no's of electronic packers, eight spout, single discharge with a capacity of 240 tph each through air slides, bucket elevators and screens. Each packer will be connected with 6 nos. truck/trailer loaders for loading packed cement bags. The packed bags from packers will be transported to truck loading bays by suitable flat belts conveyors and diverters. A separate provision will be also available to load bulk cement through closed tankers.. Each packer will also be connected with 8 wagon loaders for loading packed cement bags. The packed bags from packers will be transported to wagon loading bays by suitable flat belts conveyors and diverters.

#### **4.5.7 Logistics transportation**

The existing railway siding of the UPCL shall be used for unloading of gypsum procured from domestic sources. Railway infrastructure for loading of bagged cement with necessary material handling equipment shall be installed.

#### **4.5.8 Wagon Loader**

A separate wagon loading platform with 8 wagon loader shall be considered for finish product transportation.

#### **4.5.9 Quality control**

The quality control department at the proposed plant shall have the following facilities:

##### **Chemical Analysis laboratory**

Facilities for testing the physical properties like sieve analysis, setting time, soundness, fineness, CCS, Grindability, moisture content, drying shrinkage, etc. following lab equipment are envisaged

- X-ray diffractometer (XRD)
- Conventional chemical analysis equipment.
- For Physical Analysis

### **Particle Size Distribution (PSD)**

To determine the PSD of the clinker, cements, etc. a laser diffraction type PSD analyser will be installed having typical particle size range of 0.3 mm 400 micron.

### **Quality Control Plan**

To produce good quality cement, it is imperative that sampling & testing of various raw materials like clinker, gypsum, fly ash and the final product is carried out regularly at the required intervals for taking corrective action timely as per standards. To ensure consistent product quality and to permit the trouble free and cost effective operation, the quality control plan for sampling & testing of various raw materials, in-process materials and the final product is suggested. While proposing the methods and procedures for quality control, the following aspects have been taken into account.

- Requirements and norms, particularly in cement testing.
- Corrective measures to be undertaken as quickly as possible in the process operation.
- Desired degree of automation.
- Available raw materials and process equipment.
- The main area of quality control has been envisaged.
- Before Cement Mill
- After Cement Mill
- Laboratory

The laboratory will be accommodated in the Central Control Room (CCR) building at the proposed plant site. The laboratory shall have the provision of chemical and physical testing facilities for raw materials, clinker, gypsum, flyash and cement.

#### **4.5.10 Environment**

- **Plant landscape and green belt-** Due care has to been taken to keep-up the natural settings/ greenery in and around the plant .A thick green belt shall be developed in and around the plant.
- **Pollution control equipment-** The installation of the following pollution control equipment is foreseen:
- **Cement mill bag filter** - Closed sheds/silos for raw and finished materials. Bag filters at transfer points, water spraying etc. Regular monitoring of ambient air quality and ground water quality and suitable measures shall be planned time to time to minimise the impacts.



#### 4.5.11 Civil Engineering Considerations

##### Topography

Based on topography of the site area, no major work is envisaged towards grading and levelling of the site.

##### Civil Construction Criteria

- **Excavation-** Excavation levels shall be required specific as per design. Mechanised means for excavation shall be employed. Enough care shall be taken to avoid excess excavation.
- **Backfilling-** Excavation products of soil can be used directly for back filling after boulders and other objectionable material have been removed. Back filling material should be free of organic materials, clay balls, and kind of constructional or non-constructional debris, and other objectionable inorganic matter. Back filling should be done in layer of not more than max. 300 mm and each layer should be well watered and compacted by mechanized and manual means. The boundary of any compacted back-fill material shall be extended at least 1.00 m (0.05 m from both sides) beyond the foundation footprint.
- **Foundation-** Isolated or strap foundation footings are envisaged at this stage for lighter structures. The dimensions of isolated footing at least be 300 mm more than that of RCC column

#### 4.5.12 Electrical

##### Power distribution system

- **Power source and power demand-** The power demand for grinding unit has been estimated at about 15 MVA. The power requirement for the grinding unit shall be met by a dedicated supply line from UPCL at 132 KV or 33 KV switch yard with suitable step down transformer.
- **Construction power-** The construction power is also envisaged to be made available from UPCL.

##### Medium voltage (11 kV) power distribution and load centres

Distribution system 11 kV- SF6/ Vacuum circuit breakers shall be used for Incomers, Bus Couplers, outgoing distribution feeders, motor feeders and transformer feeders. Each circuit shall have the necessary metering and protection to suit the application. In case of vacuum switch gears, the motor feeders shall be provided with surge protection.

##### Low voltage (415 V) distribution and motor control centres

LT Distribution board 415 V- 415 V LT Distribution boards have been suitably considered at the load centres. The LT switchboards are considered with fully draw out, motor operated air circuit breakers with necessary safety features to facilitate safe operation and easy maintenance.

Motor control centres (MCCs)- Functional MCCs i.e. MCC controlling a group of interconnected and simultaneously operated loads during the process are envisaged.

All the MCCs considered shall be fully drawn out type. Each vertical panel of MCCs will incorporate related Input/ Output modules and communication modules. These shall be connected to the respective CPU through serial data.

#### **4.5.13 Drives for the grinding unit**

The type of drives considered is based on following requirements:

- Load Characteristics
- Starting Torque
- Operating characteristic i.e. high power factor and efficiency at operating points
- Accuracy and range of speed control required for specific applications.

All Motors, 250 kW and above shall be connected at 11 kV and motors below 250 kW at 415 V. Power saving equipment like variable frequency drives are taken into consideration for drives to have added economy in energy cost as well as to achieve precise speed control.

#### **Power factor improvement for the grinding unit**

For maintaining a high overall plant power factor (PF) and in order to reduce the demand charges, static power factor improving capacitors of suitable kVAR rating and voltage grade are considered.

In the envisaged scheme, suitable size capacitors have been considered for direct connection across stator switch terminals of respective 11 kV motors. For compensation of LT load, multi –step automatic controlled capacitor banks have been considered for connection at Main LT switchboards. The capacitor banks are sized to maintain the overall plant power factor of about 0.95 lag.

#### **Earthing for the grinding unit**

Adequate provision of sub-station earthing and earthing of high and low voltage equipment have been considered for the safety of operating personnel as well as for proper system operation as per requirements of Indian Electricity Rules and IS : 3043.

#### **Illumination for the grinding unit**

An efficient illumination scheme for inside and outside buildings shall be provided. Sufficient number of lighting boards and distribution boards are considered for lighting of various locations of the plant.

#### **Fire detection and alarm system**

For detection of fires in electrical buildings, Ionization type dual chamber/dual source smoke detectors will be used where incipient fires are likely, e.g. in cable cellars, switch gear rooms, control rooms etc. Fixed temperature cum rate of rise type heat detectors will be installed in transformer rooms, battery rooms etc.

Multi zone type fire alarm panels will be installed in the electrical buildings. The fire detectors will be wired in zones. On detection of fire/fault in any zone, audio-visual alarm will be sounded in control panel and also by electronic hooters fixed in various

locations in the electrical buildings. The alarm shall also be sounded at the central position.

### **Cable & cable laying for the grinding unit**

Following type of cables are proposed to be provided in the plant

Power(HT)	:	11 KV, aluminium conductor, XLPE insulated, armoured cables
Power(LT)	:	1.1KV, aluminium conductor, PVC(Alternatively XLPE) insulated armoured
Control	:	1.1 KV grade, Copper conductor, PVC insulated, armoured cables 91.5 & 2.5 sq. mm), unscreened
Instrumentation	:	1.1 KV grade, Copper Conductor, PVC insulated, armoured cables (0.5 & 1.0 sq. mm) screened

#### **4.5.14 Control & Instrumentation**

For effective control of various process variables, integrated & distributed microprocessor based, control & instrumentation system has been considered keeping in view the following objectives:

- Dependable and rugged instrumentation network
- Maximum protection against dust and vibration
- Operational safety
- Easy maintenance and repairs
- Flexibility to adopt future development/modifications
- Optimum operational efficiency and good quality product
- Maximum standardization to keep the inventory low

The control and instrumentation system envisaged incorporates the following essential features for safe operation of the plant and machinery and provides necessary operating data to evaluate the operating performance and fault monitoring.

- Suitable programmable logic control (PLC) system for sequence interlocking and automatic closed loop control through PI and PID action.
- Control of electronic weigh feeders for desired proportioning and feed rate.
- Sequential start/ stop of plant sections through process level PC controls, when the local/ remote switch at individual drive of the sequence is in remote position.
- It shall be possible to stop any drive from the field for safety reasons, from the local push button station near the drive or through safety switches.
- Color graphic and alphanumeric display with equipment fault monitoring system.
- Log trends for selected process parameters.
- Display of important process data.
- Printers for event/ alarm list(s) and report generation.
- Hard copy printer for print out of display at VDU.

### **Central control system for the grinding unit**

Integrated and distributed hierarchical digital controls for centralized monitoring and control from central control room (CCR) have been envisaged. The central control system is structured into 4 level hierarchical configurations as given below:

- **Level – 1** (Field Level) - At field level the instruments and sensors have been installed in accordance with P & I diagrams. For certain systems e.g. mills, silos, weighing systems etc. control systems are also located in the field.
- **Level – 2** (Department Control Level) - Using the process stations-with their process input/ output devices assuring the safe operation of machines and of the production process.
- **Level – 3** (Supervisory Level)- Using operator station having supervisory processor with visual display unit, keyboards, mouse, printers & hard copier etc. at operator level located at the central control room assuring a simple and efficient man/ machine interface for the remote operation of the plant.
- **Level – 4** (Optimization and Information Level- Future)- The Management Station shall be capable to handle monitoring functions for the plant management and to provide tools for the optimization and the strategic planning/ control of production. Management stations are envisaged such that the plant operations are maintained during shut down periods of these stations.

### **Programming terminal**

One programming device with necessary VDU & keyboard for programming from operator level processor or process level PCs has been considered. Hand held terminals shall also be provided for word and bit examination and alteration and I / O bit forcing at process level.

### **Process/ instrumentation**

Necessary field sensors shall be installed to monitor process variables like pressure, temperature, flow, level, speed, etc. The sensors shall be linked to plant control system through field transmitters/ transducers to display the parameters on operator station and exercise the desired controls. The broad technical features of sensors and instruments are described as follows:

- **Pyrometers-** For temperature measurement in hot zones non-contact type radiation pyrometers are proposed to be used. Pyrometers would include air purging and water cooling arrangements.
- **Level sensors-** Specially designed level sensors will be deployed for monitoring and control of material level in clinker discharge hoppers. RF admittance type sensors would be used for point level control. For continuous level monitoring, ultrasonic/ electromechanical type of instruments would be used.
- **Speed switches-** These are proposed to be deployed for achieving zero speed protection for various equipments. The unit chosen would have built in initial bypass time delay and designed to operate over a range of speeds. The primary sensor would be non-contact type designed to achieve unlimited number of operations. The unit as well as sensor would have a high degree of environmental protection.
- **Dust monitor-** A microprocessor based monitoring device would be deployed which will provide concentration of particles in each stack. The equipment would have a built in air purge system.

## 5.0 Raw Materials

The raw materials for production of Portland Pozzolana Cement (PPC)/ Ordinary Portland Cement are Clinker, Gypsum and Fly ash.

### Clinker

Clinker shall be sourced by way of imports from the West Asian countries and also from domestic sources as may be commercially economical to do so. Inhouse Clinker manufacturing unit at Lakhpat is also under consideration. Clinker shall be added @61% in Portland Pozzolana Cement (PPC). Clinker shall be transported by trucks from Mangalore Port to the Grinding Unit. The composition of the clinker shall be as below.

Clinker Specification	%age
SiO <sub>2</sub>	21-22%
Al <sub>2</sub> O <sub>3</sub>	5-5.5%
Fe <sub>2</sub> O <sub>3</sub>	4-4.5%
CaO	65.50-66.20%
MgO	1.5% Max
SO <sub>3</sub>	1.00% Max
Loss on ignition	0.75% Max
Total Alkalies	0.70% Max
Insoluble Residue	0.40% Max
Free Lime	2.00% Max
LSF	94-96 %
C <sub>3</sub> S	53-57%
C <sub>2</sub> S	10-18%
C <sub>3</sub> A	6-8%
Bulk Density	1.2-1.35 Gm./Ltr)
Moisture	5% Max
Size	+ 3 mm – Min. 70 % - 3 mm – Min. 30 %

### Gypsum

Gypsum shall be obtained from market for grinding unit. Gypsum shall be added @ 4% in Portland Pozzolana Cement (PPC). Gypsum shall be transported in trucks. Considered quality of gypsum is as follows:

SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	MgO	Na <sub>2</sub> O	K <sub>2</sub> O	SO <sub>3</sub>	CI
15.11%	2.63%	0.89%	1.22%	0.44%	0.50%	33.22%	0.01%

### Fly Ash

Fly Ash will be sourced from UPCL or any other Thermal plant in the vicinity. Fly Ash shall be added @ 35% in Portland Pozzolana Cement (PPC). Fly Ash shall be transported in pneumatic conveyors from the UPCL to cement grinding unit. Quality of fly ash is considered on follow specifications:

#### Quality of Ash Content

<b>Descriptions</b>	<b>Percentage</b>
Silica	53.2
Alumina	21.3
Ferric Oxide	7.8
Titania	1.0
Phosphoric Anhydride	0.1
Lime	9.6
Magnesia	1.9
Undermined(By Diff)	1.5
<b>Total</b>	<b>100</b>

## 6.0 Site Analysis

### 6.1 Climatic Condition

It may be 'climatic condition' in place of 'land condition'

- Average Temperature
  - Maximum : 34 °C
  - Minimum : 20.8 °C
- Relative Humidity : 89 %
- Average Rainfall : 3797 mm

**Source:** IMD – Monthly mean maximum & minimum temperature and total rainfall based upon 1901 – 2000 data

### 6.2 Land Area Details

<b>Sr No</b>	<b>Unit</b>	<b>Area (Acres)</b>
1	Plant Building, Roads, Parking Bay & Open Spaces	23.0
2	Green Belt	12.0
	<b>Total</b>	<b>35.0</b>

### 6.3 Input Materials

The details of the input materials required, their sources, transportation mode and their quantities for proposed cement grinding unit are as given below.

<b>Sr No</b>	<b>Material</b>	<b>Source</b>	<b>Transportation Mode</b>	<b>Requirement (in TPD)</b>	<b>Basis</b>
1	Clinker	Transportation from Mangalore Port or other domestic source.	By Truck	3700	Considering 61% Clinker factor
2	Gypsum	Purchase from Market	By truck/By Railway	245	Considering 4% of total cement
3	Fly ash	From UPCL or any thermal plant in vicinity.	Pneumatic Conveyors.	2150	Considering 35% of total cement

### 6.4 Workshop

A mechanical and an electrical workshop is envisaged to take care of the regular maintenance/ repair jobs in the plant.

## 6.5 Central stores

A store building needs to be constructed for storing tools, spare parts, consumables, etc. Open area to be earmarked for storing machinery and construction materials for the proposed grinding unit site.

Cranes, Monorails and Pulley blocks-Adequate sized maintenance cranes/ hoists, monorails and pulley blocks to be provided at all suitable locations at the plant site for ease of maintenance and operation.

### 6.5.1 Miscellaneous services

- **Technical & Laboratory/QC office-** A suitable technical office & laboratory / QC office shall be constructed for the project activities and operation phase.
- **Administrative & Time and Security office-** A suitable administrative, time & security office shall be constructed for the project activities and operation phase.
- **Dispensary-** A small dispensary with first aid facilities will be provided in the plant premises.
- **Firefighting system-** Fire detection and extinguishing system shall be provided in all buildings.
- **Weighbridge-** Two nos. electronic weighbridges are envisaged to take care of the incoming and outgoing materials at site. These may be located near the main entrance of the the plant sites.
- **Bags Godown-** Space shall be provided in the packing plant for the storage of empty bags.
- **Parking-** The adequate parking area for trucks may be planned outside the main gate.

## 7.0 Availability of water its sources, Energy /power requirement and sources

### Power

The maximum estimated power demand for the proposed grinding unit is estimated as 15 MVA. The power requirement for the grinding unit shall be met dedicated supply line from UPCL power plant or alternatively dedicated connection from the State Grid may be taken based on economics. Suitable step down transformer or other infrastructure may be installed, if required.

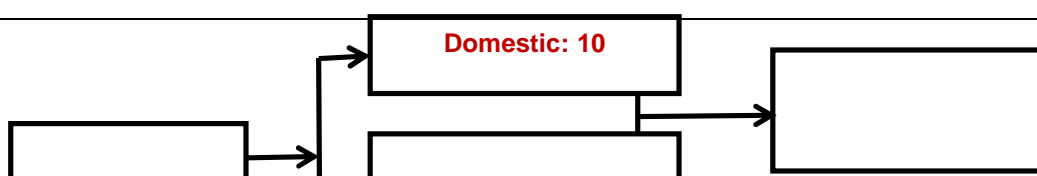
### Water

The water requirement for the grinding unit, the water requirement is estimated as 300 m<sup>3</sup>/ day. Water is required for equipment cooling, drinking, sanitation, Dust Suppression, Green belt etc. Primarily, water requirements for the unit shall be met by KIDC supply water (treated) or from SPPL extension water line with prior approvals. For plant equipment, water shall be re-circulated after cooling to avoid any wastage and only losses shall be making up from fresh water.

### Water Balance (M3/Day)



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### **Compressed air supply**

Compressors and blowers have been -envisaged for operation of process equipment. The compressed air is also used for various bag filters installed to minimise air pollution and diverting gates, valves, blasters etc. Blowers are mainly used for aeration of silos.

### **Central Control Room (CCR)**

A CCR building is envisaged to be constructed at site. This building can be located above the MCC room near cement mill section. Operation of the cement mill & Packing Plant will be carried out from this control room.

### **Manpower Availability**

Since, there are many industries operating in this belt and therefore the required skilled manpower can be sourced easily.

## **8.0 HUMAN RESOURCES**

### **8.1 Introduction**

The Human requirements have been separately provided for the following two phases:

- Project implementation phase.
- Plant operation phase.

### **8.2 Basic**

The details recommendation for each phase has been taken into consideration the following:

- Project technical concept.
- Smooth and efficient plant operation,
- Effective inter-departmental co-ordination.
- Optimum organization with well-defined job responsibility.
- Optimum utilization of different levels of workmen and supervisory staff.
- Training needs of the personnel, wherever required, will be taken care of by UTCL.



- Manpower requirement in certain categories like fitters, welders, khalasis, helpers, peons, canteen staff, guest house attendants, etc. can be met through contractor(s). Certain activities may be assigned to specialized agencies/contractors. These may include loading-unloading, plant cleaning job, packing, and security for plant.

### 8.3 Project Implementation Phase

For the project implementation phase, the required resources will be sourced from concerned executing contractors.

### 8.4 Plant Operation Phase

For the plant operations the required resources will be sourced from concerned contractors or by our group units, further locals manpower will be utilized as per the skills.

### 8.5 Employment Generation (Direct and Indirect) due to the project

Direct and indirect employment will be generated due to the project. The total manpower requirement for the project is estimated as approx. 65 (Direct) and approximately 500 (Indirect). Unskilled/ semi-skilled manpower can be sourced from the local area and skilled manpower shall have to be sourced from outside/ local.

## 9.0 Planning & Implementation Schedule

### 9.1 Planning Schedule (Pre Project Activities)

Sr.	Project Activity	Months					
		1	2	3	4	5	6
1	PRE PROJECT ACTIVITIES						
2	Investment decision						
3	Preparation of financial application						
4	Project appraisal by financial institute						
5	Obtaining requisite approvals & linkages						
6	Infrastructure development						
7	Preparation & release of main machinery tender						
8	Floating and receipt of tender						
9	Classification, evaluation and negotiation of tender						
10	Order placement of main machinery						

## **9.2 Implementation Schedule (Project Activities)**

The implementation period has suggested 18 months for project execution activities after placement of main machinery order until the plant commissioning. As per the project implementation schedule the expected implementation time has been estimated as:

- Pre project activities: 6 months
- Project execution activities: 18 months

The schedule will serve as a guideline for preparation of a detail implementation schedule once the decision of the project execution is taken.

Implementation period can be further shortened with careful detail planning and close monitoring of various activities involved in project execution.

The estimated capital cost of the project is Rs. 556.25 Crores inclusive of expenditure estimated for Pollution Control Measures as Rs.15 Cr. Detailed estimated breakup of project cost is given in Annexure-1

## **10.0 Environmental Management Plan**

### **Air Environment**

- All major sources of air pollution (Cement Mill) will be provided with Bag houses & Bag filters to maintain emissions within the prescribed norms i.e. 30 mg/Nm<sup>3</sup> for particulate matter emission from the stacks.
- Bag filters will be provided at all loading /unloading points and transfer points.
- Clinker will be stored in closed clinker silo; Gypsum is stored in covered shed and cement in Cement Silo. Fly ash will be stored in silos and closed shed.
- Proper maintenance of vehicles will be done to reduce gaseous emissions.
- Operators will be provided with personal protective equipment like safety Goggles, dust mask, ear plugs, helmets etc.
- Periphery of plant and surrounding areas of office building will be covered by thick green belt to attenuate the pollutants emitted by the Plant.
- Ambient air quality and stack emissions will be regularly monitored to keep emission levels below the prescribed limits.

### **Waste Water Generation & Treatment**

- No industrial waste water will be generated during process.
- Domestic waste water generated from the office toilets will be treated in the STP and treated water will be used for green belt development.
- Rain water harvesting will be practiced at plant.

### **Noise Environment**

- Walls and ceilings of the concerned buildings will be lined with sound absorbing materials.
- Properly insulated enclosures will be provided for high noise generating plant machinery.
- Personal Protective Equipment like earplugs and earmuffs will be provided to the workers.

- Regular monitoring of noise level will be carried out and corrective measures in concerned.

### **Solid Waste Generation and Utilization**

- No solid waste will be generated from the cement manufacturing process.
- Dust collected from air pollution control equipment will be totally recycled in process.
- Sludge from Sewage Treatment Plant (STP) will be used as manure for green belt development.
- A part of used oil will be utilized for lubrication purpose & remaining will be sold to authorized members.

<b>S.No.</b>	<b>Waste</b>	<b>Method of Disposal</b>
1	Used Oil	Used internally for lubrication of scraper chains
2	Used Grease	Given to PCB approved agencies
3	Lead Acid Batteries	Exchanging with PCB approved agencies and OEMs
4	Transformer Oil	Given to PCB approved agencies

<b>S.No.</b>	<b>Types of Waste</b>	<b>End Use/ Disposal</b>
1	Dust collected from air pollution control equipment	Totally recycled in process
2	Sludge is generated from sewage treatment plant	Manure for green belt development
3	Solid waste generated from colony	Disposed after segregating the waste into biodegradable and non-biodegradable

### **Greenbelt Development/Plantation**

Out of total land i.e. 35 Acre of which 33% of the area will be developed as greenbelt area & plantation. A thick greenbelt all along the roads and plant will be developed.

- Plantation will be done in and around the plant premises.
- 80% survival rate will be maintained with all possible efforts.
- The trees have been planted at suitable grid spacing to encourage proper growth.
- Local plant species have been preferred.

### **11.0 Conclusion**

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

