OCL INDIA LIMITED

ENVIRONMENTAL IMPACT ASSESSMENT STUDY FOR PROPOSED CEMENT GRINDING PLANT OF 1.35 MTPA CAPACITY

At

VILLAGE: KULAPACHURIA, P.S. SALBONI,
DISTRICT: PASCHIM MIDNAPUR, WEST BENGAL.

Prepared by

Envirotech
ENVIROTECH EAST PVT. LIMITED
LABORATORY RECIGNISED BY MINISTRY OF ENVIRONMENT & FORESTS
An ISO 9001:2000 & 14001:2004 Company
BENGAL AMBUJA COMMERCIAL COMPLEX
UN-F13, 1050/1, SURVEY PARK, KOLKATA - 700 075
✆ - (033) 2418 8127/28,
e-mail :eeplkol@gmail.com, eeplkol@vsnl.net

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Bengal Ambuja Commercial Complex
UN-F13, 1050/1, Survey Park, Kolkata - 700 075
✆ - 91 33 2418 8127/8128/8601, Fax : 91 33 2418 8128
e-mail: eeplkol@gmail.com, eeplkol@vsnl.net

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1.0 GENERAL

1.1 PREAMBLE

M/s. OCL India Limited, (which was earlier known as M/s. Orissa Cements Limited (OCL) has proposed to setup a 1.35 MTPA capacity Cement grinding unit near village Kulapachuria, PS Salboni in Paschim Midnapur district in West Bengal.

In order to assess the likely impacts arising out of the proposed project, OCL had appointed M/s Envirotech East (P) Ltd, Kolkata to undertake the Rapid Environmental Impact Assessment (REIA) study for the various environmental components which may be affected, to assess the impact arising out of the proposed project and to prepare a suitable environmental management plan (EMP) to minimize those adverse impacts.

Baseline Data have been collected for the various environmental components such as air environment, water environment, land environment, noise environment and socio-economic environment during winter 2008-2009 and are presented in this report along with prediction and evaluation of impacts of the proposed project activities. After predicting potential problems, the EIA identifies measures to minimize the problems (adverse impacts) that may arise due to project and outlines ways to improve the project's suitability for its proposed environment.

1.2. UTILITIES

1.2.1 Power

The power demand of the proposed plant is estimated as 12 MVA. Proposed power shall be obtained from WBSEB. However, One D.G set of 1000 KVA will be installed as a stand by to the WBSEB connection.

1.2.2 Water

Total water requirement of the project will be around 900 m^3/day for process + cooling + administrative purposes. Such water will be met by drawing water through bore well to be developed within the project site. Drawal of ground water will be reduced once the piped water is made available at the site by the local Authority.

1.2.3 Manpower

The regular manpower required for administration, and production purposes will be around 158.

1.3 SITE

1.3.1 Site Selection

The proposed Cement Grinding Plant is coming up near the Village Kulapachuria, P.S. Salboni in the District of Paschim Midnapur in West Bengal at Latitude: N 22° ' 31.78' and Longitude: E 87° ' 18.71'. A plot measuring around 162 acres has been allotted by WBIDC for establishment of the proposed unit. The plot is located very close (approximately 15 km) to the District town of Paschim Midnapur. All social infrastructures are available in the location. The proposed site is well connected by road. Adra - Khargapur Railway Line of South Eastern Railway is running very close to the project site. Distance from Howrah Railway station to Midnapur railway station is about 129 km and the project site is approximately 15 km from Midnapur. The nearest airport is Kolkata which is about 140 km from the project site.

1.3.2 Site Justification

The present site was selected based on environmental consideration and other factors, e.g.

1. Growing demand for the cement
2. Not disturbing any prime agri - land
3. Easy to receive RM

4. Transport accessibility for RM & FG
5. Environment impact should be low.
6. This industry does not need enormous amount of water.
7. The site has a connecting road and easy approachability.

1.4 PROCESS DESCRIPTION

OCL is proposing to manufacture 1.35 MTPA Portland Slag Cement (PSC), Portland Pozzolana Cement (PPC) and / or any other type of cement suiting the market requirement.

1.4.1 Product Mix

I.S. 455-1989, the standard for PSC permits to use slag 25% to 70%. and I.S. 1489-1991 part-1, the standard for PPC permits to use fly ash 15% to 35%. The product mix given hereunder is based on actual achievement at OCL,Rajgangpur.

Product Mix

Sl. No.	Component	Proportion by Weight for PSC	Proportion by Weight for PPC	Proportion by Weight for OPC
1	Clinker %	40 to 57	72 to 65	95 to 97
2	Gypsum %	3 to 5	3 to 5	3 to 5
3	Slag %	57 to 40	-	-
4	Fly Ash %	-	25 to 30	-

1.4.2 **Raw Materials**

Raw Materials Requirement

Material	Estimated Requirement (MTPA)	Source	Locality	Transportation Distance (km)
Coal	0.0600	Purchasefrom coal mines	Ranigung (W.B)	150
Clinker	1.2830	OCL, Rajgangpur	In-house clinkerisation unit at Rajgangpur, Orissa	375
Slag	0.7695	Purchasefrom Steel Plants	Jamshedpur, (Jharkhand) / Purulia, Kharagpur, Durgapur, Salboni (W.B)	180 / 200 / 40 / 150 / 2
Fly Ash	0.4050	Purchasefrom Thermal Power plant	Kolaghat Thermal Power Station / Jindal power plant at Salboni	85/5
Gypsum	0.0650	Purchasefrom Chemical Plant	Tata Chemicals, Haldia, West Bengal	120

Brief Manufacturing Process:

The clinker unloaded from the wagons would be extracted by an apron conveyor, installed under the tippler hopper and would be fed to the proposed clinker storage covered silo through a belt conveyor.

The slag, gypsum and coal, which will be coming either wagon or truck, will be unloaded by tippler and stored at designated storage place or common stacker & Reclaimer. Fly ash will be transported to the plant from source through bulk carriers and pumped into the silo.Clinker from the silo shall be extracted and transported to the clinker hopper of the cement mill section through discharge gate and belt conveyor. Clinker shall be fed into the mill by weigh feeder provided beneath the clinker hopper.

The Gypsum would be reclaimed through a common reclaimer and through a set of belt conveyors to the cement mill bins.

Stored slag would be reclaimed with the help of a common reclaimer and will be transported to the cement mill hopper through a belt conveyer.

Cement grinding mill will be used for cement grinding and making Portland Slag cement (PSC). The cement grinding mill will be either Vertical Roller mill (VRM), Ball mill or Roll Pres. The selection of mill depends upon best technology available during selection. Water is required for optimizing grinding process. Hot air is also required for drying the moisture of raw materials as well as it acts as carrier of material from grinding mill to dust collecting equipment. Hot air will be generated from Hot Air Generators (HAG) by burning Furnace oil (FO) at the time of start-up and subsequently by coal dust firing.

A coal pulverizing mill with closed steel storage silo will be installed. Pulverized coal will be used in hot air generator. Part of the hot gas generated from HAG will be used in coal pulverizer

Intermixing of separately ground slag and OPC together in a paddle mixer can produce PSC. Direct grinding of clinker, gypsum and slag together can also produce PSC. Direct grinding of Clinker, Gypsum and Fly Ash together can produce PPC.

Taking into account the high seasonality in the market demands, separate storages for PPC, OPC and ground slag have been considered.

Cement, PPC, PSC and OPC (different grade) from the grinding system would be transported to the packing silos from where it would be transported to the packers. Arrangement would be such that all packers will be capable of being fed from all silos.

Electronic roto-packers would be adequate to meet the packing requirement of the plant. Wagon loaders and truck loaders will be used for loading wagons and trucks respectively.

2.0 BASELINE ENVIRONMNETAL SCENARIO

The area falling within the radius of 10 km around the proposed project at Village Kulapachuria, PS Salboni in Paschim Midnapur district in West Bengal has been considered as study area. On-site environmental quality monitoring was carried out from December 2008 - February 2009.

2.1 Meteorology

The monthly maximum and minimum temperatures recorded on-site during the aforesaid monitoring period varied between (26.5 – 33.0)°C and (9.5–13)°C respectively with overall maximum and minimum temperatures being 33.0°C and 9.5°C respectively.

The monthly minimum and maximum relative humidity recorded on-site during the said monitoring period varied between (31 - 48) % and (59 - 65) % respectively.

During the said monitoring period, the monthly mean wind speed measured on-site varied between 3.5 km/hr to 4.4 km/hr. The overall mean wind speed during the period was 3.9 km/hr. Predominant wind direction was north followed by north-east.

2.2 Ambient Air Quality

Ambient air quality was monitored at six (6) locations in and around the project site.

The overall mean of 24-hourly average values of SPM, RPM, SO_2 and NO_x in the area (mean of all the 6 locations) were 122.6 $\mu g/m^3$, 44.1 $\mu g/m^3$, 5.0 $\mu g/m^3$ and 21.2 $\mu g/m^3$ respectively. Values of all pollutants at the respective locations were within the acceptable ranges on all occassions.

2.3 Water Quality

Surface Water samples were collected and analyzed at 4 locations during the study period to assess the water quality. Besides, water samples were also collected from four (4) locations during the study period to assess the baseline status of the ground water quality surrounding 10 km periphery of the study area.

pH values of Surface water samples were found in the range of (7.1–7.8). Dissolved Oxygen was observed in the range of (5.5–6.1 mg/l). The Total Dissolved Solids were found in the range of 174–262 mg/l while Total Hardness of the collected sample was found in the range of 164–213 mg/l.

pH values of ground water samples was found in the range of (6.9–7.6). TDS values ranged between (200 – 287) mg/l, well within the permissible limit of 500 mg/l for drinking water. Total Hardness contents were found ranging between (154-206) mg/l.

Conclusion can be drawn in the light of the overall analysis made so far that the ground water in the study area is free of any kind of industrial and urban pollution and has been found to be generally fit for human consumption.

2.4 Noise

A total of 10 locations around the proposed project were selected for the measurement of ambient noise levels.

The day-time noise level in the area varied between 50.7 dB(A) and 56.7 dB(A) and the night-time noise level ranged between 38.8 dB(A) and 43.3 dB(A).

2.5 Ecology

The study area is found to have a good vegetation cover due to helpful climatic conditions and good soil quality in the area.

Most of the study area is covered by agriculture land interspersed with fallow land and barren land. There is fairly dense forest in NW direction of the proposed plant site beyond Kasai River. The tree density ranges from 1000 to 2000 trees per hectare. The overall floral composition in the whole study area is quite rich.

2.6 Demography and Socio-economy

The 10 km, radius area around the project site falls under block Salbani, Keshpur and Medinipur in Medinipur (West) district of West Bengal. The study area includes, either partly or entirely 252 villages.

The study area is High density populated with the total population of 1,29,986 (as per 2001 Census). Scheduled Caste (SC) and Scheduled Tribe (ST) population is about 17.03% and 17.88% of the total population respectively. The sex ratio is about 963 females per 1000 males. The overall literacy rate is about 53.6%. Male literacy rate is 60.4% and female literacy rate is 39.6%. The principal language is Bengali. The principal staple food is rice. The primary sources of drinking water are tube wells, Well, Supply water.

2.7 Water use

No abstraction of surface water is envisaged. Ground water will be used for meeting the plant's daily water demand. However for such drawal prior permission of the concerned Authority would be taken. Such ground water drawal will however be reduced once the piped water supply system (which is under active consideration of the State Public Health Engineering Department) of the local Authority using river Kanksabati as source becomes operational. Usually, prior to its implementation techno-econmic feasibilty of such water supply system is examined in details by PHED, there by eliminating any possibility of non-availabilty of requsite volume of water to the committed consumers.

The plant will be needing fresh water to the tune of 900cum/day for meeting its daily water demand. In addition, treated wastewater to the tune 175 cum/day will also be use for non-critical purposes. As such, there would be maximum use of treated wastewater for optimum use of fresh water.

2.8 Land Use

The study area covers 252 villages in Medinipur west District. About 49.87% of the study area consists of agricultural land that is mostly non-irrigated. Cultivable waste lands occupy about 6.74% of the total study area and land not available for cultivation occupy about 15.17% of the total study area. About 23.64% of the study area is covered under Forests. The area does not have any major religious place but there exists a few educational institutions and health care facilities within the study area.

3.0 PREDICTION OF IMPACTS

3.1. PREDICTION OF IMPACT ON AIR ENVIRONMENT

Efficient collection of dust at the sources, their dedusting with high efficiency filters and recycling the dust to the process will be the key in managing the air quality in and around the plant. In fact, there will be hardly any impact on the air environment due to generation of air pollutants from the manufacturing process. The impact on air quality due to different construction activities and vehicular movement due to the proposed project is marginal. The impact of these emissions will be limited to a very short distance and will be insignificant.

The use of the generators is very occasional and short period; as such the impact of its emissions on the air quality will be insignificant. The impacts, if any, will be limited to a very short distance and will also be very occasional.

3.2 PREDICTION OF IMPACT ON WATER ENVIRONMENT

Ground water drawn through bore wells will be used for meeting the daily water demand of the plant. This practice will however be reduced / discontinued once piped water is made available at the plant site by the concerned Authority. No wastewater is expected from the process. Domestic wastewater along with wastewater from non-processing areas of the plant will be treated in a well designed wastewater treatment plantand such treated wastewater will be used in non-critical purposes within plant premises.

Ground water will be used for meeting the daily water demand of the plant. The neighbourhood of the site does not have any dependable surface water source and ground water is the primary source of water in the area. Ground water will be drawn only on getting consent from the concerned body (State water Investigation Directorate). Usually the Directorate, issues their Consent considering all relevant aspects. Thus no impact on ground water hydrology is expected due to this project.

Rainwater would be stored in a rain water holding tank from where such water would be used in non-critical purposes within the plant area.

3.3 PREDICTION OF IMPACT ON LAND ENVIRONMENT

Solid waste generated from pollution control systems like bag filters will be recycled into the process and no disposal on to the land. So there will not be any load on land. There is no discharge of liquid effluents on to the land.

3.4 PREDICTION OF IMPACT ON BIOTA

The project under consideration will be set-up in an area, which does not have biological wealth of importance, and hence will not impede or disturb any existing biota. Further, the emissions that would be generated will consist of only dust, which will be collected in high efficiency bag filter

and only clean air will be let out to the environment. Hence no negative impact on the existing biota is envisaged due to emissions from the proposed project.

3.5 PREDICTION OF IMPACT ON NOISE ENVIRONMENT

The noise level within the plant building at a distance of one metre from the source will be maintained at less than 85 dB(A). The ambient noise levels at plant boundary will less than the permissible levels by development of green belt, which will result in absorbing about 50% of the noise.

3.6 PREDICTION OF IMPACT ON SOCIO ECONOMIC ENVIRONMENT

The project would generate employment opportunities to skilled and un-skilled people of the locality. Also health, educational facilities and communication by roads, will be improved which will have positive impact on the socio-economic environment.

4.0 OVERALL IMPACT EVALUTION

The net environmental impact due to activity of the proposed plant of OCL as indicated is positive. It is attributed to green belt development and land use. The net impact on environmental pollution is negative. The negative impact is mainly due to insignificant rise in levels of air pollutants. The human interest parameters show encouraging positive impact due to better job opportunity, transportation, medical facilities. Over all impact is therefore positive from the proposed OCL plant.

5.0 ENVIRONMENT MANAGEMENT PLAN

An environmental management plan (EMP) is prepared to minimise those adverse impacts.

5.1 CONSTRUCTION PHASE.

In the present project the potential for environmental pollution during construction phase is more and control of pollution is of considerable importance. The measures that would in general be followed are as follows:

- Regular spraying of water to suppress dust from the construction activities.
- Proper maintenance of plant, machineries and vehicles.
- Proper sanitation facilities at the construction site.
- Fuel to be provided to the construction workers to avoid felling of trees.
- Workers exposed to nosy environment to be provided with ear plugs.
- The site will be secured by fencing and will be manned at entry points.

5.2 POST CONSTRUCTION PHASE

In the proposed cement grinding plant suitable pollution control equipments shall be selected which will ensure that the emission levels are maintained below the prescribed limits. All the pollution control equipment in the proposed cement plant is designed for an out let emission of less than 50 mg/m^3 of suspended particulate matter.

The manufacturing process is not going to generate any wastewater. Domestic wastewater along with discharges from other non-processing areas will be treated in a wastewater treatment plant. Treated wastewater meeting the statutory limits would be used in non-critical purposes.

Noise generating sources and their platforms would be maintained properly to minimise noise and vibration. Attempts would be made to restrict noisy operations during day time to reduce community annoyance. Ear muffs / plugs would be provided for personnel working near the noisy machines. Noise barriers would be provided in the form of trees in green belt area. All plants and machineries will be properly maintained.

No solid waste is expected from the process. Dust collected in the pollution control systems will be recycled back into the process.

Rain water will be intercepted and stored suitably in the plant premises. Such water will be re-used suitably in non-critical purposes.

An extensive greening programme including green belt development will be undertaken.

5.3 POST PROJECT MONITORING

OCL has drawn an effective environmental monitoring programme which will help in assessing the efficacy of the treatment facilities/systems based on which curative/corrective actions could be taken.

6.0 PROJECT COST AND COST OF EMP

The total project cost will be around Rupees 45,739 lakhs, which will vary depending upon the type cement mill, its auxiliaries and facilities.

Around 25 crores have been earmarked for the environmental management programme as mentioned above.

CHAPTER 1.0
INTRODUCTION

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INTRODUCTION

1.1 INTRODUCTION

OCL INDIA LIMITED, formerly "Orissa Cement Limited" and known as **"OCL"** was established in the year 1949 has its registered office at Rajgangpur, Orissa OCL India Limited is actively involved in the manufacturing and trading of cement. OCL India Limited now intends to expand its manufacturing activities through setting up of a 1.35 MTPA Cement Grinding Plant in the District of Paschim Midnapur in West Bengal. The proposed Cement Grinding Plant is coming up near the Village Kulapachuria, P.S. Salboni in the District of Paschim Midnapur in West Bengal.

The plot measuring around 162 acres have been allotted to OCL by West Bengal Industrial Development Corporation (WBIDC) for setting up of the proposed Cement Grinding Plant. The plot is located very close (approximately 15 km) to the district town of Paschim Midnapur. All social infrastructures are available in the location. The proposed site is well connected by road. Adra- Khargapur Railway Line of South Eastern Railway is running very close to the project site.

1.2 OCL INDIA LIMITED - An Overview

OCL INDIA LIMITED, formerly "Orissa Cement Limited" and known as "OCL" was established in the year 1949, which started producing Cement through wet process technology under the brand name of "Konark". Keeping a steady progress with time and technology it has modernized to fully automated dry process plant in 1988. OCL commands the position of market leadership in the state of Orissa since its inception and today it is the premier lead brand in the state of Orissa. 'Konark' brand cement enjoys brand advantage in the region. It is a name cemented to Quality.

OCL diversified from Cement to the field of Refractory in 1954. Over the years, it has introduced a large and well-equipped Refractory plant in India covering a wide range of products for use in the Ferrous & non-ferrous Industries. Its customers base spreads from Iron and steel to cement, aluminum, glass, copper, chemicals and hydrocarbon industries. Today,

OCL enjoys a huge market share in India and overseas extending to five continents across the globe.

During the year 2001-02, OCL has diversified its activities into Sponge Iron and now into Steel making. However, Steel plant has been hived off as an independent unit called OISL with effect from 20-12-2006.

1.3 MARKET DEMAND

Growth in cement consumption in India over the last decade has exhibited a strong correlation to the GDP. This is understandable, since an increase in national income leads to higher investment in both housing and infrastructure, which consume cement. The cement demand in the next 5 years is expected to grow at a very fast rate.

The markets of interest for Orissa Cement Ltd. (OCL) plant mainly comprises of West Bengal, North Jharkhand, East Bihar and Assam of which West Bengal is biggest with an annual consumption of 7.29 mio t in FY08. Infact, West Bengal constitutes about 65% of the consumption in the target market.

The decision of the West Bengal Government to promote IT Industries, create special IT city near Kolkata, will lead to higher cement consumption. Also emphasis is being given on infrastructure development. Moreover private sector is also foraying in the area of real estate. West Bengal Industrial Infrastructure Development Corporation (WBIIDC) plans to develop industrial townships to attract investment. Thus a heavy demand in construction materials including cement is expected.

Cement consumption in West Bengal has grown at a compound annual growth rate (CAGR) of 6.4% pa from FY98 to FY08 and is expected to grow at the rate of 7.0% from 2009 onwards.

Cement production capacity of West Bengal is expected to grown to a level of 10.83 mio tpa by FY11 from its current production capacity of around 5.54 mio tpa. Main supply of cement to WB comes from the plants within the state and account for 49% of the demand of the state. The next largest supplier is Chhattisgarh which accounts for 23% share, 17% of requirement is met by the plants from Jharkhand, 7% comes from Orissa, 3% from Madhya Pradesh and balance 1% comes from other states like Andhra Pradesh, Maharashtra, Karnataka, Tamil Nadu and Bihar.

In the target region, Portland Pozzolana Cement (PPC) is the most prevalent product and constitutes around 71% of the total cement usage. Portland Slag Cement (PSC) has a share of around 18%. Ordinary Portland cement has a share of around 11%.

Based on various studies it is expected the proposed OCL plant, which is likely to become operational by FY11 would be able to sell approximately 0.99 mio t in its first year of operation and would reach 100% capacity utilisation from the sixth year onwards.

1.4 JUSTIFICATION OF THE PROJECT

The present market scenario in the country is favorable to go for new cement plant and OCL India Limited is in advantageous position to go for capacity enhancement and increasing product range by putting up an additional clinkering line at Rajgangpur in Orissa and this Cement Grinding Plant which will be closure to the market. Keeping the growth in quality cement consumption in India over the last decade in view, OCL India Limited is planning to increase its cement production capacity through this particular project, which is quite justified. The company is planning to set up the plant under consideration to manufacture Portland

Slag Cement (PSC), Portland Pozzolana Cement (PPC) and / or any other type of Cement suiting to the market requirement.

1.5 SITE LOCATION

The proposed Cement Grinding Plant is coming up near the Village Kulapachuria, P.S. Salboni in the District of Paschim Midnapur in West Bengal. A plot measuring around 162 acres has been allotted by WBIDC for establishment of the proposed unit. The plot is located very close (approximately 15 km) to the District town of Paschim Midnapur. All social infrastructures are available in the location. The proposed site is well connected by road. Adra - Khargapur Railway Line of South Eastern Railway is running very close to the project site. The co-ordinates of the location of the proposed project are –

Latitude: N 22^0 ' 31.78'
Longitude: E 87^0 ' 18.71'
Elevation: 46 m above MSL.

Distance from Howrah Railway station to Midnapur railway station is about 129 km and the project site is approximately 15 km from Midnapur. The nearest airport is Kolkata which is about 140 km from the project site. The project site has good connectivity with seaport of Kolkata, Haldia, Paradeep and Vishakhapatnam.

Indicative location of the project site is presented in **Figure – 1.1**

1.6 ENVIRONMENTAL CLEARANCE

New development may cause different types of impacts on its surrounding environment and on human beings. There are some statutory obligations that any project proponent has to fulfill before proceeding with any developmental work. It is with that view to assess the impact and to ensure

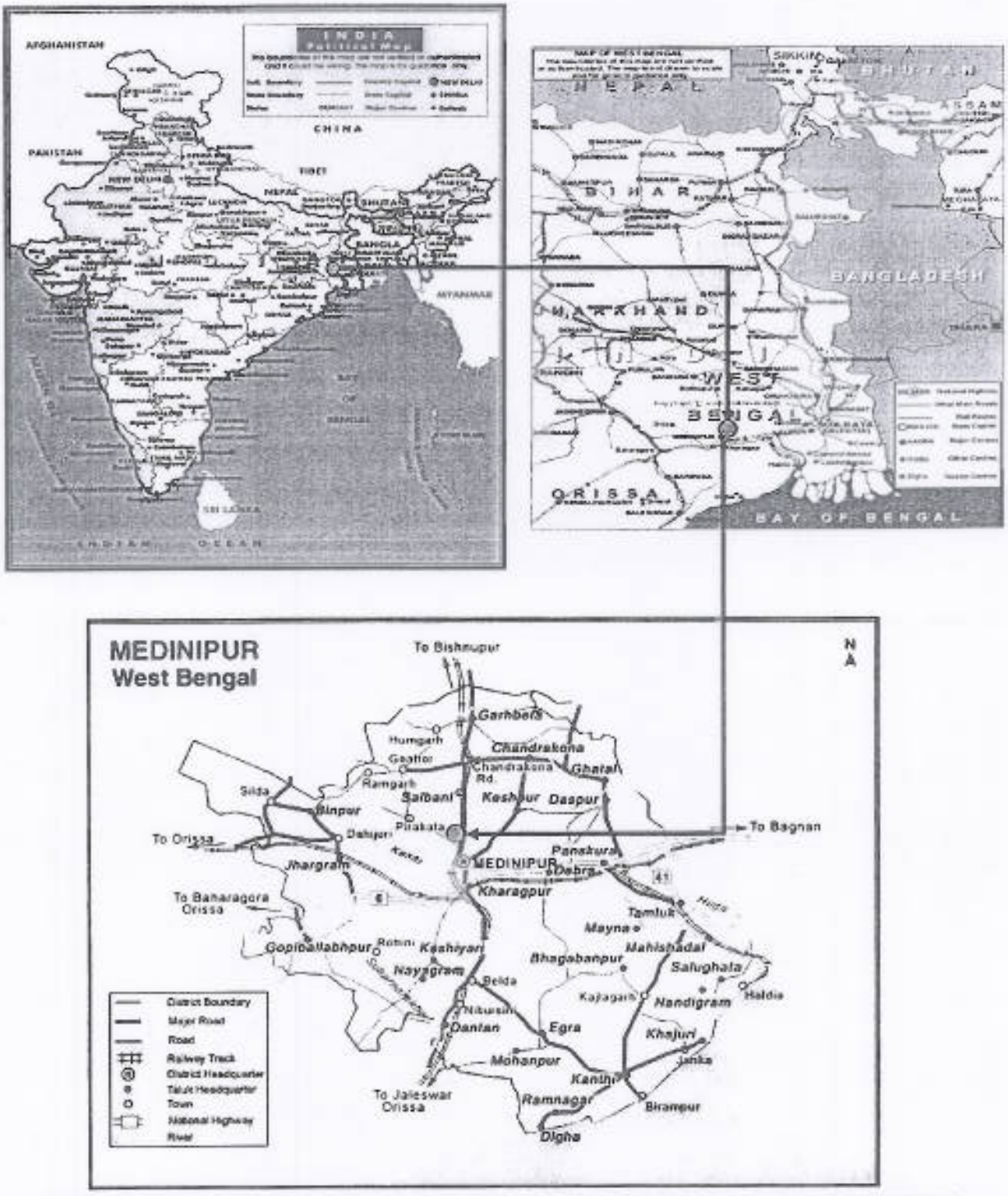


Figure - 1.1
INDICATIVE LOCATION OF THE PROJECT SITE –
VILLAGE Kulapachuria, Paschim Midnapur, WEST BENGAL

environmental quality; Environmental Impact Assessment is a necessary exercise.

M/s Envirotech East (P) Ltd, Kolkata, an Environmental Consultancy firm was entrusted by the Management of OCL to carry out an EIA study for its proposed Cement Grinding unit at Salboni and assist the Management in obtaining Environmental Clearence from the State Level Environmental Impact Assessment Authority (SEIAA).

1.7 ENVIRONMENTAL IMPACT ASSESSMENT

Scope of work

The objective of the Environmental Impact Assessment is characterisation of the existing status of the environment around the proposed site, to identify the probable impacts on the environment due to the proposed project, delineate the mitigative measures to reduce the impact and finally to assess the overall impact. An EIA study, thus, necessarily includes collecting detailed information on the existing environmental scenario or baseline data and establishing the data related to the proposed activity, i.e. project data. The project data is then superimposed on the baseline data and the resultant environmental condition predicted with the help of effective predictive tools.

The scope of work includes:

- To generate baseline data by proper monitoring and surveying schedules.
- To analyse for various environmental components viz. Air, Water, Noise, Land, Biological, Socio- Economic for getting the information about existing background status.
- To identify different impacts of various operations of industry on the environmental components.

- To evaluate proposed pollution control measures.
- To prepare a proper environmental management plan (EMP).
- To prepare a post project environmental quality monitoring programme.

Methodology

The study was carried out in details for the environmental components like Air, Water, Noise, Biological, Land and Socio-economic. The findings were used to evaluate the impact.

Air Environment

Baseline data for ambient air quality has been generated within 10km radius of the proposed site during December, 2008 and February, 2009. Micrometeorological data have also been compiled for the above mentioned season. The parameters measured for Ambient Air Quality status (AAQS) were Suspended Particulate Matters (SPM), Respirable Particulate Matters (RPM), Oxides of Sulfur (as SO_2) & Oxides of Nitrogen (as NO_2).

Water Environment

Water quality was also monitored around the study zone around the site. Information on quality of water resources including both surface and ground water was collected. The parameters of prime importance which were measured for the water quality covered Physical, Chemical, Inorganic, Organic, Nutrient and heavy metals. Water samples were collected during the monitoring season.

Noise Environment

Noise monitoring was carried out at different zones around the plant by Noise meter. Noise levels were monitored both for maximum and equivalent noise level.

Biological Environment

Keeping in view about the possibility of harmful impact on biological component due to the proposed project both terrestrial and aquatic flora, fauna and different biological aspects were studied.

Socio-Economic Environment

A socio-economic study covering the towns and villages around the proposed site was done. Relevant data were collected from census handbooks and field surveying.

All the aforesaid environmental parameters have been used for identification, prediction and evaluation of significant impacts.

Establishing Project Data

Project data consisting of the process description, raw materials requirement, handling and storage of all materials, general layout, commissioning schedule, water demand, source of water supply, water distribution network, wastewater and solid waste generation and their disposal, noise level and its source, source of power etc. were established in consultation with the officials of the Project Proponent.

Assessment of Environmental Impact

Based on the project data and background information generated though environmental monitoring and collected through desk research and data collection, probable impacts of the project during construction as well as operational phases of the proposed project on the different components of the environment were assessed.

Environmental Management Plan

An Environmental Management Plan (EMP) is prepared which in general covers the sources of pollution, proposed pollution control system/ measures, solid waste handling, utilisation, disposal and management, greening program, recommendation for additional mitigatory or remedial or control or safety measures etc.

CHAPTER 2.0

PROJECT DESCRIPTION

CHAPTER 2.0
PROJECT DESCRIPTION

2.1 THE PROJECT

OCL India Limited, one of the leading cement manufacturing company is planning to set up a cement grinding and packing plant of capacity 1.35 million tonne per annum at village: KULAPACHURIA, P.S. SALBONI, Dist Paschim Midnapur, West Bengal. Project site location is given in Figure 1.1.

The company will manufacture Portland Slag Cement (PSC), Portland Pozzolana Cement (PPC) and/or any other type of Cement suiting the market requirement. The clinker is the main ingredient of all varraities cement. This will be transported from its existing plant at Rajgangpur, Dist-Sundargarh, Orissa. Other additives used in cements are Gypsum, Fly ash and slag, which will be supplied from nearest sources. For this purpose, the company will lay down.

1) All facilities for Rail movement, truck movement and wagon tippler for unloading wagon and truck tippler for unloading truck.
2) Closed covered silo/ storage yard for storing clinker, slag, gypsum, fly ash and coal.
3) Raw material and cement conveying system.
4] Packing bag Godown
5] Bag filters and other pollution control equipments etc.

The details of proposed product mix for cement manufacture are presented in Table – 2.1.

Table - 2.1
Product Mix

Sl. No.	Component	Proportion by Weight for PSC	Proportion by Weight for PPC	Proportion by Weight for OPC
1	Clinker %	40 to 57	72 to 65	95 to 97
2	Gypsum %	3 to 5	3 to 5	3 to 5
3	Slag %	57 to 40	-	-
4	Fly Ash %	-	25 to 30	-

2.2 SALIENT FEATURES OF THE CEMENT GRINDING UNIT

a) Required quantity of clinker shall be transported by rail from the existing group clinkerisation unit at Rajgangpur, Orissa. The existing buffer hopper and wagon loading facility at Rajgangpur shall be utilized for clinker storage and loading for transport to the proposed cement grinding plant.

b) Slag requirement shall be met from near by slag sources as from Jamshedpur, (Jharkhand) / Purulia, Kharagpur, Durgapur, Salboni (West Bengal). Chemical gypsum would be purchased from Tata Chemicals, Haldia, West Bengal.

c) Fly ash requirement would be met from Kolaghat Thermal Power Station/Jindal's proposed power plant at Salboni. PPC would also be manufactured to suit the market need.

d) A railway siding shall be constructed at the proposed grinding unit near Godapiasal railway station for parking of wagons and unloading the clinker. For the unloading operation a wagon tippler shall be installed. The wagon tippler shall be equipped with an integrated weighbridge. The effective capacity of the wagon tippler shall be around 1,200 tph in order to unload a clinker rake in about 4 hrs. Placement of wagons on the tippler would be achieved with the help of side-arm charger.

2.3 RAW MATERIALS

Clinker, Gypsum, Slag and Gypsum are four raw materials used for manufacturing OPC, PPC and PSC. Fuel, Coal and Furnace Oil (FO) are also required during cement grinding. An optimistic view is taken while estimating the quantity of above raw materials because this will help for deciding storage capacity of silo/yard/hopper, transport capacity of conveying equipments and other auxiliary equipments. Following two factors are detrimental factor for arriving at an optimistic view.

1) Cement market condition, which is very dynamic and very difficult to predict. In such situation the company shall focus to produce one type of cement although company has capability to produce three types of cement i.e. OPC, PPC and PSC.

2) Cost and availability of raw material are also factor for company to go for producing one quality of cement out of three quality of cement i.e. OPC, PPC and PSC.

The raw material requirement for each quality of cement is estimated based on 100% production. Maximum figure in all three varieties of cement are considered as final figure. All estimated quantities are on dry basis and given in hereunder table 2.2

Table - 2.2

Estimated Raw Material Requirement

Name of Raw material	Raw material consumption % and requirement qty in million tonne per year (mtpy)						Maximum qty (Dry) of raw material out of three varieties of cement
	OPC (100% production)		PPC (100% production)		PSC (100% production)		
	%	Qty (mtpy)	%	Qty (mtpy)	%	Qty (mtpy)	Qty (mtpy)
Clinker	97%	1.31	67%	0.90	42%	0.57	1.31
Gypsum	3%	0.04	3%	0.04	3%	0.04	0.04
Fly ash	Nil	Nil	30%	0.41	Nil	Nil	0.41
Slag	Nil	Nil	Nil	Nil	55%	0.74	0.74
Total	100%	1.35	100%	1.35	100%	1.35	

The source of availability of raw material and its distance from proposed source are presented in Table- 2.3. All raw materials are given in dry basis.

Table – 2.3
Raw Materials Requirement

Material	Estimated Requirement (MTPA)	Source	Locality	Transportation Distance (km)
Coal	0.060	Purchase	Ranigung (W.B)	150
Clinker	1.31	OCL	In-house clinkerisation unit at Rajgangpur, Orissa	375
Slag	0.74	Purchase	Jamshedpur, (Jharkhand) / Purulia, Kharagpur, Durgapur, Salboni (W.B)	180 / 200 / 40 / 150 / 2
Fly Ash	0.41	Purchase	Kolaghat Thermal Power Station / Jindal power plant at Salboni	85/5
Gypsum	0.04	Purchase	Tata Chemicals, Haldia, West Bengal	120

2.4 PROCESS DESCRIPTION

The clinker unloaded from the wagons would be extracted by an apron conveyor, installed under the tippler hopper and would be fed to the proposed clinker storage covered silo through a belt conveyor. A suitable dust suppression system will be provided for dust suppression at the wagon tippler hopper. Clinker will be stored in a silo of capacity 25,000 T made of RCC. The capacity of clinker silo would be sufficient for 14 days of grinding requirement. Clinker from the silo shall be extracted and transported to the clinker hopper of the cement mill section through discharge gate and belt conveyor. Clinker shall be fed into the mill by weigh feeder provided beneath the clinker hopper.

Chemical gypsum would not require crushing and hence crusher has not been considered. The storage capacity for gypsum considering 14 days storage requirement stockpiles of 2,000 Tons capacities have been considered. The gypsum shall be brought through rail/ road and shall be transported to the common stacker of 1200 TPH for making gypsum stockpile. The material would be reclaimed through a common reclaimer of 300 TPH meant for gypsum/ slag through a set of belt conveyors to the cement mill bins.

Slag will be received in the plant through wagon/truck and would be unloaded through wagon tippler/truck tippler. The material will be stacked in a linear stockpile through a common stacker of 1,200 TPH and reclaimed by a common reclaimer of 300 TPH. Provision would be made also to bring the slag in the plant through trucks and required unloading and transport facility to slag stockpile.

A storage facility equivalent to 10 days has been considered at the cement plant. The stored slag would be reclaimed with the help of a common reclaimer and will be transported to the cement mill hopper through a belt conveyer.

The cement raw materials will be ground in grinding mills, which shall be either Vertical Roller Mill (VRM) or Ball mill or Roll Press with Ball mill. Water will be required for making smooth grinding operation. Hot gas is required for drying slag and gypsum, for maintaining mill outlet temp more than dew point and for carrying the product through hot gases. Hot Air Generators (HAG) are used to produce hot gases. These hot gas generators use furnace oil at the time of start-up and subsequent coal firing.

Coal required for such purpose would be sourced from Raniganj area of West Bengal, which is located within 150 km distance and will be transported to the plant site by road. Raw coal hoppers with truck tippler would be provided. Coal will be fed to a roll crusher of 50 TPH capacity through a belt conveyer. Crushed coal will be transported through a belt conveyor to covered coal storage. Coal would be used as the major fuel in the plant. A coal-pulverizing mill with closed steel storage silo will be

installed. This pulverized coal will be used in hot air generator. Furnace Oil (FO) will be used in HAG during start up_for generating hot gas, which will be used for drying coal during grinding of coal in coal-pulverizing mill. The coal powder shall be used in HAG for generating hot gas. After that FO firing in HAG is switched off. One Furnace oil storage tank will be installed.

Fly ash will be transported to the plant from source through bulk carriers and pumped into the silo. The capacity requirement of fly ash will depend upon the product mix. However a RCC Silo of 3,500 Tons is envisaged for storage of fly ash. From the silo, fly ash will be transported to the cement mill through a set of air slides/dense phase pneumatic conveying system and controlled by a solid flow meter dozing valve combination. The storage requirement equivalents to 6 days have been considered.

The cement grinding capacity of the plant would be 1.35 MTPA.

The mill will be used for grinding slag and OPC separately which will subsequently be mixed using a paddle mixer to give PSC. Same mill will also be used for grinding Clinker, Gypsum and Fly Ash together to produce PPC.

Board technical features of the cement mill system would be as follows –

Cement Mill Bin(s):	3 bins - 1 x 300 T capacity for clinker, 1 x 300T capacity for slag and 1 x 100 T for gypsum
Cement Mill Feeding:	Apron weigh feeders have been considered for extraction of clinker, slag and gypsum. Feed to the mill would be controlled with the help of these weigh feeders.
Mill System:	The VRM mill/ball mill_/ball mill with roller press with high efficiency separator and a chain type bucket elevator coupled with air slides have been considered to achieve this.

Product Collection: OPC/ ground Slag/ PPC collected from the bag filter would be transported to the different cement silos with the help of air slide(s).

2.5 CEMENT STORAGE

Taking into account the high seasonality in the market demands, separate storages for OPC and ground slag have been considered. A Four compartment silo of 8,000 Tons capacity has been considered for storage of OPC and Ground Slag.

OPC and Ground slag would be mixed in required ratio with the help of a paddle mixer and would be transported to the PSC Packing silos with the help of a set of air slides and bucket elevators.

Clinker, Fly ash and Gypsum are mixed and ground in grinding mill to produce PPC, which is conveyed to PPC packing Silo through a set of conveying equipments.

A cement storage capacity, equivalent to 3.0 mill days has been considered.

Two silos of RCC construction of 6,500 Tons each have been considered for storage of PSC and PPC.

From the silos, cement would be transported to the packers, with the help of a set of air slides and bucket elevators. Arrangement would be such that all packers will be capable of being fed from all silos.

Keeping In view the demand for bulk cement in West Bengal, a provision for bulk loading would be arranged. 1 x 200 TPH capacity bulk loading facility would be installed.

2.6 CEMENT PACKING & DESPATCH

Requirement of packing depends upon the market needs. If cement markets are far away from the plant (more than 150 km - 200 km) then transportation through rail network would become an economically viable option for the plant, the packing capacity would be designed considering cement dispatch in bags through trucks as well as rail.

It is proposed to install 3 x 180 TPH, 12-spout electronic roto-packers. Two numbers of packers would be adequate to meet the packing requirement of the plant. However, one additional packer would be installed to facilitate rake loading in time bound manner.

Eight numbers of truck loaders would be provided for loading bags in the trucks. From the packer outlet up to the loading of packed bags in the trucks, a suitable conveyor system with flat belts and diverters would be installed. Eight numbers of wagon loading machines would be provided for dispatch through rail.

An indicative process flow sheet is presented in **Figure - 2.1**.

2.7 PROPOSED PLANT LAYOUT

Indicative layout of the proposed Cement Grinding Plant is presented in **Figure - 2.2**.

2.8 MAJOR UTILITY FACILITIES

2.8.1 Power System

The power demand for the proposed plant has been estimated as 12 MVA. The power requirement will be met by 132 kVA power line of WBSEB. As per advice of WBSEB the bulk power of 132 kVA would be made available from the nearest substation/feeder point and the distance of the feeder point from the project site is approximately 12 km. The distance of closest Dharma substation from the plant site is approximately 16 km. It is

understood that there would not be any constraint as far as availability of power is concerned and the power supply at 132 kVA is quite stable in the region.

A DG set of 1000 kVA would be installed for meeting the construction power requirement as well as for emergency power requirement for running of the packing plant and alternately a construction power of 1 MVA from WBSEB is under consideration.

2.8.2 **Water Supply**

No abstraction of surface water is envisaged. Ground water will be used for meeting the plant's daily water demand. However for such drawal necessary permission of the concerned Authority would be taken. Necessary water pumping, pipeline and receiving facilities would be developed by OCL India Limited.

Drawal of ground water would be reduced once the piped water supply system of the local Authority (which is under active consideration of the government) becomes operational.

An open reservoir of 2,000 m^3 would be developed for rainwater storage. Such rain water after needed treatment would be suitably used within the plant area.

Water will be required during grinding operation for smooth operation of plant. Fairly good volume of water will be needed for controlling fugitive dust emission by spraying water at different locations like transfer points, unloading points, roads etc.

The plant will be needing fresh water to the tune of 900 m^3/day for meeting its daily water demand in various purposes including drinking and sanitation uses. An indicative water demand statement is presented in Table – 2.4.

Additionally, treated wastewater to the tune of 175 cum/day from the effluent/ sewage treatment plant will be used in dust suppression and other non-critical purposes.

Table – 2.4
Indicative Water Requirement

Sl.No.	Purpose	Qty. (M^3 / Day)
1	Process requirement	330
2	Cooling Tower	300
3	Domestic Demand	170
4	Miscellaneous Purpose	50
5	Dust Suppression Purpose	50
Total water requirement		**900**

A treatment facilities based on the quality of water would be considered in the project. Water will be stored in an underground tank for plant use and overhead (OH) tank for drinking purpose. For plant equipment, water would be re-circulated after cooling to avoid any wastage and loss.

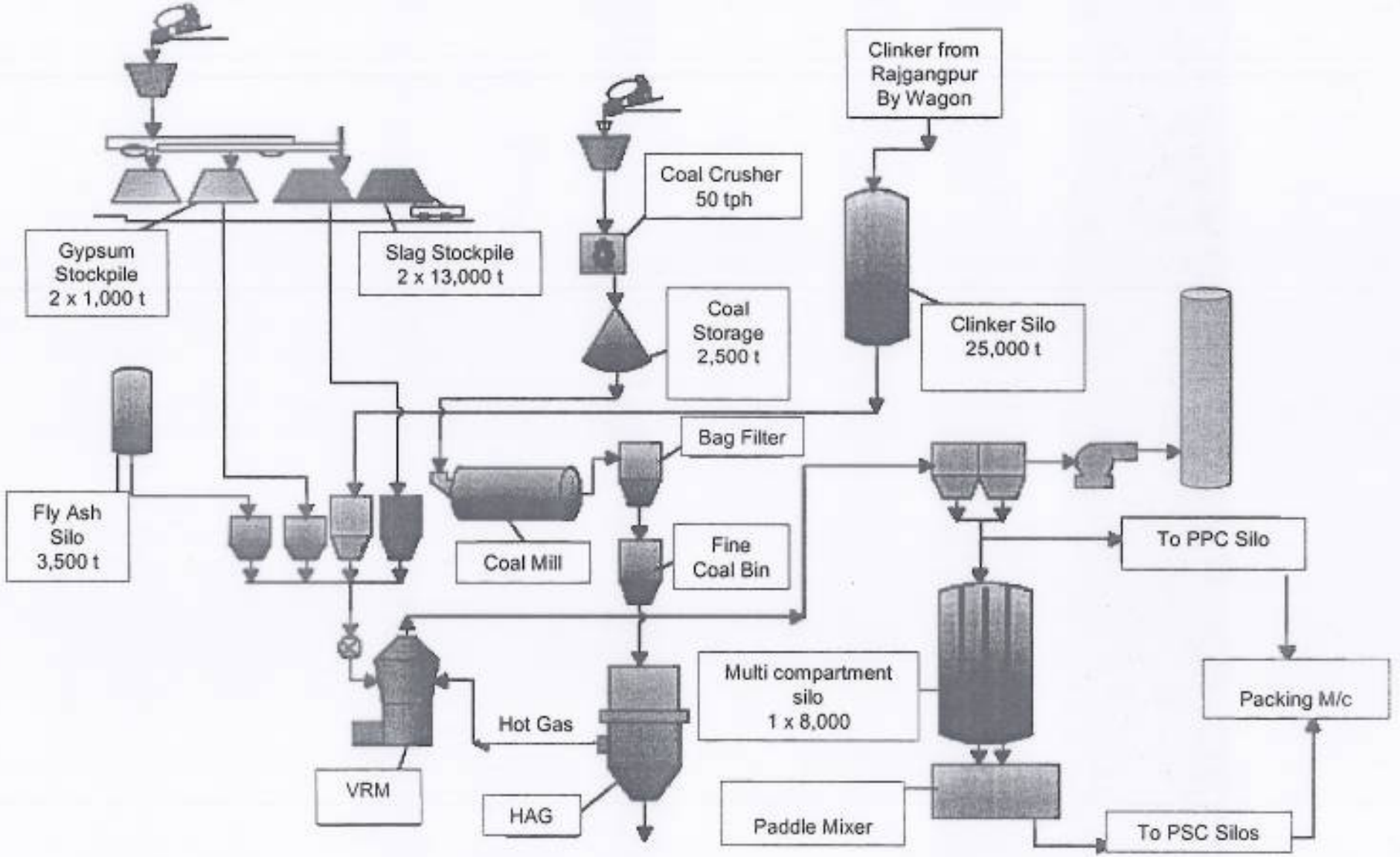
The indicative water balance diagram for the proposed project is presented in **Figure - 2.3**.

2.8.3 Compressed Air Supply

Centralized compressor and blower room would be installed for the sake of overall economy, effectiveness and to facilitate the operation and maintenance of the plant. The compressed air would be required mainly for dust collection from the equipments and operation of pneumatic valves. Blowers will be used for aeration of silos.

A centralized compressor room would be installed for cement grinding, storage and packing section. Blowers will be suitably accommodated under buildings/ silos near points of utility.

FIGURE 2.1 : AN INDICATIVE PROCESS FLOW SHEET



VRM : Vertical Roller Mill
HAG : Hot Air Generator

PPC : Portland Pozzolana Cement
PSC : Portand Slag Cement

FIGURE - 2.2 : INDICATIVE LAYOUT OF THE PROPOSED CEMENT GRINDING PLANT

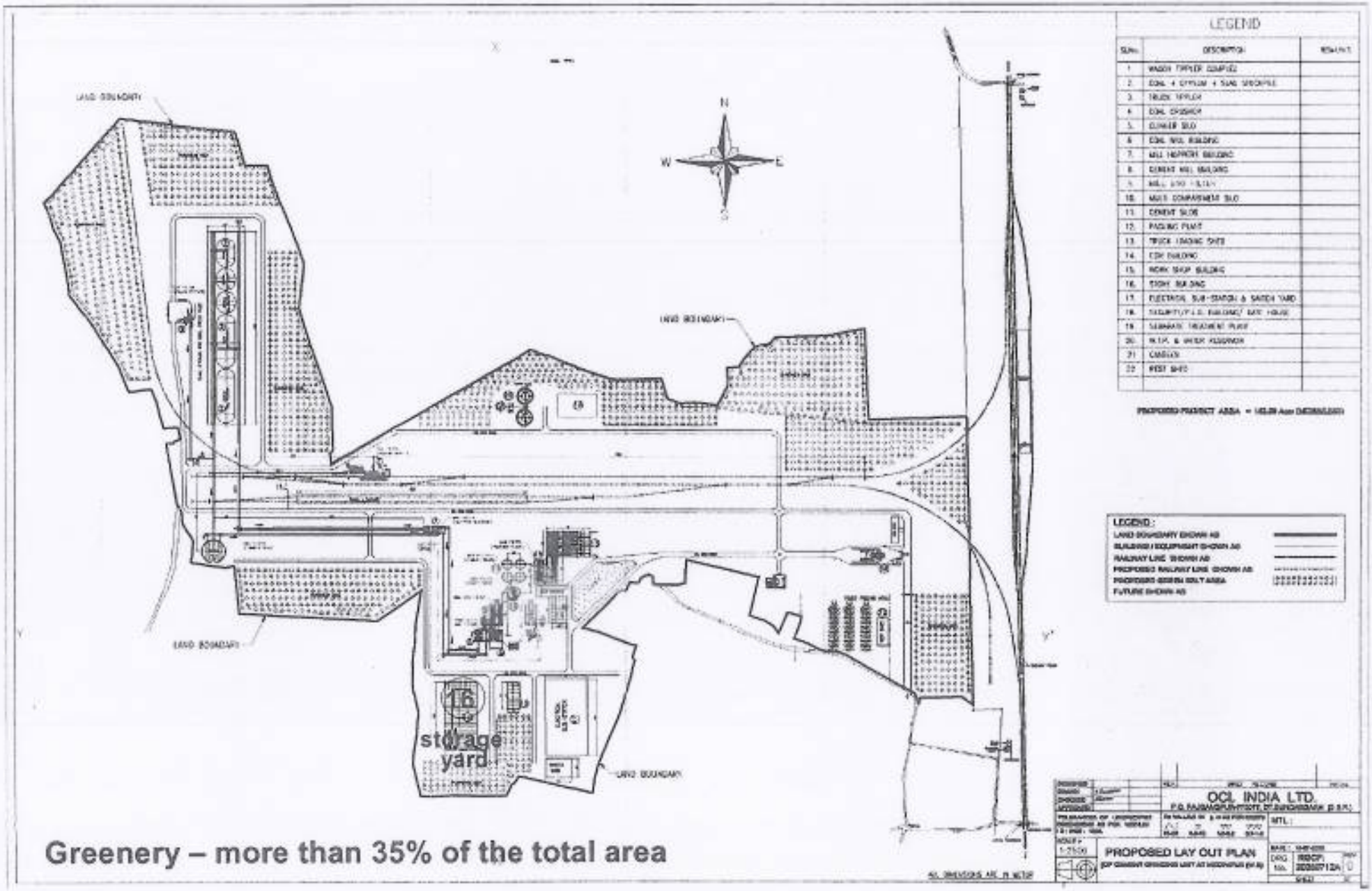
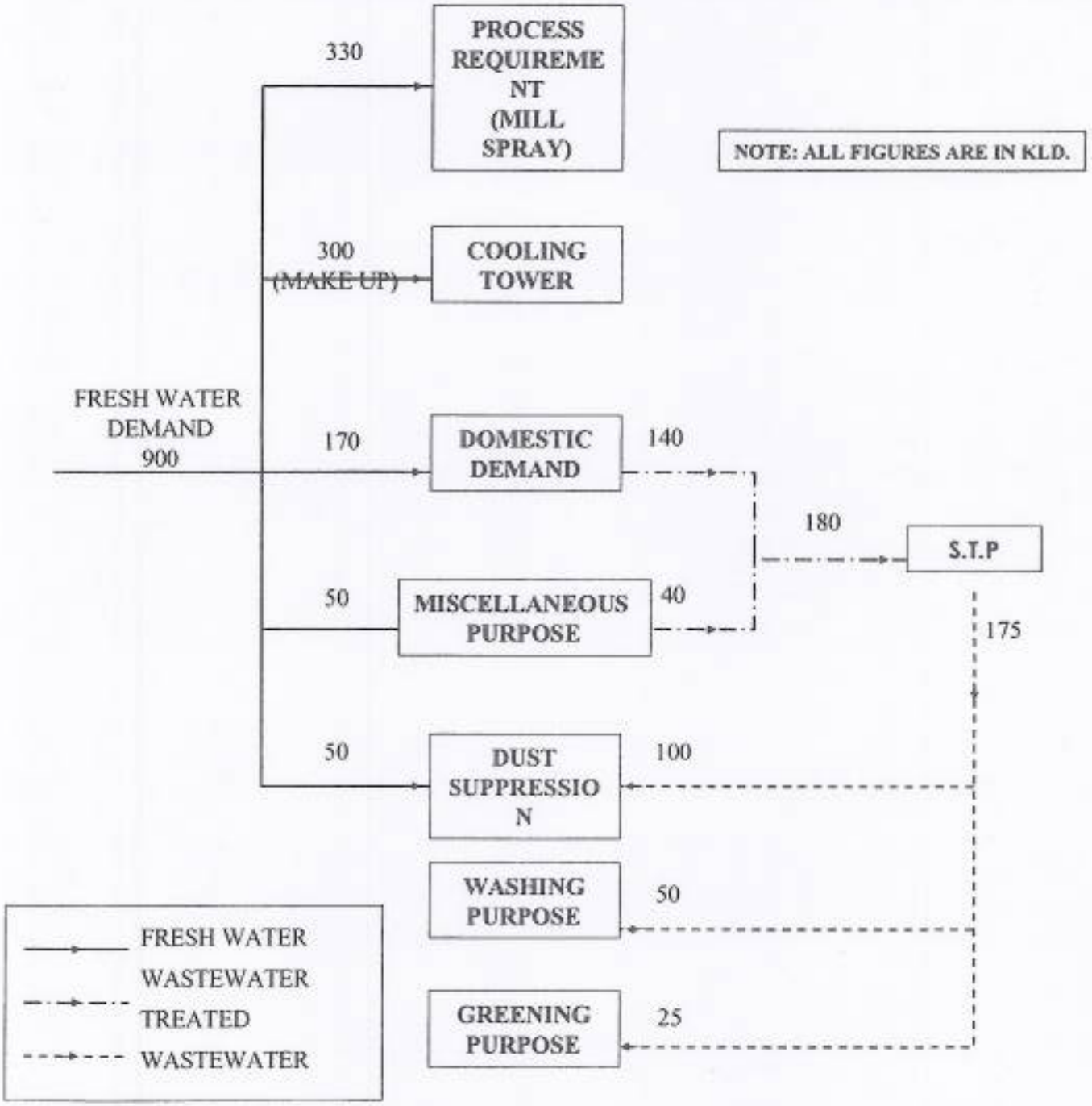


FIGURE 2.3 : INDICATIVE WATER BALANCE DIAGRAM



2.8.4 Central Control Room (CCR)

A CCR building would be constructed. Operation of the cement mill and packing plants will be carried out from the central control room.

2.8.5 Fire Fighting System

A complete fire fighting system would be provided comprising of -

- A suitable high-pressure system of fire hydrants consisting of suitable number of fire hydrants.
- A complete separate fire fighting water piping network for feeding the hydrants.
- Heavy-duty ABC powder type fire extinguishers would be hung at important electrical equipment areas.
- Portable CO_2 extinguishers shall be provided throughout the plant.
- Automatic fire extinguishing system using water would be provided for empty bags store in the packing plant.
- Fire extinguisher system shall be provided near oil tank.

2.9 AUXILIARY INFRASTRUCTURE

2.9.1 Workshop

A small mechanical and electrical/ instrument workshop for repairs and maintenance would be installed.

The main equipment for the mechanical workshop would include lathe machine, horizontal shaper, bench drilling machine, grinding machine, threading machine, arc & gas welding machines, hydraulic shear machine and lifting tackles viz. pulley blocks, pullers, chain blocks, d-shackles, hydraulic cylinders, etc. A 5 T capacity H.O.T. crane will also be provided in the mechanical workshop.

Similarly, main equipment for the electrical workshop would include portable multi meters, portable insulation tester, earth tester, portable single pen recording ammeter/ voltmeter, portable AC multi range

wattmeter, lux meter, tong tester AC/ DC, phase sequence meter, soldering meter, motor winding machine, assorted hand tools, etc. Instrument workshop would mainly comprise of manometer, hand tachometer, digital FC tester, logic clip, digital multimeter, signal generator etc.

2.9.2 Machinery Stores

A store building would be constructed for storing tools, spare parts, consumables, etc. Open area will be earmarked for storing machinery and construction materials for the proposed plant.

2.9.3 Cranes, Monorails and Pulley Blocks

Adequate sized maintenance cranes/ hoists, monorails and pulley blocks will be provided at all suitable locations at the plant to facilitate the maintenance and operation of the plant.

2.9.4 Technical & Administrative Office

A suitable Technical Office & Administrative Office would be constructed for the project activities and operation phase.

2.9.5 Time and Security Office

At the entrance of the main plant, a Time Office and a Security Office would be constructed.

2.9.6 Clinic

A dispensary with first aid facilities would be provided in the plant premises.

2.9.7 **Weighbridge**

Three numbers of weighbridge will be provided. Two of them will be utilised for recording weights of various incoming and outgoing materials and one of them will used for bulk loading of cement.

2.9.8 **Bags Godown**

A godown would be provided in the packing plant area for the storage of bags.

2.9.9 **Parking**

Adequate parking space would be provided in the plant premises for the parking of vehicles.

2.10 IN BUILT POLLUTION CONTROL MEASURES

The pollutants in the form of solids, liquids and gases are expected to be generated from various Units as envisaged under the proposed Cement Grinding Plant. Release of such pollutants without proper care may affect the environment adversely. Pollution of the environment not only adversely affects the human beings, flora and fauna but also shortens the life of plant and equipment. This vital aspect, has been taken into account while planning the plant and equipment and adequate measures have been proposed to limit the emission of pollutants within the stipulations of statutory norms.

2.10.1 **Air pollution control**

Cement industry is known for its contribution to air Pollution. The pollutants, mainly particle matter would be emitted either from the stack or from storage.

Sources of air pollution can be broadly divided into two groups – process and non-process. Process emissions would be those which would be emitted during production/operation of the plant, while non-process emissions would be due to different material handling facilities.

The Main air pollutant from the process and non-process emissions would be SPM.

A number of systems have been proposed for air pollution control, which will provide safe environmental conditions in the working area and will ensure acceptable air quality in the surrounding area of the plant.

Efficient collection of dust at sources, their dedusting with efficient filters and recycling the dust to the process would be the prime objective.
The main dust sources of the manufacturing process would be -

- Coal grinding
- Cement grinding

For drying of coal in the drying-cum-grinding process, hot gas would be used and dedusted by a fabric filter and the dust content of the cleaned gas would be about 50 mg/Nm^3.

The cement-grinding unit would also be provided with bag filters. The dust content in the exhaust air would be less than 50 mg/Nm^3.

Dry fog dust suppression system, bag filters etc. would also be provided in various sections of material handling and processing units for controlling air pollution. Some other actions that would in general be taken in this respect are -

- Conveying of clinker from wagon tippler to silo will be made through locally covered single over land belt conveyor.
- Separate closed conveying system for additive will be provided.
- All silos will be equipped with closed mechanical or pneumatic conveying system.
- Bag House will be installed for controlling particulate emission at the cement mill.
- All transfer points and loading or unloading points will be provided with bag filter./dust suppression system

- Pneumatic conveying system for fly ash handling will be used, to avoid generation of fugitive dust.

2.10.2 Water Pollution Control

The prevention and control of water pollution aim at conserving make-up water by recycling the waste water after treatment.

The grinding unit would have a provision of sewerage system for the collection and disposal of sewage from the cement works and residential quarters. The sewage would be treated in a common sewage treatment plant. Treated wastewater will be reused for the cement manufacturing process. Water system will be designed for "Zero Discharge". The sewage sludge, which is an excellent fertilizer, would be utilised in the areas where aforestation is anticipated.

2.10.3 Noise Pollution Control

Noise generation will be considered while selecting equipment. Equipment would not generate noise more than 85 dB (A) at 1 m distance. Wherever required noisy equipment will be placed on vibration isolators or housed in a separate enclosure or surrounded by baffles covered with noise absorbing material. As the operator would be stationed in the control room, there will be minimum chance of exposure to high noise levels. However personnel working in high noise zones will be provided with personal noise protection equipments (e.g. ear muffs, ear plugs) and their duty hours will be regulated to control noise exposure levels.

2.10.4 Wastewater Management

No wastewater is expected from the proposed cement manufacturing process.

The grinding unit would have a provision of sewerage system for the collection and disposal of sewage from the cement works and residential quarters. The sewage would be treated in a common sewage treatment plant. The treated wastewater to the tune of 175m^3/day from the effluent/

sewage treatment plant will be used in dust suppression and other non-critical purposes. Water system will be designed for "Zero Discharge".

Drainage & Rain water Harvesting

The proposed project will have a properly designed drainage system. Rain water intercepted through these drains will be taken into a water reservoir. There will be an arrangement for letting out the excess rain water run-off into the nearby water course. Rain water so stored would be used for non-critical purposes within the plant.

2.10.5 Noise Management

During the construction phase of the proposed project, noise will be generated due to movement of vehicles and operation of light and heavy construction machineries including pneumatic tools and compressors. The operation of the new units is expected to generate relatively high and continuous noise. Impacts of noise on workers can be minimised through the adoption of adequate protective measures, which are as follows -

a. Use of personal protective equipments (earplugs, earmuffs, noise helmets etc.)
b. Education and public awareness.
c. Exposure control through the rotation of work assignments in the intense noise areas.

2.10.6 Plant Safety

Plant safety measures would form an integral part of the environment protection plan of the proposed plant. Workers' safety would be of highest degree of concern so as to avoid any form of personal injury or untoward accident. In-built safety features of the plant and machinery would be made adequate in order to avoid hazardous events causing damage to the life and property.

2.10.7 Greenbelt & Landscaping

During development of plant general layout, adequate space would be reserved for greening activity including plantation of trees. This would improve the plant aesthetics as well as prevent the fugitive dust emissions.

2.10.8 Environmental Monitoring

Routine monitoring of stack emission, ambient air quality, work zone air quality, noise level, wastewater and surface water stream etc. would be carried out. The monitored data would be recorded and necessary corrective measures would be taken to avoid any non-compliance of Statutory Regulations.

2.11 CONSTRUCTION INPUTS INCLUDING STRUCTURAL, MACHINERY

The main construction material required will include steel, cement, stone, aggregates, sand and bricks. Machineries will include concrete mixers, hoists and welding equipment. The heavy equipments will include earthmovers, cranes, trucks, dumpers etc for excavation as well as transport of material. All of above items are easily and abundantly available from market supply sources.

2.12 MAN POWER REQUIREMENT

Man Power requirement has to be assessed on the basis of –

- Arrangement of plant as conceived
- Service facilities available
- Number of plant operating shift
- Extent of mechanization
- Philosophy of control
- Executive oriented operational practice
- Executive oriented maintenance planning, condition monitoring and predicative maintenance practice

- Preventive and breakdown maintenance through contracts under supervision of plant executives.

Manpower of about 158 persons would be required during operational phase.

Construction manpower will be coming to site mostly from the neighborhood on daily basis. This will be supplemented by various specialized groups of construction and installation workmen who will be brought to the construction site by their respective construction firms.

2.13 TRANSPORT FACILITIES

Incoming raw material and outgoing finished products would be transported by railway wagons / road transport. Carriage of the finished products to the market will be through railway and road transport.

2.14 PROJECT PERIOD

The entire project will be completed within 27 months time after getting environmental clearance.

2.15 PROJECT COST

Cost for the proposed project has been estimated to be about Rupees 45,739 lakh, which will vary depending upon the selection of equipment, RBI Index rate, exchange rate etc.

CHAPTER 3.0

BASELINE ENVIRONMENTAL SCENARIO

CHAPTER 3.0
BASELINE ENVIRONMENTAL SCENARIO

3.0 GENERAL

The EIA is aimed at determining the environmental impacts on the "Study Area", which encompasses all areas falling within a radius of 10 km around the proposed plant site of M/s OCL India Limited due to the proposed project.

The major environmental disciplines studied in this EIA report include soil, land use, meteorology, surface and ground water quality, air quality, noise, ecology and demography and socio-economics.

This section presents detailed discussion on the field data, generated for soil, meteorology, water quality, air quality, noise, ecology and socio-economics during three months' period (01st December, 2008 – 28th February, 2009) along with the relevant secondary data, collected from various agencies on the relevant disciplines.

The map showing the location of the project site is presented in **Fig1.1.**

3.1 PHYSIOGRAPHY

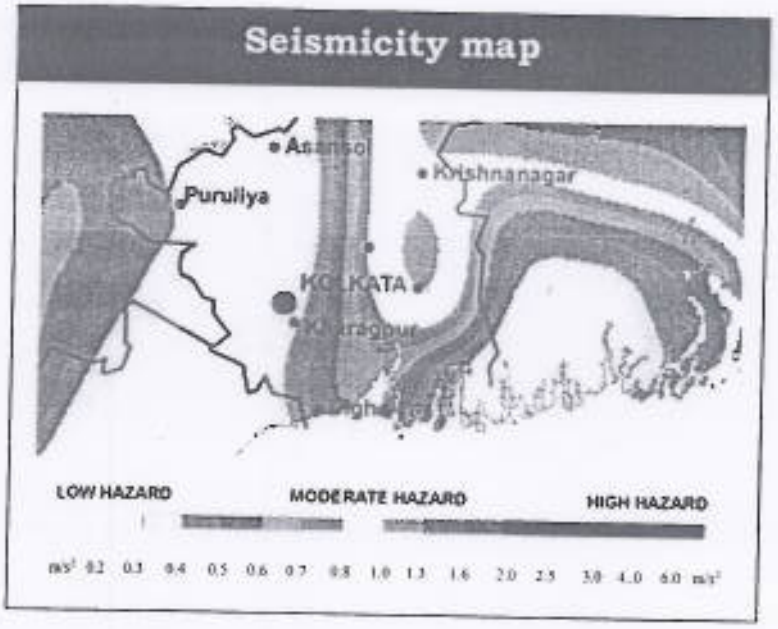
The proposed Cement Grinding Plant is coming up near the Village Kulapachuria, P.S. Salboni in the District of Paschim Midnapur in West Bengal. The plot is located very close (approximately 15 km) to the District town of Paschim Midnapur. All social infrastructures are available in the location. The proposed site is well connected by road. Adra - Khargapur Railway Line of South Eastern Railway is running along the eastern side of the project site at a distance of about 0.5 km. The proposed site is located about 1.25 km on the western side of NH-60. Nearest railway station is Godapiashal, which is around 0.6

km on north-eastern direction of the project site. Its geographical coordinates are 22°31.78' N and 87°18.71" E. Distance from Howrah Railway station to Midnapur railway station is about 129 km and the project site is approximately 15 km from Midnapur.

The main surface water body in the area is the river Kankshabati is a perennial river, which flows about 13 km away towards southern side from the project Site. The average elevation is about 46 M above the Mean Sea Level (MSL). The study area is a part of Midnapur district, West Bengal. Situated in Kankshabati river basin, the area is a mild topographic high. Climatically it falls in the Gangetic West Bengal region. Geologically, the area is a soft rock area having three main lithologic units: (a) a lateritic formation, (b) an older deltaic formation, and (c) a younger deltaic formation.

3.2 SEISMICITY

According to IS: 1893 – 1984, the study area falls in Zone-II and means that the earthquake shock in the area is minor. There is no major earthquake episode recorded in the study area.



3.3 LAND USE BASED ON 2001 CENSUS

The land use classification used in this report has been adopted from District Census for the year 2001. The break up of land use has been presented in 5 categories viz. Forest Land, Irrigated Land, Non-irrigated Land, Culturable Waste Land and Land not available for cultivation.

Irrigated and non-irrigated lands are break-up of agricultural land. Culturable wastes include lands within culturable holdings such as permanent pastures, other grazing lands, meadows, lands under miscellaneous tree crops and groves not included in the net area sown, and other culturable wastes. Lands under that ching grasses, bamboo bushes and other groves for fuel, etc. which are not included in forest or orchard are also included in this category. Fallow lands which have not been cultivated during the current year and the last five years or more in succession are also included in this category. Area not available for cultivation includes (a) barren lands and un-culturable lands within cultivable holdings which cannot be brought under cultivation without incurring a huge cost and (b) lands put to non-agricultural use. The land use pattern of the study area, based on Census Data of 2001 is presented in Table-3.3.1 and shown in **Figure 3.3.1**. Google view of the study area is presented in **Figure 3.3.1 A**.

Table 3.3.1
Land Use Pattern of the Study Area
(Based on Census Data of 2001)

SL. NO.	Class	Area (in Ha.)	Study Area (%)
1	Agricultural Land Irrigated Land: 4736.65 (15.05%) Non-irrigated Land: 10923.30 (34.79%)	15660	49.87
2	Cultivable Waste Land	2117	6.74
3	Area not available for Cultivation	4763	15.17
4	Forest	7424	23.64
5	Others (settlements, water bodies, roads, railway lines, hills, valleys etc.)	1436	4.57
TOTAL		**31400**	**100.00**

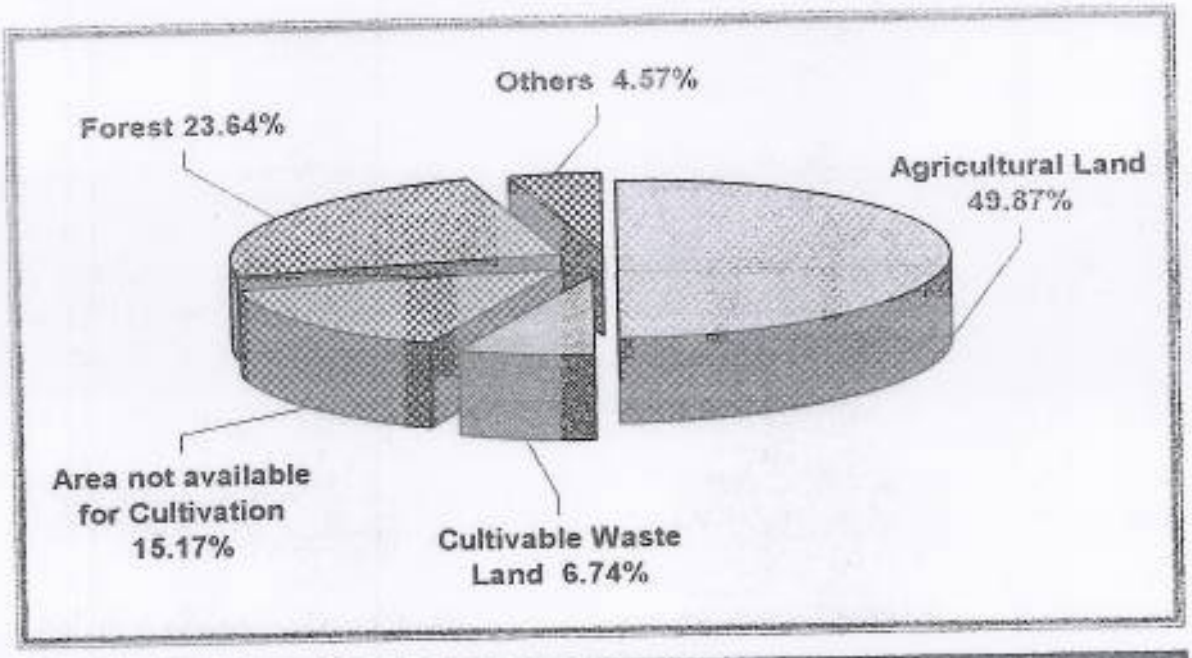


FIGURE 3.3.1
LANDUSE PATTERN IN THE STUDY AREA
(BASED ON 2001 CENSUS)

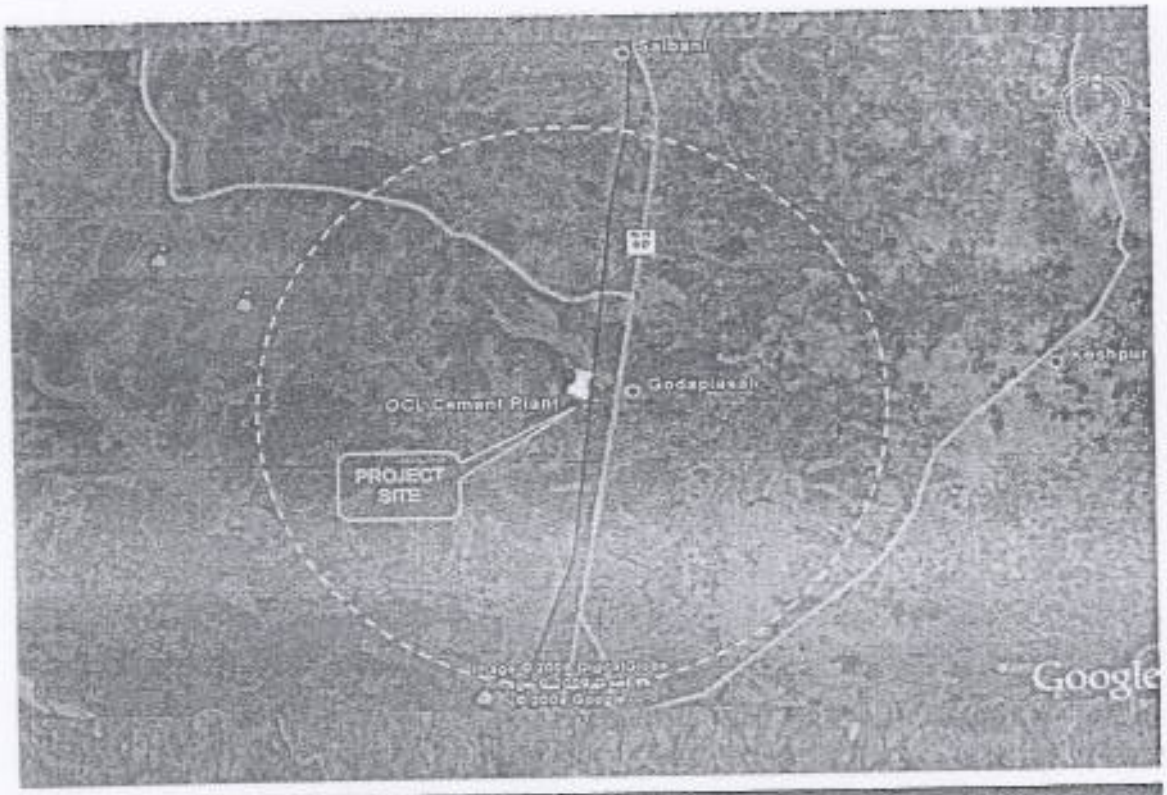


FIGURE 3.3.1 (A)
GOOGLE VIEW OF THE STUDY AREA

3.4 GEOLOGY AND SOILS

The soils of the study area are formed through alluvial deposits and overlain by more recent back swamp deposition. The soils are light to dark coloured and poor in calcareous materials. In general three types of soils have been recognized in this district, viz. i. residual types derived from weathering of granites, gneisses and schist, ii. Lateritic soil and iii. Clay loam to clay.

Soils in the area are mostly clay silt or clay in texture and contain large percentage of silt and clay and hence possess high water holding capacity. Only in areas close to rivers, soils are sandy clay. Alluvial soils are often very fertile. Spot sampling of soil samples from the core area and different places in the buffer zone was carried out

The soil characteristics are summarized in Table 3.4.1 & the soil quality monitoring locations are shown in **Fig. 3.4.1.**

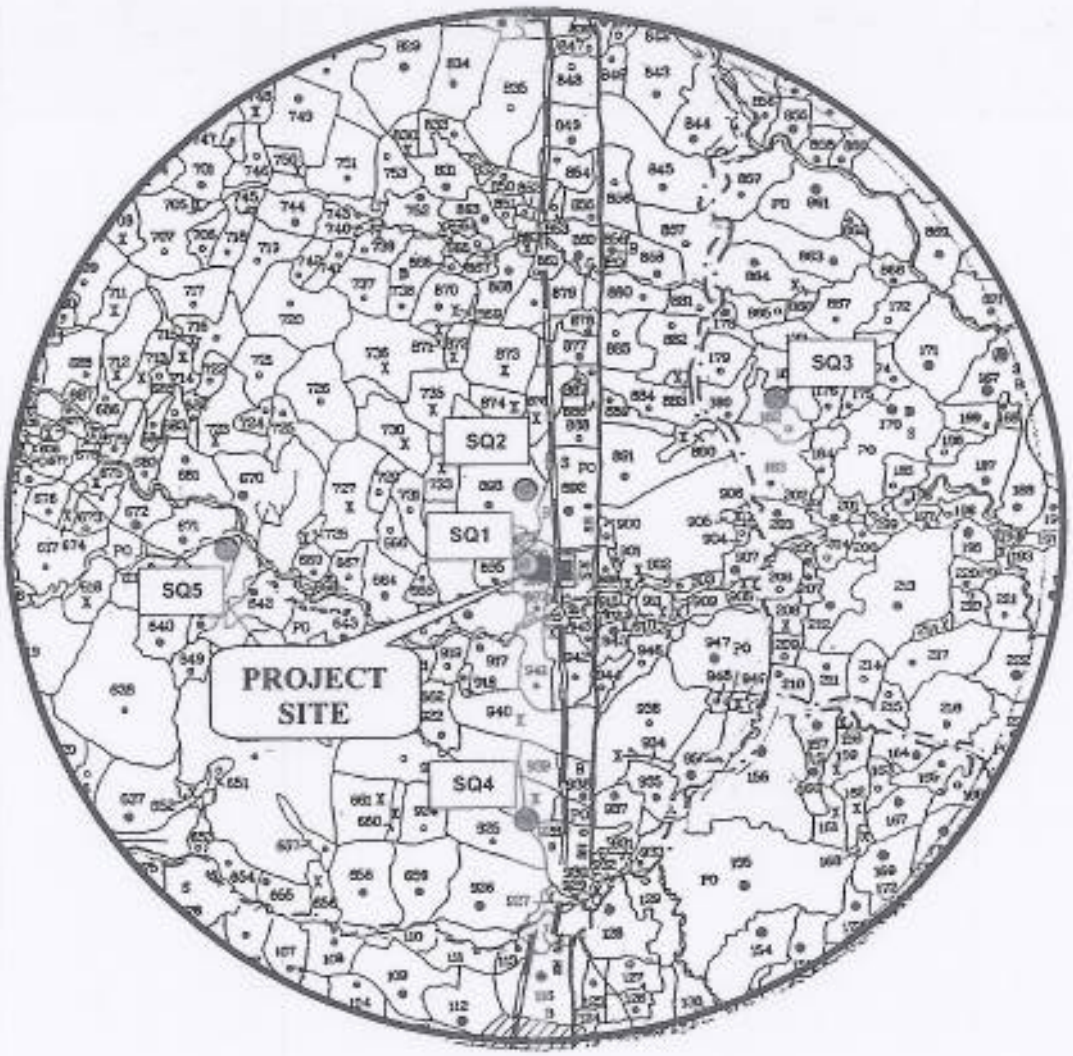
Table 3.4.1
Sample Type : Soil Sample

Code	Sampling Location	Sampling Period
SQ-1	Project Site	JANUARY,09
SQ-2	Pathrajur	
SQ-3	Raghunathchak	
SQ-4	Dhanyasol	
SQ-5	Tarashuli	

ANALYSIS RESULTS

S.N.	PARAMETERS AND UNIT	SAMPLING LOCATIONS				
		SQ-1	SQ-2	SQ-3	SQ-4	SQ-5
PHYSICAL CHARACTERESTICS						
1	COLOUR	Brown Clay	Brown Clay	Brown Clay	Brown Clay	Brown Clay
2	**TEXTURE**					
a)	Gravel	20	22	18	24	20
b)	Sand	24	25	21	16	24
c)	Silt	21	20	22	19	18
d)	Clay	35	33	39	41	38
3	BULK DENSITY (g/cm^3)	1.55	1.56	1.52	1.57	1.58
4	POROSITY (%)	40.9	43.1	40.3	38.9	42.3
5	WATER HOLDING CAPACITY (%)	37.2	35.5	40.1	38.5	37.8
CHEMICAL CHARACTERESTICS						
1	pH	6.9	7.2	6.8	6.6	6.7
2	EC (µmhos/cm)	591	565	583	554	635
3	CALCIUM (%)	0.39	0.36	0.39	0.41	0.43
4	MAGNESIUM (%)	0.44	0.40	0.46	0.41	0.35
5	SODIUM (%)	0.53	0.52	0.55	0.48	0.61
6	POTASSIUM (%)	0.37	0.20	0.35	0.28	0.42
7	SULPHUR (%)	0.08	0.10	0.09	0.12	0.06
8	NITROGEN (%)	0.38	0.33	0.37	0.34	0.40
9	PHOSPHORUS (%)	0.05	0.05	0.07	0.05	0.04
10	CEC (meq/100 g)	24.9	25.2	26.3	24.8	27.4
11	ORGANIC MATTER (%)	2.9	2.2	3.4	3.7	2.8
12	COPPER (mg/Kg)	7.3	6.8	7.5	9.2	10.4
13	CHROMIUM (mg/Kg)	23.2	20.3	18.7	22.7	25.3
14	ZINC (mg/Kg)	15.5	17.3	14.9	15.6	22.4
15	LEAD (mg/Kg)	6.3	6.6	7.4	6.2	6.9

Fig. 3.4.1 SOIL QUALITY MONITORING LOCATIONS



SQ1- PROJECT SITE
SQ2- PATHRAJURI
SQ3- RAGHUNATHCHAK
SQ4- DHANYASOL
SQ5- TARASHULI

3.5 AIR QUALITY

Eight (6) locations were selected in the study area based on the direction in which the wind blows during the entire season as well as annually. The locations of the monitoring stations were based on the

frequent wind directions in order to site the stations as close as feasible to the anticipated maximum pollutant deposition areas, moreover, duly considering human habitation and proximity to sensitive zones within the study area which are shown in Table 3.5.1. Thus, all probable directions, which may be polluted due to the emission from the proposed units of M/s OCL India Limited due to the proposed project, have been covered. The monitoring locations are depicted in Figure 3.5.1.

Table : 3.5.1
Ambient Air Quality Monitoring Locations

Sl. No.	Location Code	Location	Location w.r.t. Project site (centre) (km)	Direction w.r.t. Project site (centre)
1.	AQ1	PROJECT SITE	-	-
2.	AQ2	DHANYASOL	S	5.1
3.	AQ3	TARASHULI	W	5.5
4.	AQ4	KULPHENI	E	5.0
5.	AQ5	RAGHUNATH CHAK	NE	5.7
6.	AQ6	BAMUN MARI	E	5.8

Parameters, Frequency and Monitoring Methodology

Monitoring was conducted in respect of the following parameters:

- Suspended Particulate Matter (SPM)
- Respirable Particulate Matter (RPM)
- Sulphur Dioxide (SO_2)
- Oxides of Nitrogen (NO_x)

The equipment was placed at a height of 3 to 4.5 metres above ground level at each monitoring station, thus negating the effects of wind blown ground dust. The equipment was placed at open space free from trees and vegetation which otherwise act as a sink of pollutants resulting in lower levels in monitoring results. At locations

close to highways, the equipment was placed at least 100 m away from highways/roads to avoid influence of traffic exhaust emissions.

Ambient Air Quality Monitoring was conducted for three months period (from 1st December 2008 to 28th February 2009.

Duration and Frequency of Monitoring

The monitoring was carried out at a frequency of twice a week at each station, adopting a continuous 24-hour schedule for SPM, RPM, SO_2 and NOx.

Sampling & Analytical Techniques

With a view to collect the samples for SPM, RPM, SO_2 and NO_x, High Volume Samplers (HVS) / Respirable Dust Samplers (RDS) along with Gaseous attachment APM 411 were used. The instruments were well capable of drawing air at a flow rate of 1 to 1.3 m^3/min with very little pressure drop. Glass micro-fibre filter papers (GFA Sheets, Whatman) were used for the collection of SPM. SO_2 was collected by drawing air at a flow-rate of 0.5 litres per minute (lpm) through an absorbing solution i.e., Sodium tetrachloromercurate (West and Gaek Method). And, NO_x were collected by drawing air at a similar flow rate through the mixture of absorbing solutions i.e. sodium hydroxide and sodium arsenite (Jacobs and Hochheiser Method).

For the sampling and analysis of the above parameters, IS-5182 was followed.

3.5.1 Monitoring Results

Table 3.5.2 summarizes the statistical results of the monitored pollutants. The ambient air quality data indicate the values of SPM, RPM, SO_2 and NO_X are within the prescribed limits, established by CPCB at all the monitoring stations.

Table -3.5.2		Statistical Analysis of Pollutants (Period: DECEMBER, 2008 - FEBRUARY, 2009)					
Pollutants	**Locations**	**MES**	**Min**	**Max**	**A.M.**	**S.D.**	**P – 98**
SPM ($\mu g/m^3$)	PROJECT SITE	24	82	170	113.08	28.64	169.08
	DHANYASOL	24	95	241	128.04	31.48	206.04
	TARASHULI	24	81	168	119.70	25.93	162.94
	KULPHENI	24	95	177	124.38	24.29	173.32
	RAGHUNATH CHAK	24	80	191	119.88	27.96	186.86
	BAMUN MARI	24	94	220	130.33	32.51	210.8
	Overall	144	80	241	122.6	3.15	210.32
RPM ($\mu g/m^3$)	PROJECT SITE	24	25	71	40.82	13.73	70.24
	DHANYASOL	24	32	96	46.08	13.40	83.18
	TARASHULI	24	24	67	42.58	10.61	64.06
	KULPHENI	24	31	74	45.12	12.39	70.72
	RAGHUNATH CHAK	24	26	80	42.97	12.64	73.46
	BAMUN MARI	24	30	95	46.96	14.13	79.86
	Overall	144	24.3	96.4	44.1	1.26	82.8
SO_2 ($\mu g/m^3$)	PROJECT SITE	24	<4	7	4.25	1.02	7
	DHANYASOL	24	4	8	5.29	1.27	8
	TARASHULI	24	<4	10	4.41	1.71	9.32
	KULPHENI	24	4	7	5.46	1.14	7.0
	RAGHUNATH CHAK	24	<4	9	4.90	1.55	8.62
	BAMUN MARI	24	4	7	5.67	1.09	7.0
	Overall	144	4	10	5.0	0.28	9.3
NO_2 ($\mu g/m^3$)	PROJECT SITE	24	10	26	19.04	4.35	25.08
	DHANYASOL	24	14	31	21.38	5.44	30.54
	TARASHULI	24	13	28	20.42	4.86	27.5
	KULPHENI	24	16	30	22.08	4.27	29.08
	RAGHUNATH CHAK	24	11	27	20.58	4.69	27.0
	BAMUN MARI	24	15	31	23.83	5.30	30.5
	Overall	144	10	31	21.2	0.5	30.5

MES : No. of Measurements, MIN : Minimum, Max : Maximum,
AM : Arithmetic Mean
SPM : Suspended Particulate Matter, RPM : Respirable Particulate Matter
SO_2 : Sulphur Dioxide, NO_x : Oxides of Nitrogen

3.5.1.1 Suspended Particulate Matter (SPM)

Arithmetic Mean of the 24-hourly average values of SPM varied station-wise between 113.08 $\mu g/m^3$ (at Project site) and 130.33 $\mu g/m^3$ (at Bamunmari) with overall mean of the 6 stations being 122.6 $\mu g/m^3$.

The maximum 24-hourly average 98-percentile value of SPM (max 210.8 $\mu g/m^3$ at Bamunmari, at all the locations were observed to be much within the limit of 500 $\mu g/m^3$ for industrial areas, as stipulated in the National Ambient Air Quality Standards.

3.5.1.2 Respirable Particulate Matter (RPM)

Arithmetic Mean of the 24-hourly average values of RPM varied station-wise between 40.82 $\mu g/m^3$ (at Project Site) and 46.96 $\mu g/m^3$ (at Bamunmari). The overall mean for the 6 stations was 44.1 $\mu g/m^3$.

The 24-hourly average 98-percentile values of RPM (max 83.18 $\mu g/m^3$ at Dhanyasol, at all the locations were observed to be well within the limit of 150 $\mu g/m^3$ for industrial areas as well as 100 $\mu g/m^3$ for rural and residential areas, as stipulated in the National Ambient Air Quality Standards.

3.5.1.3 Sulphur Dioxide (SO_2)

The overall mean of 24-hourly average values of SO_2 over the study area was derived to be 5.0 $\mu g/m^3$ with station-wise variation of arithmetic mean values at the 8 stations between 4.25 $\mu g/m^3$ (at Project Site and 5.67 $\mu g/m^3$ (at Bamunmari).

The 24-hourly average 98-percentile values of SO_2 (max 9.32 $\mu g/m^3$ at Tarashuli) at all the locations were well below the permissible limit of 120 $\mu g/m^3$ for industrial areas, as stipulated in the National Ambient Air Quality Standards.

3.5.1.4 Oxides of Nitrogen (NO_x)

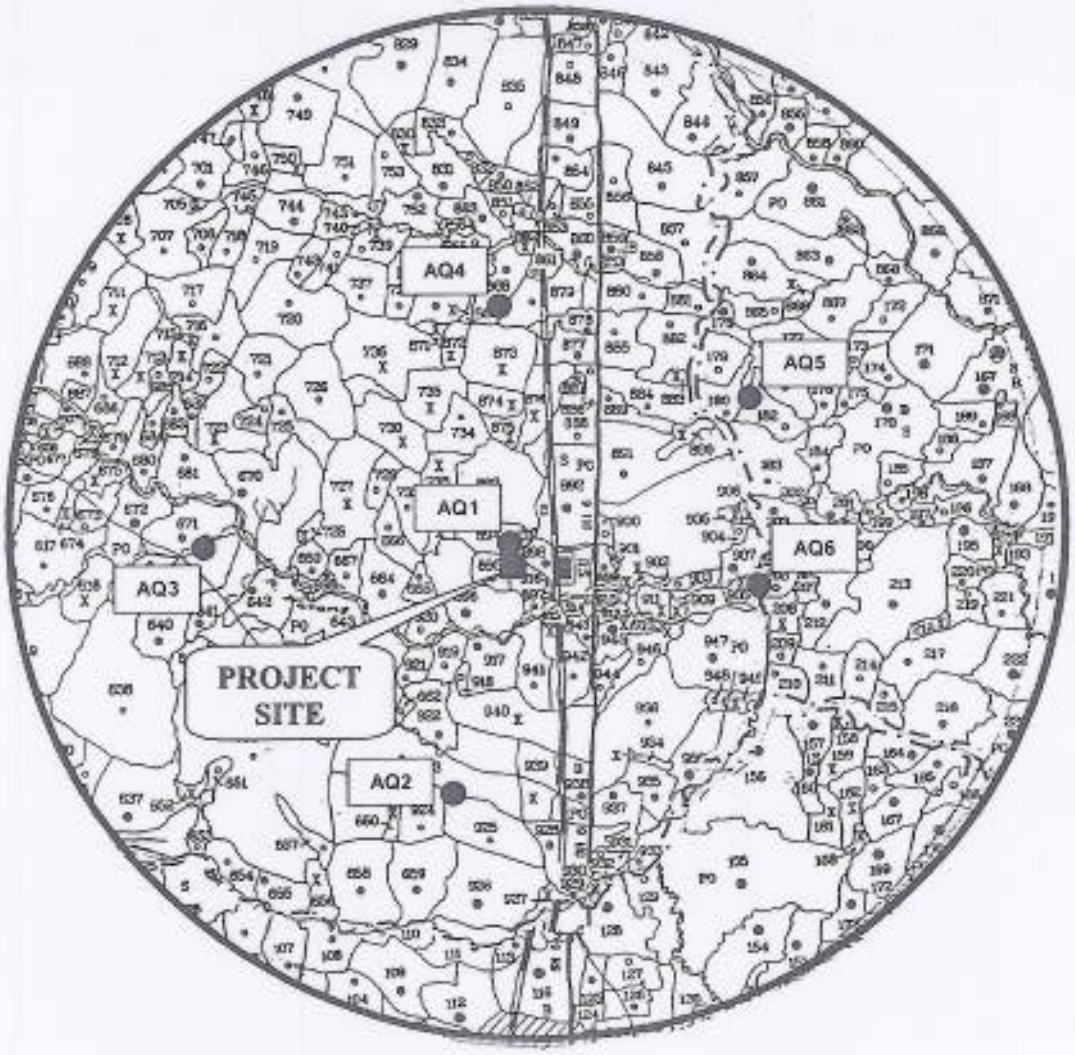
The overall mean of 24-hourly average values of NO_x over the entire area was 21.2 $\mu g/m^3$ while individual arithmetic mean levels computed at the 6 stations ranged between 19.04 $\mu g/m^3$ (at Project Site) and 23.83 $\mu g/m^3$ (at Bamunmari).

The 24-hourly average 98-percentile values of NO_x (max 30.54 $\mu g/m^3$ at Dhanyasol) at all the locations were well below the permissible limit of 120 $\mu g/m^3$ for industrial areas and 80 $\mu g/m^3$ for rural and residential areas, as stipulated in the National Ambient Air Quality Standards.

3.5.1.5 Conclusion

The values of all the pollutants at the respective locations were within the acceptable ranges on all the occasions.

Fig. 3.5.1 AIR QUALITY MONITORING LOCATIONS



AQ1- PROJECT SITE
AQ2- DHANYASOL
AQ3- TARASHULI
AQ4- KULPHENI
AQ5- AGHUNATH CHAK
AQ6- BAMUN MARI

The graphical analysis of the concentrations of pollutants is shown in **Fig 3.5.2A, 3.5.2B, 3.5.2C, 3.5.2D.**

Figure 3.5.2 A STATISTICAL ANALYSIS OF SPM

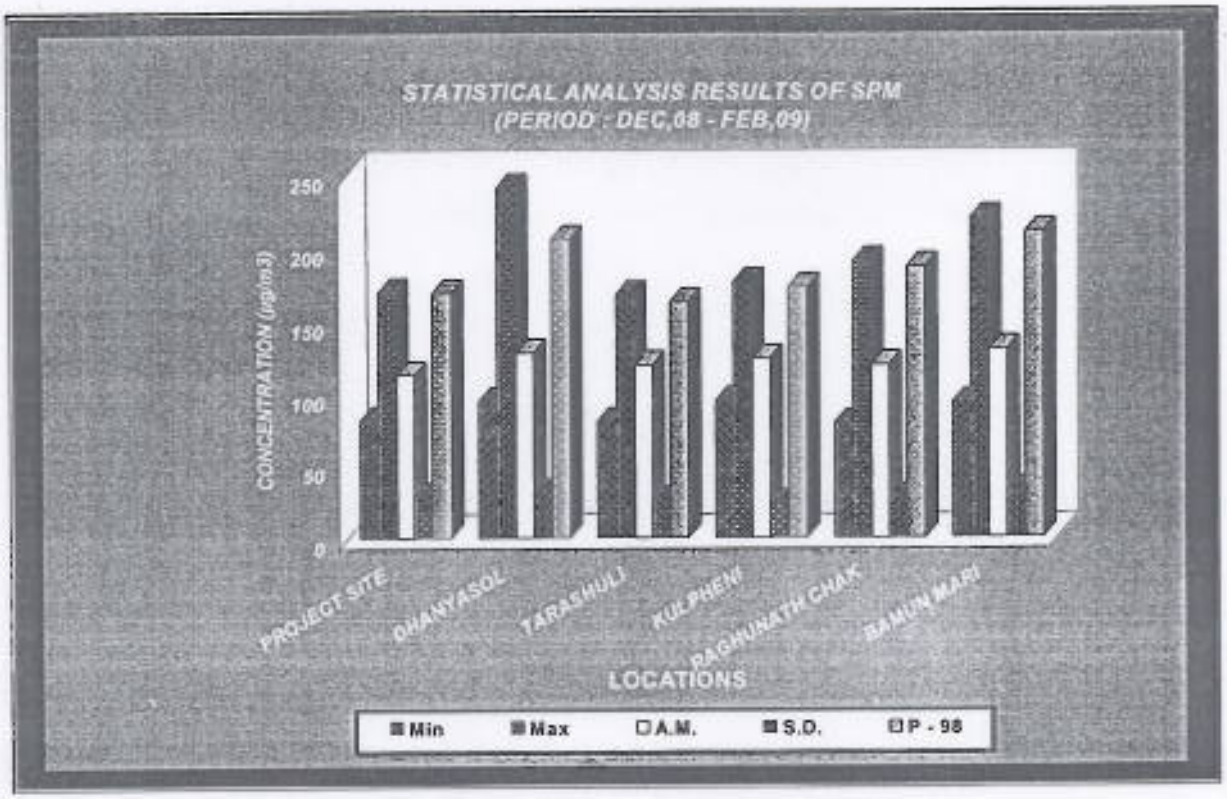


Figure 3.5.2 B STATISTICAL ANALYSIS OF RPM

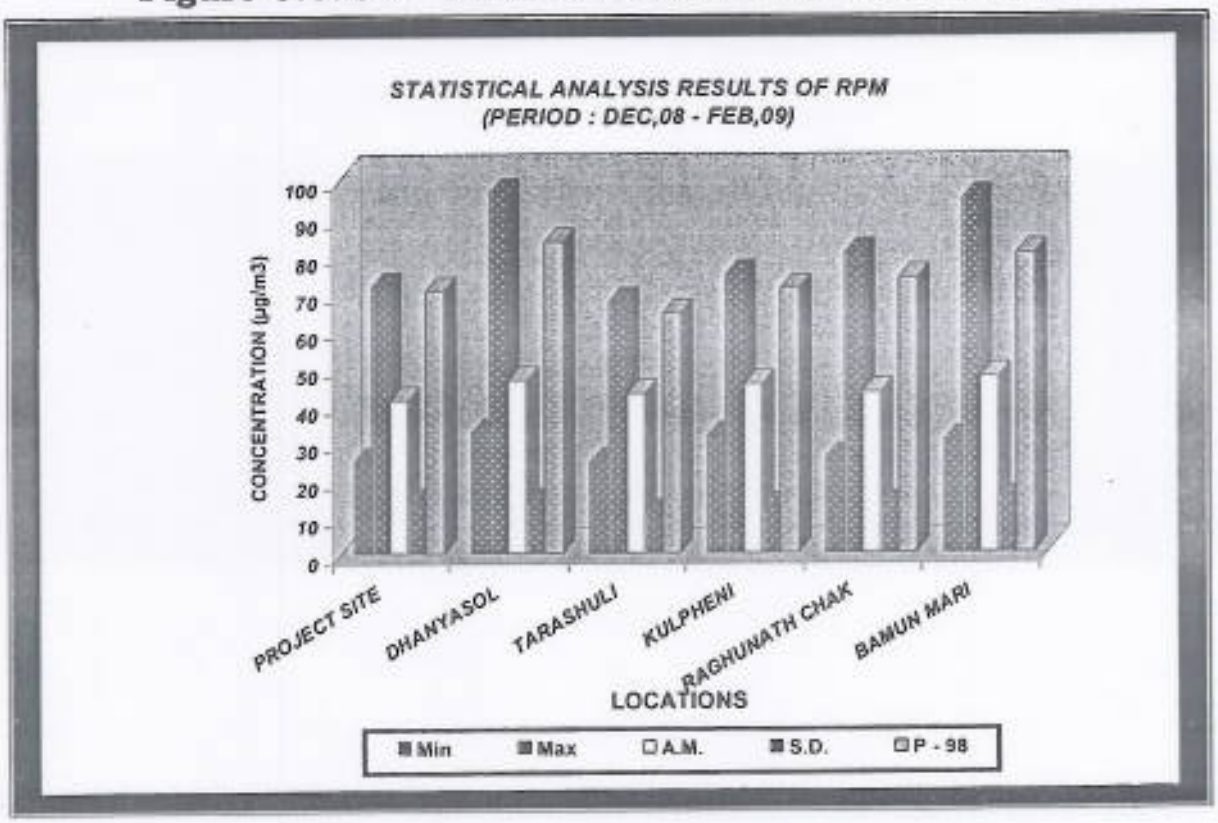


Figure 3.5.2 C STATISTICAL ANALYSIS OF SO_2

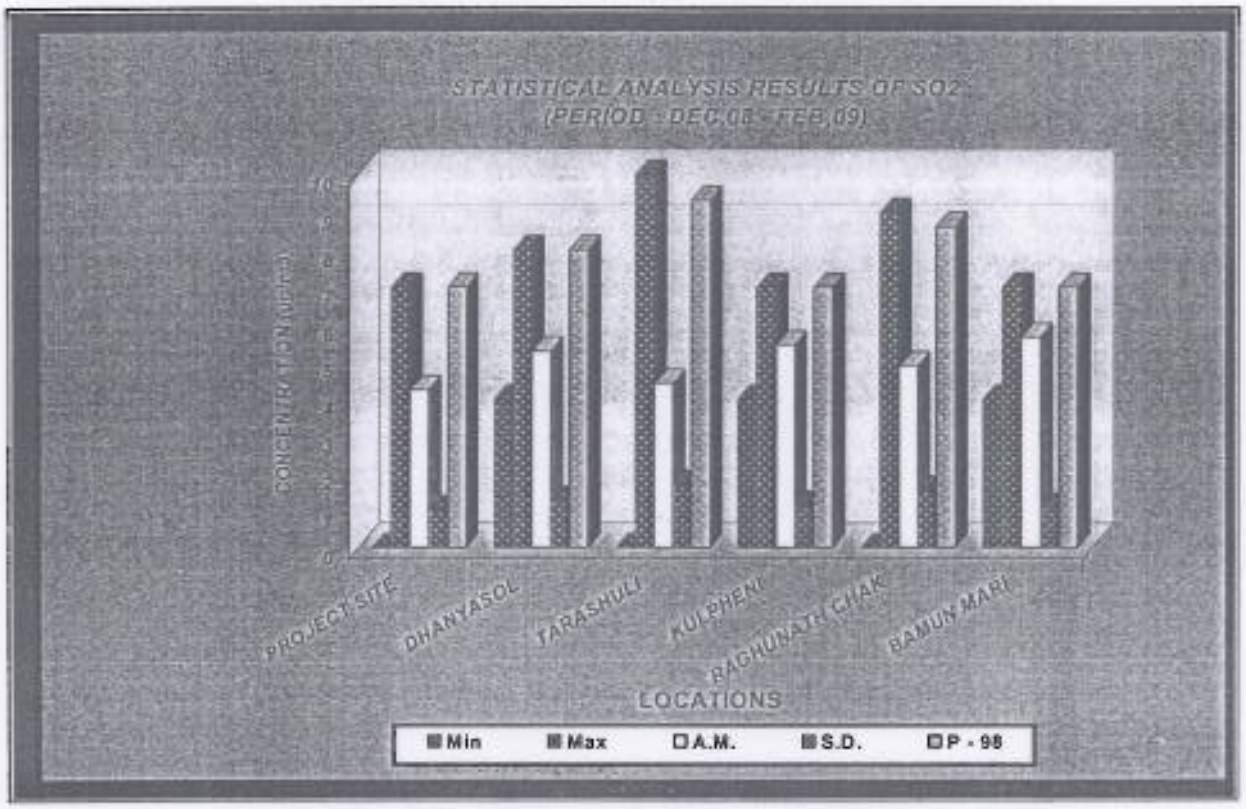
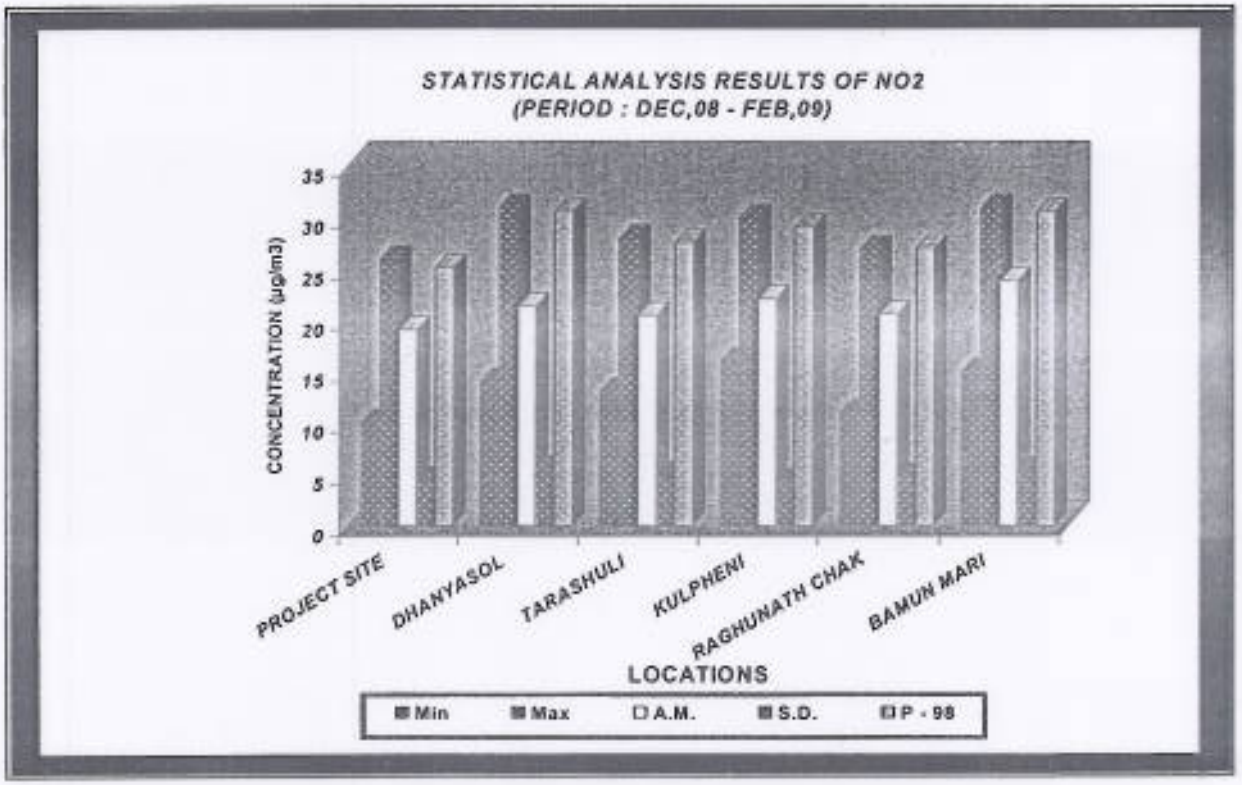


Figure 3.5.2 D STATISTICAL ANALYSIS OF NO_x



3.6 METEOROLOGY

3.6.1 Location

The climate of the area is characterized by a hot and dry summer from March to May, a south-west monsoon or rainy season from June to September, a pleasant post-monsoon or retreating monsoon from October to November and a cool winter from December to February. Therefore, climatologically, four seasons viz. summer (pre-monsoon), monsoon, post-monsoon and winter could be deciphered comprising the following months:

Summer	:	March, April, May
Monsoon	:	June, July, August, and September
Post-monsoon	:	October, November
Winter	:	December, January, and February

3.6.2 Past Records of IMD, Medinipur

3.6.2.1 Data Collected

The meteorological data described in this section have been collected from the IMD Station located at Medinipur, which is around 10 km. from the Project Site and deemed to be representative of the study area. The station is observed to be well manned and equipped. Available meteorological data for the past 30-years' period (1951-80) have been collected and summarized. The climatic features of this station are presented in Tables – 3.6.1 and 3.6.2.

3.6.2.2 Temperature

At Medinipur, the maximum (38.4°C) of the mean daily maximum temperatures has been recorded during May and the minimum (23.3°C) of the mean daily minimum temperatures recorded during January (Table-3.6.1).

3.6.2.3 Relative Humidity

Humidity is fairly high through the major part of the year and the mean relative humidity rises to above 83% during the monsoon months, particularly July to September ranging between 76-83% in

Medinipur (Table 3.6.1). Humidity is comparatively low in the dry summer months (March-May), winter months (December-February) and in November the mean relative humidity ranging between 36-66% in Medinipur. The above trend in humidity in various seasons clearly shows a discernible influence of rain on humidity.

3.6.2.4 Atmospheric Pressure

The data on atmospheric pressure does not portray any unusual features. The pressure varies slightly around the annual mean value of about 1003.88 millibars (mb) at 0830 IST and 1000.2 mb at 1730 IST at Medinipur (Table-3.6.1). As usual in diurnal variation, the pressure in the morning (0830 IST) is more than that in the evening (1730 IST) during all the months.

3.6.2.5 Rainfall and Rainy Days

The total annual mean rainfall received is about 1478.4 mm at Medinipur (Table-3.6.1). Rainfall peaks during the month of July (mean monthly being about 312.1 mm followed by August (mean monthly being about 310.1 mm. Total mean number of rainy days is about 75 days per annum in Medinipur.

3.6.2.6 Cloud Cover

The mean monthly data reveal that the cloud cover ranges between 3.0 and 3.4 octas and in the month of October, it is between 3.1 and 3.2 octas. In November, it ranges between 1.6 and 1.6 octas (Table-3.6.1).

3.6.2.7 Wind Speed and Direction

The annual mean wind speed is around 5.0 km/h at Medinipur with the mean monthly wind speed ranging between 3.1 km/h (during November) and 9.0 km/h (during May) in Medinipur (Table-3.6.1).

3.6.3 On-Site Meteorological Observatory

Air Pollutants upon discharge to atmosphere pass through a number of mechanisms, which include diffusion and transportation leading to dispersion. These mechanisms are governed by the local atmospheric conditions. All these result in the necessity to collect the

meteorological parameters like ambient temperature, wind speed, wind direction, and other weather conditions (relative humidity, atmospheric pressure etc.), which will be ultimately used for the prediction of the ground level concentrations of the air pollutants through mathematical modelling.

For this purpose as also to corroborate and supplement the long term meteorological data availed from IMD, Medinipur, a sophisticated on-site meteorological observatory was established close to the project site (located on the roof top of a residential house and operated continuously for three months period (December, 2008 – February, 2009)

This location was found to be most suitable one being close to the project site. The summary of the on-site data generated in respect of the above parameters for the period mentioned above are presented in Table-3.6.2. The Wind rose diagram for the entire period is shown in **Figures 3.6.1**through **3.6.4**.

3.6.3.1 On-Site Meteorological Observations

Temperature

The monthly maximum and minimum temperatures recorded on-site during the aforesaid monitoring period (December,2008 – February, 2009) varied between (26.5–33.0)^{0}C and (9.5–13)^{0}C respectively with overall maximum and minimum temperatures being 33.0^{0}C and 9.5^{0}C respectively (Table-3.6.2). It could be observed that, the pattern of data recorded on-site generally matches with the past data of IMD.

Relative Humidity

The monthly minimum and maximum relative humidity recorded on-site during the said monitoring period varied between (31-48)% and (59-65)% respectively, the overall minimum and maximum being 31% & 65% respectively (Table-3.6.2).

Atmospheric Pressure

The overall minimum and maximum atmospheric pressures recorded on-site during the said monitoring period were 754.1 mmHg and

760.30 mmHg respectively (Table-3.6.2). During the period, lowest pressure of 754.1 mmHg as observed in February, while highest pressure of 760.30 mmHg was observed in the month of December. Such values compare well with the past IMD data.

Wind Speed and Direction

During the said monitoring period, the monthly mean wind speed measured on-site varied between 3.5 Km/hr (Jan, 2009) to 4.4 Km/hr (Feb, 2009) (Table-3.6.2). The overall mean wind speed during the period was 3.9 km/hr. The most predominant wind direction was North followed by North-East. (Table-3.6.2).

Table : 3.6.1
Mean Monthly Summary of Climatological Data Collected from IMD, Medinipur (1951-1980)

MONTH	DAILY TEMPERATURE (°C)		RELATIVE HUMIDITY (%)		ATM. PRESSURE (mb)		TOTAL RAIN FALL (mm)	NO. OF RAINY DAYS	CLOUD COVER		MEAN WIND SPEED (KM/H)
	MAX	MIN	0830	1730	0830	1730			0830	1730	
JAN	30.2	8.4	59	45	1012.2	1008.1	12.4	0.9	1.4	1.1	3.3
FEB	35.0	11.1	56	38	1009.8	1005.7	19.7	1.3	1.4	1.2	3.9
MAR	39.6	15.8	56	34	1006.8	1002.4	32.5	2.2	1.5	1.8	5.5
APR	42.9	19.8	60	43	1003.3	998.7	49.5	3.2	1.9	2.8	7.5
MAY	35.5	21.1	66	54	999	995	80.9	5.0	2.4	3.6	9.0
JUNE	41.0	22.1	76	70	995.3	992.1	219.6	11.6	5.1	5.8	6.8
JUL	35.1	23.2	83	81	995.2	992.6	312.1	15.8	6.1	6.3	5.7
AUG	34.2	23.3	84	81	996.4	993.5	310.1	15.4	5.9	6.2	5.0
SEP	34.4	22.8	83	81	1000.2	997	290.4	12.9	4.8	5.5	4.1
OCT	34.0	18.8	77	73	1006	1002.6	120.0	5.8	3.1	3.2	3.2
NOV	31.6	13.4	66	60	1010.1	1006.4	13.7	0.8	1.6	1.6	3.1
DEC	29.2	9.5	59	50	1012.3	1008.3	4.1	0.2	1.0	1.1	3.2
ANNUAL TOTAL OR MEAN	**44.4**	**8.0**	**69**	**59**	**994.6**	**994.6**	**1392.2**	**75.1**	**3.0**	**3.4**	**5.0**

Table 3.6.2
Onsite Meteorological Data
(December 2008– February 2009)

Month	Temperature		Relative Humidity		Barometric Pressure		Average Velocity (Km/h)
	Maximum	Minimum	0830 hrs	1730 hrs	0830 hrs	1730 hrs	
	(°C)		(%)		(mm Hg)		
Dec,08	28.5	10	64	44	760.3	756	3.7
Jan,09	26.50	9.50	65.00	48.00	759.90	755.90	3.5
Feb,09	33.00	13.00	59.00	31.00	758.50	754.10	4.4
OVERALL	33.0	9.5	65.0	31.0	760.3	754.1	3.9

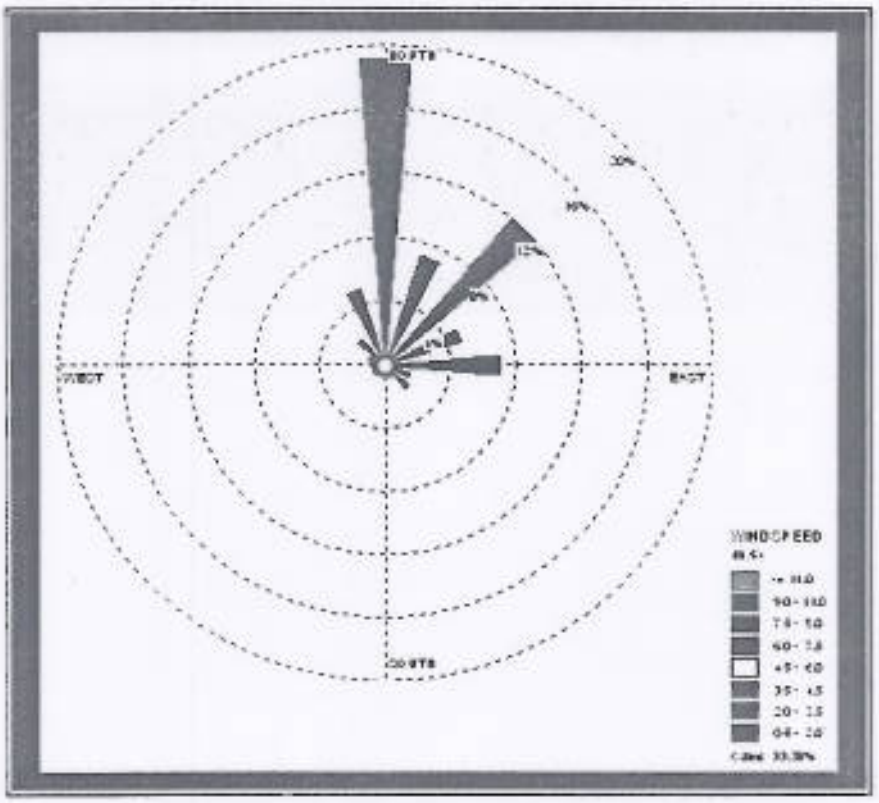


Fig No. 3.6.1 Windrose Diagram for
(December, 2008)

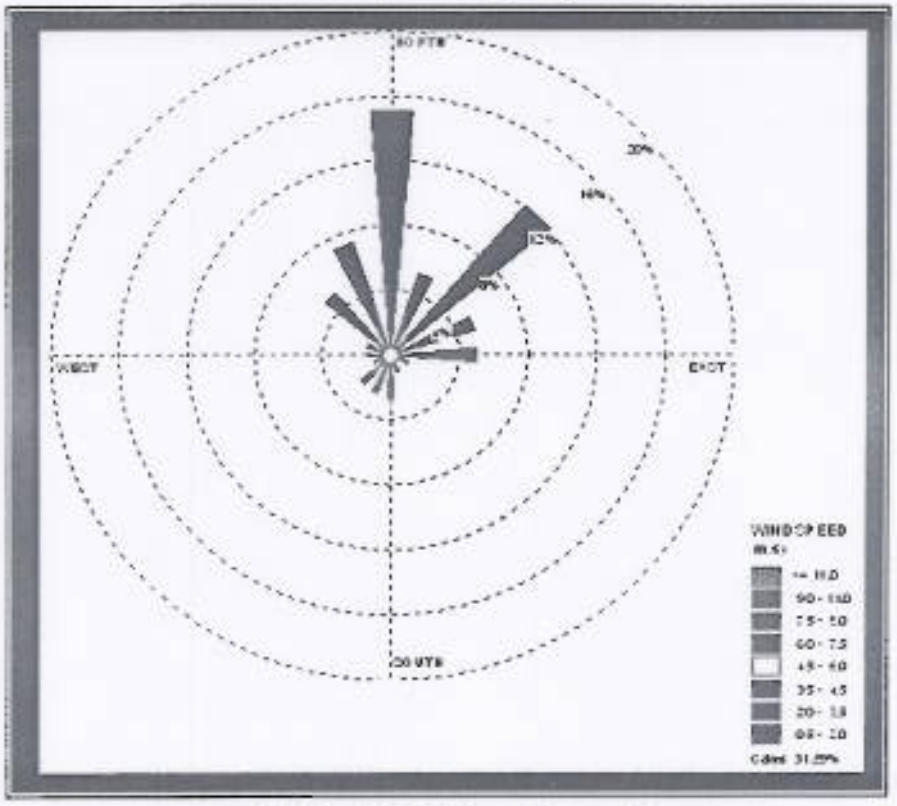


Fig No. 3.6.2 Windrose Diagram for
(January, 2009)