ENVIRONMENTAL IMPACT ASSESSMENT

FOR

THE PROPOSED 30 MW CAPTIVE POWER PLANT AT DURGAPURAM VILLAGE, DACHEPALLI, GUNTUR DISTRICT, ANDHRA PRADESH

FINAL REPORT

Sponsor :

JAYPEE GROUP

Durga Cement Works (DCW)

(A Unit of Andhra Cements Limited)

Hyderabad

Prepared by :

VIMTA LABS

Determining Quality

Vimta Labs Ltd.

142, IDA, Phase-II, Cherlapally,

Hyderabad–500 051

env@vimta.com, www.vimta.com

February, 2013

FINAL REPORT

Durga Cement Works (DCW)
(A Unit of Andhra Cements Limited)
Hyderabad

ENVIRONMENTAL IMPACT ASSESSMENT
FOR
THE PROPOSED 30 MW CAPTIVE POWER PLANT AT DURGAPURAM VILLAGE, DACHEPALLI, GUNTUR DISTRICT, ANDHRA PRADESH

For and on behalf of VIMTA Labs Limited

Approved by : **E. Shyam Sundar**

Signed :

Position : **Vice President**

Date : 27th February 2013

The report has been prepared inline with the prescribed TORs issued vide letter No. SEIAA/AP/GTR/2012, dated 24/07/2012 of SEIAA, Hyderabad.

This report has been prepared by **Vimta Labs Limited** with all reasonable skill, care and diligence within the terms of the contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

Table of Contents

Table of Contents (Contd.)

Table of Contents (Contd.)

List of Figures

List of Tables

List of Tables (contd…)

1.0 EXECUTIVE SUMMARY

1.1 Introduction

Durga Cement Works (DCW) a unit of Andhra Cements Limited (ACL) is proposing to install 30 MW coal based Captive power plant for meeting the power requirement of 2.31 MTPA existing cement plant at Durgapuram village, Dachepalli, Guntur District, Andhra Pradesh. Durga Cement Works at village Durgapuram village, Dachepalli, Guntur district in operation since 1986. ACL has been taken-over by Jaypee group.

2.0 Screening Category

The proposed power plant project falls under 'Category B', as per Environment Impact Assessment (EIA) notification dated 14th September 2006 which requires preparation of EIA Report to get Environmental Clearance (EC) from the State Environmental Appraisal Committee, Hyderabad.

3.0 Objective of the Report

The present EIA report has been prepared based on the Terms of Reference (TOR) approved by MoEF, Vide letter no. SEIAA/AP/GTR/2012, dated 24/07/2012 and based on primary data collected during 1st March – 31st May 2012 representing pre-monsoon season.

4.0 Project Description

4.1 Magnitude of the Project

The proposed power plant will be installed with a production capacity of 30 MW.

4.2 Cost of the Project

The cost estimated for the proposed power plant including utilities, offsite, auxiliary services etc, is about Rs.135.87 crores. The anticipated capital expenditure for the in-built pollution control measures is Rs. 16.3 crores.

4.3 Environmental Setting

The study area map of 10-km radius around the proposed site is given in **Figure-1**. The environmental setting of the proposed plant site is as follows:

- The project site is located at an elevation of 80 m above Mean Sea Level (MSL);
- The geographical co-ordinates of the proposed integrated plant range between 16^0 38' 2.83" N to 79^0 42' 38.29" E;
- Present land use at the proposed plant site is under industrial category;
- The State Highway, SH-2 at a distance of 20-m, SSE from the proposed plant boundary;

FIGURE-1
STUDY AREA MAP (10-KM RADIUS)

- Nadikudi Railway station located at a distance of 5.3 km, SSE from the proposed plant boundary;
- The nearest airport to the project site is located at Hyderabad at a distance of about 145-km, NW from the proposed plant site;
- Krishna river and Dandivagu river are two water bodies within the study area located at distance of 3.6-km (N) and 4.1–km (W) respectively from the project site;
- 9 reserve forest blocks exists within 10-km radius; and
- The project area falls under Seismic Zone-I as per Indian Standards, IS:1893 (Part-1) 2002.

5.0 Process Description and Sources of Pollution

5.1 Process Description

The power plant employs with AFBC boiler. The primary fuel to be used for the power generation will be coal. The mode of transportation of coal will be by rail/road.

Steam is generated in the boiler of the Thermal Power Plant using the combustion heat of the fuel (coal) burnt in the combustion chamber. The steam generated is passed through steam turbine where part of its thermal energy is converted into mechanical energy. This mechanical energy is further used for generating electric power. The steam coming out of steam turbine is condensed in the air cooled condenser and condensate is supplied back to the boiler with the help of the boiler feed pumps and cycle is repeated.

The installation of boiler of 132 TPH at BMCR, generating steam at a temperature of 480^0C with Condensing Turbo Generator Sets having generating capacity of 660 MW of power. Installation of associated mechanical and electrical equipment, auxiliary units like coal, ash handling plant, water treatment plant, cooling water system, electrostatic precipitators (ESPs), low NOx burners, Online Stack Monitoring System etc. will form a part of the total installation.

5.2 Resource Requirement

- ***Land Requirement***

Land requirement for the proposed CPP is around 3-ha out of 141.57-ha land available for cement plant which is already in industrial use. The proposed power plant will be built within existing cement plant premises hence no change in land use. No additional land acquisition involved.

- ***Fuel Requirement***

Coal requirement for the proposed 30 MW power plant is about 0.21 MTPA which will be sourced from Singareni Collaries Limited/Imported.

- ***Water Requirement***

The water requirement for the proposed project is about 550 m^3/day which will be met from rain water mines pit. No water extraction from surface is envisaged.

- ***Manpower***

The total manpower requirement during construction stage will be about 300 no and during operation phase requirement will be about 50 nos. including skilled and unskilled workers.

- ***Township***

A full-fledged township comprising of guest house, school, shopping centre, club, etc. is already in place. The township will have essential facilities for key plant personnel.

6.0 Sources of Pollution and Control

- ***Air Pollution Sources and Control***

The major sources of pollution are particulate matter and gaseous emissions from power plant boilers. The emissions of particulate matters from stack will be limited to 50 mg/Nm^3 as per norms specified by State Pollution Control Board. A part from dust, gaseous pollutants like SO_2, NO_X, CO will also be generated.

- ***Wastewater Generation and Treatment***

The wastewater generated in the plant area will be utilized in various activities such as ash/coal handling, fly ash conditioning, ash disposal, and service water and greenbelt development. The domestic wastewater from plant & colony will be treated in the proposed Sewage treatment plant and used in greenbelt development. The plant will be operated on zero discharge concept.

- ***Solid Waste Generation and Utilization***

The total ash generation in the power plant will be about 258.90 TPD out of which 51.78 TPA will be bottom ash and the remaining 207.12 will be fly ash. The fly ash generated from the CPP will be 100% utilized by the proposed cement plant for manufacturing the Portland Pozzolona Cement (PPC).

- ***Noise Levels***

The noise generation from various equipments of the proposed plant will not exceed 90 dB(A) at work place and earplug and earmuff will be provided to employees working in high noise zone. All the equipments will be designed to comply with the regulatory norms.

7.0 Baseline Environmental Status

Primary baseline environmental monitoring studies were conducted during pre-monsoon of 2012. The details are as follows:

7.1 Soil Characterization

It has been observed that the pH of the soil in the study area ranged from 7.8 to 8.2. The electrical conductivity was observed to be in the range of 226 μmhos/cm to 466 μmhos/cm. The nitrogen values range between 71 - 112 kg/ha. The phosphorus values range between 48 to 82 kg/ha. The potassium values range between 472 – 1196 kg/ha.

7.2 Meteorological Data Generated at Site

The meteorological parameters were recorded on hourly basis during the study period near proposed plant site and comprises of parameters like wind speed, wind direction (from 0 to 360 degrees), temperature, relative humidity, atmospheric pressure, rainfall and cloud cover.

- Temperature — Min: 21.5°C and Max: 42.5°C
- Relative Humidity — Min: 36.4% and Max: 58.3%
- Mean wind speed — 3.9 kmph
- Predominant Wind Direction — SE, S

7.3 Air Quality

The study area represents mostly rural/residential environment. Eight ambient air quality monitoring stations were selected in and around project site during the period of March to May 2012 and four locations during the period June to July 2012 and studies were carried for $PM_{2.5}$, PM_{10}, SO_2 and NOx. The concentrations of air quality parameters are given in **Table-2.0**.

TABLE-2.0
AIR QUALITY RESULTS

Sr.No	Parameter	March- May	June-July
		Range ($\mu g/m^3$)	
1	$PM_{2.5}$	11.4-23.8	8.9-15.6
2	PM_{10}	27.8-67.3	20.2-60.4
3	SO_2	7.9-13.9	6.5-11.9
4	NOx	8.5-14.9	8.1-14.2

Ambient air quality analysis reveals that these results are well within limits in all locations as per National Ambient Air Quality standards.

7.4 Water Quality

Eight ground and five surface water samples were collected and analyzed for various parameters to compare with the standards.

- ***Ground Water***

The ground water analysis results indicate that the pH ranges in between 7.2 to 7.9 which is well within the specified standard of 6.5 to 8.5. The Total Dissolved Solids (TDS) concentrations are found to be ranging in between 989 to 2940 mg/l. Total hardness was observed to be ranging from 345 to 690 mg/l.

- ***Surface Water***

Surface water analysis results indicate that the pH of the surface water samples collected ranges in between 7.7 to 8.1. The conductivity recorded in between 693 to 1805 µs/cm in the sample. The sodium and potassium concentrations varied between 75.1 to 239.9 mg/l and 0.8 to 15.6 mg/l respectively. Total hardness expressed as $CaCO_3$ ranges between 170 to 370 mg/l. The concentration of nitrate fluctuates between <0.1 to 0.7 mg/l.

7.5 Noise Level Survey

The noise monitoring has been conducted for determination of noise levels at eight locations in the study area.

- The daytime noise levels at all the locations are observed to be within the range of 39.7 to 48.0 dB (A).
- The night time noise levels at all the locations were found to be in the range of 35.8 to 44.3 dB (A).

Noise monitoring results reveal ambient noise levels in all locations are well within the limits as per Ambient Noise standards.

7.6 Flora and Fauna Studies

Detailed ecological studies were conducted to assess the present biological resources in and around the proposed project area. Field survey conducted in pre monsoon season revealed a total of 251 species of plants of which 112 were phanerophytes, 108 were therophytes, 22 hemicryptophytes, and 9 geophytes.

39 species of fauna observed in study area during study period. Out of which 1 sc-I species, 2 SC-II species and the remaining are SC-IV species. Literature survey and data collected from forest department reveals that there are no wildlife sanctuaries, national parks and biospheres and no migratory paths of birds and animals in 10 km radius.

8.0 Anticipated Environmental Impacts and Mitigation Measures

8.1 Impacts during Construction Phase

8.1.1 Impact on Land use

DCW requires 3.0-ha of land for construction of power plant. The proposed project site is located within the cement plant premise. However, the land identified for the cement complex construction is under industrial use. Hence, the impact on land usages is insignificant.

8.1.2 Impact on Soil

Apart from localized constructional impacts at the proposed project site, no significant adverse impact on the soil in the surrounding area is anticipated.

8.1.3 Impact on Air Quality

During construction phase, dust will be the main pollutant, which would be generated from the site development activities and vehicular movement on the road. The impact of such activities would be confined within the project boundary and restricted to the construction phase. To mitigate these impacts, periodic sprinkling of water will be done at the construction site. The approach roads will be paved and vehicles will be kept in good order to minimize automobile exhaust.

8.1.4 Impact on Noise Levels

Heavy construction traffic for loading and unloading, fabrication and handling of equipment and materials are likely to cause an increase in the ambient noise levels. However, the noise will be temporary and will be restricted mostly to daytime. The noise control measures during construction phase include regular maintenance of the equipment and restricting the operating hours to day time.

8.1.5 Impact on Terrestrial Ecology

Most of the land identified for the proposed project contains few trees. Trees will be cut only if required. Therefore, no major loss of biomass is envisaged during construction phase.

8.1.6 Demography and Socio-Economics

The non-workers constitute about 66.6% of the total population in 10-km radius study area. Some of them will be available for employment in the proposed plant during construction activities. As the labourers are generally un-skilled, the locals would get opportunities for employment during construction activities.

8.2 Impacts During Operational Phase

8.2.1 Impact on Soil

Most of the impacts of project on soils are restricted to the construction phase, which will get stabilized during operational phase. The impact on the topsoil will be confined to the proposed main plant area only.

8.2.2 Impact on Air Quality

Adequate stack height will be provided to disperse gaseous emissions over a wider area. In order to control emissions of Particulates adequate control equipment are proposed.

Prediction of impacts on air environment has been carried out by using Industrial Source Complex (ISCST3) and these concentrations are found to be well below the permissible NAAQS norms for rural/residential zone and Industrial/Mixed zone. Therefore, the proposed activity is not likely to have any significant adverse impact on the air environment. The incremental concentrations are presented in **Table-3**.

TABLE-3
PREDICTED 24-HOURLY SHORT TERM INCREMENTAL CONCENTRATIONS

Pollutant	Incremental Concentration ($\mu g/m^3$)	Distance (km)	Direction
PM_{10}	0.17	1.0	NW
SO_2	6.4	1.0	NW
NO_X	2.24	1.0	NW

8.2.3 Fugitive Emissions

Fugitive dust emissions from the proposed plant would be significant as there will be air pollution due to activities like transport of coal, coal handling and generally due to the movement of vehicles on the roads. Hence, the impact due to fugitive emissions would be insignificant. The proposed greenbelt and periodic water sprinkling will further help reduction in fugitive emissions.

CPCB guidelines as per GSR 414 (E) will be implemented to control the fugitive dust emissions

8.2.4 Impact on Water Resources

The total water requirement for the proposed integrated plant will be about 550 m^3/day, which will be sourced from mine pit. However, DCW is proposing to develop rain water harvesting structures, roof top harvesting structures in the area to recharge ground water in the region.

The treated CPP wastewater will be re-cycled back for use in greenbelt development. The domestic wastewater from CPP will be treated and utilized for green belt development.

8.2.5 Impact on Noise Levels

The main noise generating sources from the proposed power plant will be compressors along with cooling tower and boilers. The noise levels at the source for these units will be maintained below 85 dB (A).

8.2.6 Impact of Solid Waste Generation

- ***Ash Utilization***

Fly ash utilization will be as per MoEF flyash utilization notification. Flyash will be 100% utilized for production of pozzolona cement making by the cement plant.

Solid waste in the form of sludge is generated from the Sewage Treatment Plant (STP). The waste will be used for maintaining the MLSS in the activated sludge process of STP and the balance waste is used as manure for greenbelt development.

8.2.7 Impact on Ecology

Development of a thick green belt and transportation of material through closed conveyor system will further reduce the pollution loads in the surroundings areas and contain the negative impact on forests and terrestrial ecology and also increase the presence of avifauna and related faunal components which a positive impact over the project.

Mitigation Measures

During construction, some of the vegetation in the plant premises is required to be cleared. The measures required to be undertaken to minimise the impact on the ecology are:

- The felling of trees will be kept at minimum;
- Transplantation of existing matured trees will be undertaken and transplanted in the area earmarked for greenbelt development; and
- The greenbelt having vegetation density of 2500 trees/ha will be developed

9.0 Environment Management during Operation Phase

9.1 Air Pollution Management

In power plant an electrostatic precipitator (ESP) has been considered. The particulate matter will be limited to less than 50 mg/Nm^3.

To control the fugitive emissions, the following measures are proposed:

- All the conveyors will covered by hoods to offset any trapping of material in wind stream.
- Unloading of coal from trucks will be carried out with proper care avoiding dropping of the materials from height. It is advisable to moist the material by sprinkling water while unloading;
- The sprinkling of water will be done along the internal roads in the plant in order to control the dust arising due to the movement of vehicular traffic;
- All the workers and officers working inside the plant will be provided with disposable dust masks; and
- Greenbelt will be developed around the plant to arrest the fugitive emissions.

Air Pollution Control Schemes

Adequate and efficient control equipment will be installed in the proposed plant to keep the dust emission at a minimum. The following measures will be taken:

- Energy efficient boiler will be installed at the Captive Power Plant, which will control the emissions of SO_2. Low NOx burners will be installed to control the NOx emissions. Further, chimney of 77-m height is proposed for adequate dispersion of gaseous emissions; and
- As far as gaseous pollution is concerned, the impact of Carbon Monoxide (CO) emission is negligible in view of the firing technique of keeping a positive oxygen balance.

9.2 Noise Pollution Management

The greenbelt proposed around the boundary of the plant will attenuate the noise emitted by the various sources in the plant. Earplugs will be provided for the personnel working close to the noise generating units as a part of the safety policy. Apart from this, some of the design features provided to ensure low noise levels are as follows:

- High noise sources such as compressors & Turbo generators will be housed inside the building to reduce the noise impacts;
- Development of greenbelt to attenuate noise levels;
- Personal protection equipment to employees;
- Necessary enclosures will also be provided on the working platforms/areas to provide local protection in high noise level areas;
- The workers will be provided with ear plugs; and
- Plantation in the zone between plant and township would attenuate noise in the residential area.

9.3 Water Pollution Management

Wastewater from captive power plant is planning to treat in Effluent Treatment Plant (ETP) and treated effluents will be used in greenbelt or in plant operations and there will be no wastewater discharge from the proposed plant. Domestic waste water will treated in Sewage Treatment plant and treated water will be 100 % reused in different activities

9.4 Solid Waste Management

All the solid waste generated will be reused either in process or in ancillary operations.

- Entire fly ash generated will be used in cement manufacture.
- The sludge from STP can be used as manure for green belt development.
- Bottom ash will be collected and used for land filling.

9.6 Greenbelt Development

Due care will be taken to ensure that a greenbelt is developed around the plant and colony. All areas devoid of vegetation and having low density will be systematically and scientifically afforested.

10.0 Risk Assessment and Disaster Management

An effective Disaster Management Plan (DMP) to mitigate the risks involved has been prepared. This plan defines the responsibilities and resources available to respond to the different types of emergencies envisaged. Training exercises will be held to ensure that all personnel are familiar with their responsibilities and that communication links are functioning effectively.

11.0 Environmental Monitoring Programme

Regular environmental monitoring studies will be conducted in and around power plant area as per stipulated guidelines by State Pollution Control Board norms and Central pollution Control Board, New Delhi and as per conditions stipulated in environmental clearance.

12.0 Occupational Health and Safety

The health of all employees will be monitored once in a year for early detection of any ailment due to exposure to dust, heat and noise. All the potential occupational hazardous work places such as fuel storage area, coal handling area shall be monitored regularly. The health of employees working in these areas shall be monitored once in a year for early detection of any ailment. Though effective measures are taken to combat pollution in ambient conditions, occupational health hazards are not overlooked. Project will provide well organized occupational health services to all its employees by taking responsibility for establishment and maintenance of safe and healthy working environment and assessment of the physical and mental capabilities to turn out specific workloads.

13.0 Project Benefits

The proposed power plant will result in improvement in the social infrastructure in following manner:

- Generation of employment and improved standard of living;
- Establishment of small and medium scale engineering ancillaries,
- Revenue to Government;
- Change in the socio-economic scenario of the area;
- Direct and in direct employment during construction and in operation phases. Recruitment for the unskilled and semiskilled workers for the proposed project will be from the nearby villages;
- Development of the basic amenities viz. roads, transportation, electricity, drinking water, proper sanitation, educational institutions, medical facilities, entertainment
- Overall the project will change living standards of the people and improve the socio-economic conditions of the area.
- About Rs. 54 lakhs is proposed to spend on CSR activities as a capital cost with a recurring cost of Rs.10.80 lakhs.

Thus, in view of considerable benefits from the project without any adverse environmental impact, the proposed project is most advantageous to the region as well as to the nation.

1.0 INTRODUCTION

This chapter describes the purpose of the report, identification of project and proponent, brief description of nature, size, location of the project and importance to the region and country. The chapter also describes the scope of the study, details of regulatory scoping carried out as per Terms of Reference (TOR) issued by State Expert Appraisal Committee, Hyderabad.

- ***Present Project***

Durga Cement Works (DCW) which is a unit of Andhra Cements Limited (ACL) is proposing to install 30 MW coal based Captive power plant for meeting the power requirement of 2.31 MTPA existing cement plant at Durgapuram village, Dachepalli, Guntur District, Andhra Pradesh. ACL has been taken-over by Jaypee group.

1.1 Purpose of the Report

As per the Environmental Impact Assessment (EIA) Notification dated 14th September 2006, commissioning and operation of thermal power plants requires Environmental Clearance (EC) to be obtained from Andhra Pradesh State SEIAA before the commencement of ground activity.

Application prior environmental clearance for the above proposal has been submitted to the SEAC for getting Terms of Reference (TOR) for the preparation of EIA/EMP Report and the meeting was held on 4th July 2012. The present EIA Report was prepared based on the TOR conditions prescribed by APSEIAA. The Terms of Reference (TOR) for the proposed project was issued by APSEIAA, vide letter no. SEIAA/AP/GTR/2012, dated 24/07/2012. The copy of the same along with its compliance are enclosed in **Annexure-I.**

EIA/EMP has been prepared and submitted to state PCB for conducting Public Hearing and the meeting was held near Durga temple located adjacent to the plant premises at Durgapuram Village, Dachepalli mandal, Guntur district on 30th January 2013 and public concerns and comments are taken into consideration for preparing the final EIA/EMP report. The public hearing details are incorporated in Chaper-8.

This final EIA Report addresses the environmental impacts of the proposed project and proposes the mitigation measures for the same after conducting the public hearing.

1.2 Identification of the Project Proponent

- Andhra Cement Limited has two operating units:
  - ✓ Durga Cement Works at village Durgapuram village, Dachepalli, Guntur district in operation since 1986; and
  - ✓ Visakha Cement Works at Parlupalem village, Durganagar, Visakhapatnam in Andhra Pradesh.
- Durga Cement Works cement manufacturing capacity is under expansion from 0.8 MTPA to 2.31 MTPA;

- Visakha Cement Works (VCW) has only a Cement Grinding Unit (Slag and PPC) of 2.0 MTPA production capacity; and
- Andhra Cements Limited has been taken over by Jaypee Development Corporation Limited., a Jaypee group company by acquiring 59.80% shares in 2011.

ACL, has been taken over by **Jaypee group** which is a well-diversified industrial conglomerate in India with a turnover of over Rs.18000 crores that commenced its operations in mid sixties. Four decades later, with growth and diversification the group is engaged in the businesses of Engineering and Construction, Cement, Private Hydropower, development of Expressways, Highways and Hospitality. With a professional management team and a competent technical cadre, the group employs a total workforce of over 50000.

Jaiprakash Associates Limited (JAL), the flag ship company of Jaypee Group. Its cement division has computerized process control cement plants at 18 locations with an installed capacity of 22.8 MTPA in operation which is proposed to enhance upto 35 MTPA by 2012.

Jaypee cement plants have 100% power backup through coal based captive thermal power plants as well as a bank of diesel generating sets. Captive Power Plants (CPP) with cumulative capacity are functioning to meet the power requirement of the cement plants

Jaypee Cement Complex is consistently producing quality cement of OPC grades 33, 43, 53, IRST-40 and all the popular special blends of pozzolana cement such as 'Buniyad' and 'Buland' and Superplus Jaypee Cement.

➢ **Status of Approvals**

✓ Environmental Clearance for Durga Cement Works (expansion) of Cement Production (from 0.8 to 2.31 MTPA) capacity, Clinker Production (from 1.0 to 2.0 MTPA) capacity and Captive limestone mine (from 1.50 to 3.0 MTPA) capacity has been granted by MoEF vide letter no: F.No:J-11011/719/2007-IA-II(I) dated 20th December 2007. The EC letter along with its compliance is enclosed as **Annexure-II**;

✓ Consent to establishment for expansion of Cement production (from 0.8 to 2.31 MTPA) capacity, clinker production (from 1.0 to 2.0 MTPA) capacity has been granted by AP pollution Control Board vide consent order no: APPCB/VJA/GTR/534/CFE/HO/2008/882, dated: 27.06.2008. The CFE letter & its compliance are enclosed as **Annexure-III**. Expansion in production capacity is under implementation.

1.3 Power Scenario In Andhra Pradesh

From the below table it can be observed that Andhra Pradesh has energy shortages ranging from 0.8 % to 15.7% in the period 2005-2013. The details showing the power supply position in Andhra Pradesh is given in **Table-1.1**.

TABLE-1.1
POWER SUPPLY POSITION OF ANDHRA PRADESH

Year	Peak Demand	Availability	Surplus (+)/Deficit (-) MW/MU	Surplus (+)/Deficit (-)%
2005-2006	7487	7346	-141	-1.9
2006-2007	8224	8154	-70	-0.9
2007-2008	8920	7520	-1400	-15.7
2008-2009	5939	5575	-364	-6.1
2009-2010	6190	5860	-330	-5.3
2010-2011	6696	6436	-260	-3.9
2011-2012	6811	6756	-55	-0.8
2012-2013	7406	7125	-281	-3.8

Cement plant operation requires uninterrupted power supply to run its pyro-processing plant. Andhra Pradesh state is facing deficit of power. The proposed 30 MW CPP will ensure continuous supply and thereby efficient plant operations. Grid power to the extent of 13 MW will be used for clinker grinding operations or for emergency use.

1.4 Project Details

1.4.1 Plant Capacity

The proposed captive power plant will be installed with a production capacity of 30 MW.

1.4.2 Cost of the Project

The cost estimated for the proposed power plant including utilities, offsite, auxiliary services etc. is about Rs.135.87 crores. The anticipated capital expenditure for the in-built pollution control measures is Rs. 16.3 crores.

1.4.3 Location of the Project

The proposed plant is at a distance of about 5.5-km from Dachepalli town, located on the State Highway (SH-2) runs at a distance of 20-m from the site and the main road connecting to major destinations. The proposed plant site is 95-km from Vijayawada.

1.5 Environmental Setting

The environmental setting within 15-km of the project site given in **Table-1.2**. The index map is shown in **Figure-1.1**. Topsheet representing location map of 1:50,000 scale covering land use/ land cover, reserve forests, wildlife sanctuaries, national parks, tiger reserves etc. within 10-km of the project site is shown in **Figure-1.2**.

TABLE-1.2
DETAILS OF ENVIRONMENTAL SETTING (10-KM RADIUS)

Sr. No.	Particulars	Details
1	**Location**	
a	Village	Durgapuram
b	Tehsil	Dachepalli
c	District	Guntur
d	State	Andhra Pradesh
e	Geographical co-ordinates	Latitude - Longitude
		Plant: A: 16^0 38'37.36" N to 79^0 41.0' 41.15" E B: 16^0 39'16.05" N to 79^0 42.0' 07.93" E C: 16^0 39'09.94" N to 79^0 42.0' 38.29" E D: 16^0 38'20.69" N to 79^0 42.0' 34.28" E E : 16^0 39'02.83" N to 79^0 42.0' 32.53" E
2	Elevation	80-m above Mean Sea Level
3	Land use at the project site	Existing Cement Plant –Industrial
4	Nearest highway	State highway 2– (20-m, SSE)
5	Nearest railhead / Railway station	Nadikudi RS (5.3-km, SSE)
6	Nearest airport	Hyderabad (145-km, NW)
7	Defence installations	Nil within 15-km radius
8	Archaeological important places	Nagamma Temple (4.0 –km, SSE) (As per A.P State Archaeological Department; not listed for ASI)
9	Ecological Sensitive Areas (National Parks, Wildlife sanctuaries)	Nil within 15-km radius
10	Reserved/Protected forests within 15-km radius	Madinapadu Ext RF (0.5-km, NE) Gomalapadu RF (0.8-km, N) Madinapadu RF (1.0-km, E) Daida RF (4.0-km, W) Saidulnam RF (4.4-km, W) Ravipahad RF (6.1-km, N) Wazirabad RF (6.3-km, NW) Pasupulabodu RF (7.0-km, NW) Nirchintavagu RF (7.8-km, NNE)
11	Industries in 10-km radius	Deccan Cement Limited (6.6-km,N) India Cements Limited (8.0-km, NW) Penna Cement (7.0-km, N)
12	Nearest major city	Vijayawada (95-km)
13	Nearest major settlement	Vijayawada (95-km)
14	Nearest water bodies	Krishna river (3.6-km, N) Dandivagu (4.1-km, W)
15	Socio-economic factors	As plant will be developed within the existing cement plant complex, no resettlement and rehabilitation issues involved.
16	Seismic zone	Zone-I as per IS:1893 (Part-1) 2002

1.6 Scope of the Study

Based on the TOR, the Environmental Impact Assessment report is prepared covering study area of 10-km radial area around the plant site. The scope of study broadly includes:

- To conduct literature review and to collect data relevant to the study area;
- To undertake environmental monitoring so as to establish the baseline environmental status of the study area;

- To identify the ambient air quality levels in the proposed project area;
- To predict incremental levels of pollutants in the study area due to the proposed project activities;
- To evaluate the predicted impacts on the various environmental attributes in the study area by using scientifically developed and widely accepted environmental impact assessment methodologies;
- To prepare an Environment Management Plan (EMP) outlining the measures for improving the environmental quality and scope for future expansions for environmentally sustainable development; and
- To identify critical environmental attributes required to be monitored.

The literature review includes identification of relevant articles from various publications, collection of data from various government agencies and other sources.

1.7 Methodology of the Study

Vimta Labs Limited, Hyderabad along with Durga Cement Works officials had conducted a reconnaissance survey and sampling locations were identified on the basis of:

- Predominant wind directions in the study area as recorded by India Meteorological Department (IMD), Rentachintala;
- Existing topography, location of surface water bodies like ponds, canals and rivers;
- Location of villages/towns/sensitive areas;
- Accessibility, power availability and security of monitoring equipment, pollution pockets in the area;
- Areas which represent baseline conditions; and
- Collection, collation and analysis of baseline data for various environmental attributes.

Field studies have been conducted for a period of three months *(1st March to 31st May 2012)* representing pre-monsoon season and 1st June to 31st July 2012 covering monsoon season to determine existing conditions of various environmental attributes as outlined in **Table-1.3**. The applicable environmental standards for the project and the methodology of monitoring and analysis are given in **Annexure-IV** and administrative legislation in **Annexure-V**.

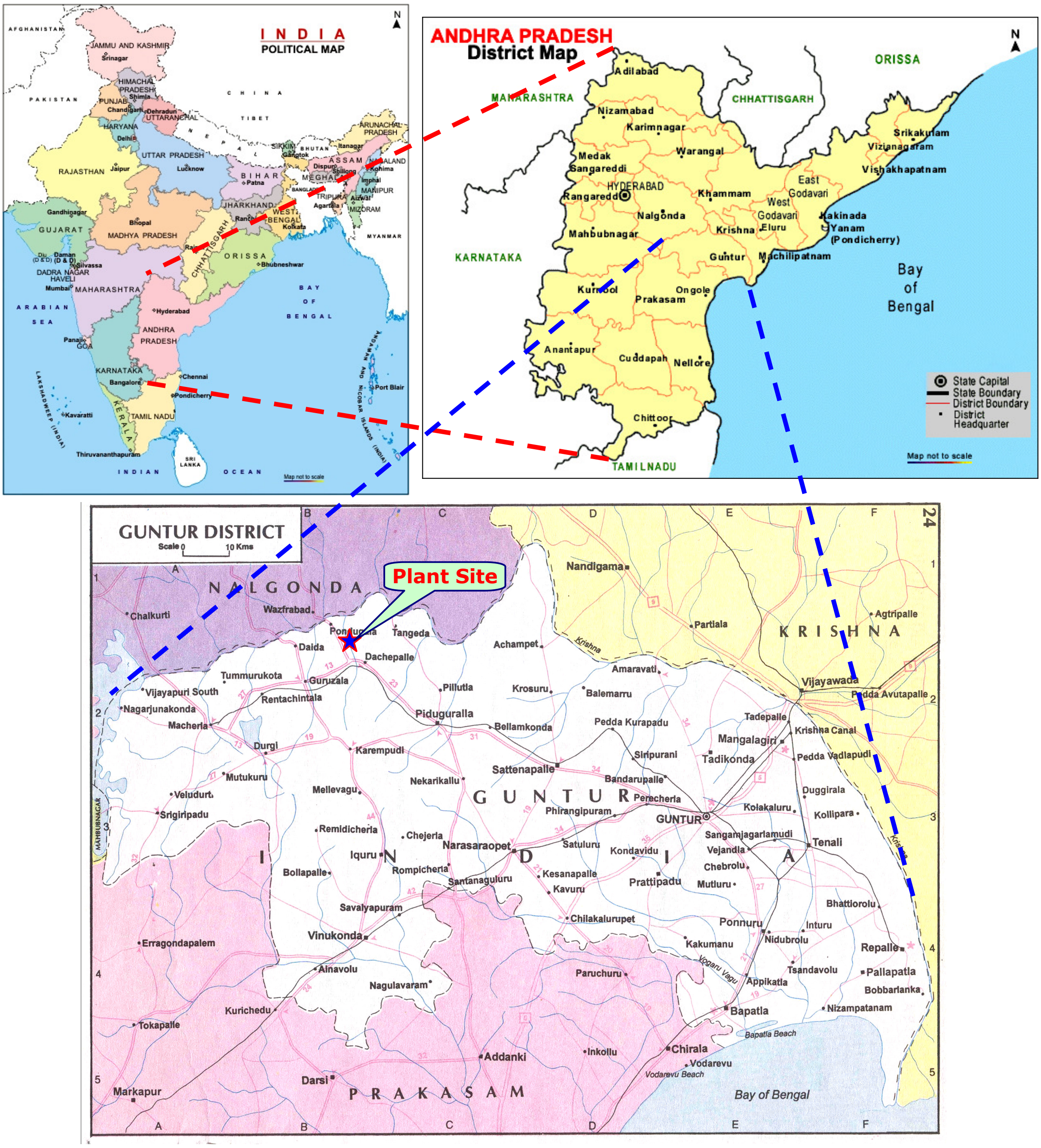


FIGURE-1.1
INDEX MAP

FIGURE-1.2
STUDY AREA MAP (10-KM RADIUS)

TABLE-1.3
ENVIRONMENTAL ATTRIBUTES AND FREQUENCY OF MONITORING

Sr. No.	Environmental Component	Sampling Locations	Sampling Parameters	Total Sampling Period	Sampling Frequency	Detection Limit	Methodology
1	Meteorology	One central location	Temperature, Wind Speed, Wind Direction	3 months	Hourly	WS: +/-0.02 m/sec WD: +/- 3 degrees Temp: +/- 0.2 ^{o}C	The meteorology parameters were recorded using automatic micro-meteorological equipment consisting of Anemometer, Wind wane and thermometer. Review of secondary data collected from IMD station at Rentachintala
			Rainfall	3 months	Daily	Rainfall: 0.2 mm	Rainfall was recorded every morning at 0830 hours
			Relative Humidity, Cloud Cover	3 months	Hourly	RH: +/- 3%	Humidity recorded using wet and dry thermometer and psycometric charts on hourly basis.
2	Ambient Air Quality	8 locations	As per NAAQS 2009	Two days per week for 13 weeks	24 hourly	$PM_{2.5}$: 2 µg/m^3 PM_{10}: 5 µg/m^3 CO: 12.5 µg/m^3 SO_2: 4 µg/m^3 NOx: 9 µg/m^3	Gravimetric method for $PM_{2.5}$ and PM_{10}. Modified West & Gaeke method for SO_2 (IS-5182 part-II 1969) using Tetrachloro mercurate 0.01 N absorbing solution. Jacob-Hochheiser method (IS-5182 part-IV 1975) for NOX using Sodium Arsenate absorbing solution of 0.01 N absorbing solution. CO was measured by GC method.
3	Water Quality	13 locations (5 Surface water 8- Ground water)	As per IS:10500-1991	Grab sampling	Once in study period	EC:+/-0.1 us/cm TSS/TDS: 0.5 mg/l O&G: 0.1 mg/l DO: 0.5 mg/l BOD: 2 mg/l COD: 0.5 mg/l Ca, Mg, Na, K: 0.1 mg/l Alkalinity, PO_4, SO_4, Cl, NO_3: 0.1 mg/l Coliform: 1 MPN	As per APHA methods. The conductivity, temperature were analyzed at site laboratory and rest of the parameters were analyzed at VIMTA's Central Laboratory at Hyderabad.

Sr. No.	Environmental Component	Sampling Locations	Sampling Parameters	Total Sampling Period	Sampling Frequency	Detection Limit	Methodology
			Heavy metals (As, Hg, Pb, Cd, Cr^{-6}, Total Cr, Cu, Zn, Se, Fe)	Grab sampling	Once in study period	0.001 mg/l	
4	Noise	8 locations	Leq	Hourly readings for 24 hours	Once in study period	SPL: 0.1 dB(A)	Integrated on hourly basis
5	Soil	8 locations	Soil profile, Chemical constituents, Suitability for agricultural growth	Composite sample up to 100- m depth	Once during study period	EC: ± 0.1 µs/cm N, P, K: 0.1 mg/kg	Analysis was carried out as per Soil Chemical analysis by ML Jackson
6	Terrestrial Ecology	Total study area	Flora and fauna	Field observations	Once in study period	-	Through field visits and collected secondary data. Count and quadrate method
7	Demography and Socio-economic aspects	Total study area	Demographic profile	-	-	-	Through field visits and secondary information sources like National Informatic Center, Delhi and Census operation division
8	Land Use	Total study area	Trend of land use change for different categories	-	-	-	Through field visits and secondary information of IRS, LISS P6 satellite imagery.
9	Geology	Total study area	Geological history	-	-	-	Secondary information sources (Geological survey of India and Central Ground Water Board, Delhi)
10	Hydrogeology (Surface and ground)	Total study area	Drainage pattern, nature of streams, aquifer characteristics, recharge and discharge areas	-	-	-	Secondary information sources like (Geological survey of India and Central Ground Water Board)

2.0 PROJECT DESCRIPTION

2.1 Introduction

This chapter addresses the details of the proposed 30 MW Power Plant including basic fuel requirement, utilities and services, infra-structural facilities and sources of pollution, their quantity, treatment and disposal of the waste.

2.2 Plant Layout

The features of the proposed layout are as follows:

- Process departments have been consolidated into comprehensive production units requiring short conveying distances and elevations and lengths of gas ducts;
- Sufficient space has been provided for ease of operation and maintenance;
- The lengths of power cables have been minimized by suitably locating load distribution centers in respect of process departments; and
- Outward movements of materials from customers/suppliers have been segregated from internal plant traffic.

The google imagery, photographs of proposed plant area and layout showing raw material, fly ash and other storage areas are given in **Figure-2.1, Figure-2.2 and Figure-2.3**.

2.3 Size or Magnitude of Operation

Taking into account, reliability of equipment and matching capacities between the different sections of the plant, the type of equipment/ installation of system and the departmental capacities of the plant, have been arrived. A brief description of proposed utilities and major equipment is given in the **Table-2.1**.

TABLE-2.1
DETAILS OF PROPOSED FACILITIES

Sr. No.	Title	Details
1	Plant capacity	30 MW
2	Land	3.0 ha (available within existing premises of DCW)
3	Process adopted	AFBC boilers with Air cooled condensers
4	Coal requirement	0.21 MTPA
	Source	Singareni collieries /Imported
5	Water requirement	550 m^3/day
	Source	Rainwater collected in mine pit
	Cooling water system	Re-circulating cooling water system. Cooling tower is provided.
6	Emission sources and their control	
	CPP (TG boilers)	ESP (>99.9% efficiency with emission <50 mg/Nm^3)
7	Power requirement	37 MW
8	Manpower	Construction : 300 Operation : 50

Note:*Application for long term linkage from Singareni Collieries is in progress. It is proposed to use the imported coal as an interim arrangement to meet the coal requirement.

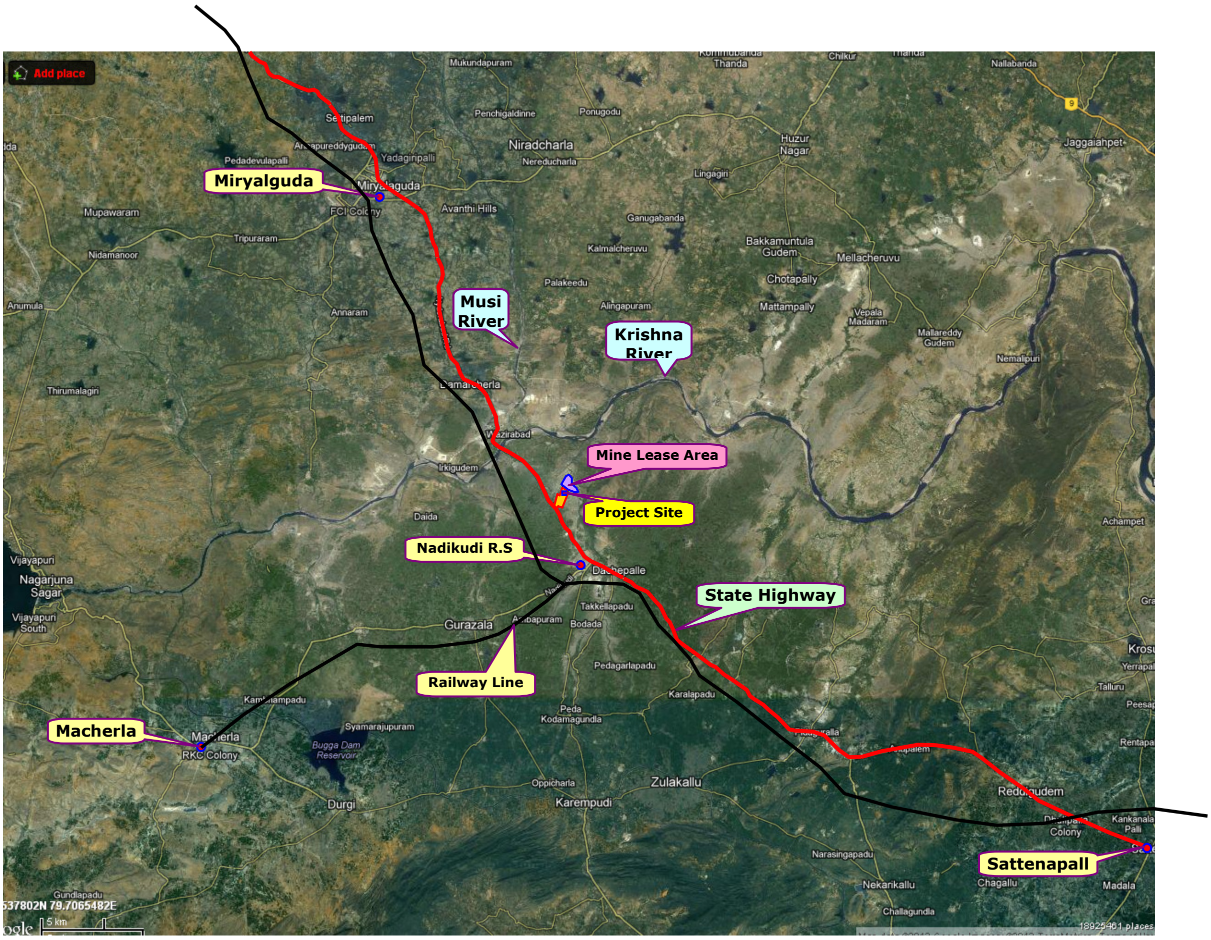


FIGURE-2.1
GOOGLE IMAGE

EXISTING PLANT VIEW

RAW MILL BAG HOUSE & STACK

COOLER ESP

BAG FILTER FOR CEMENT MILL

BAG FILTER FOR COAL MILL

FIGURE-2.2
PHOTOGRAPHS SHOWING EXISTING PLANT FACILITIES

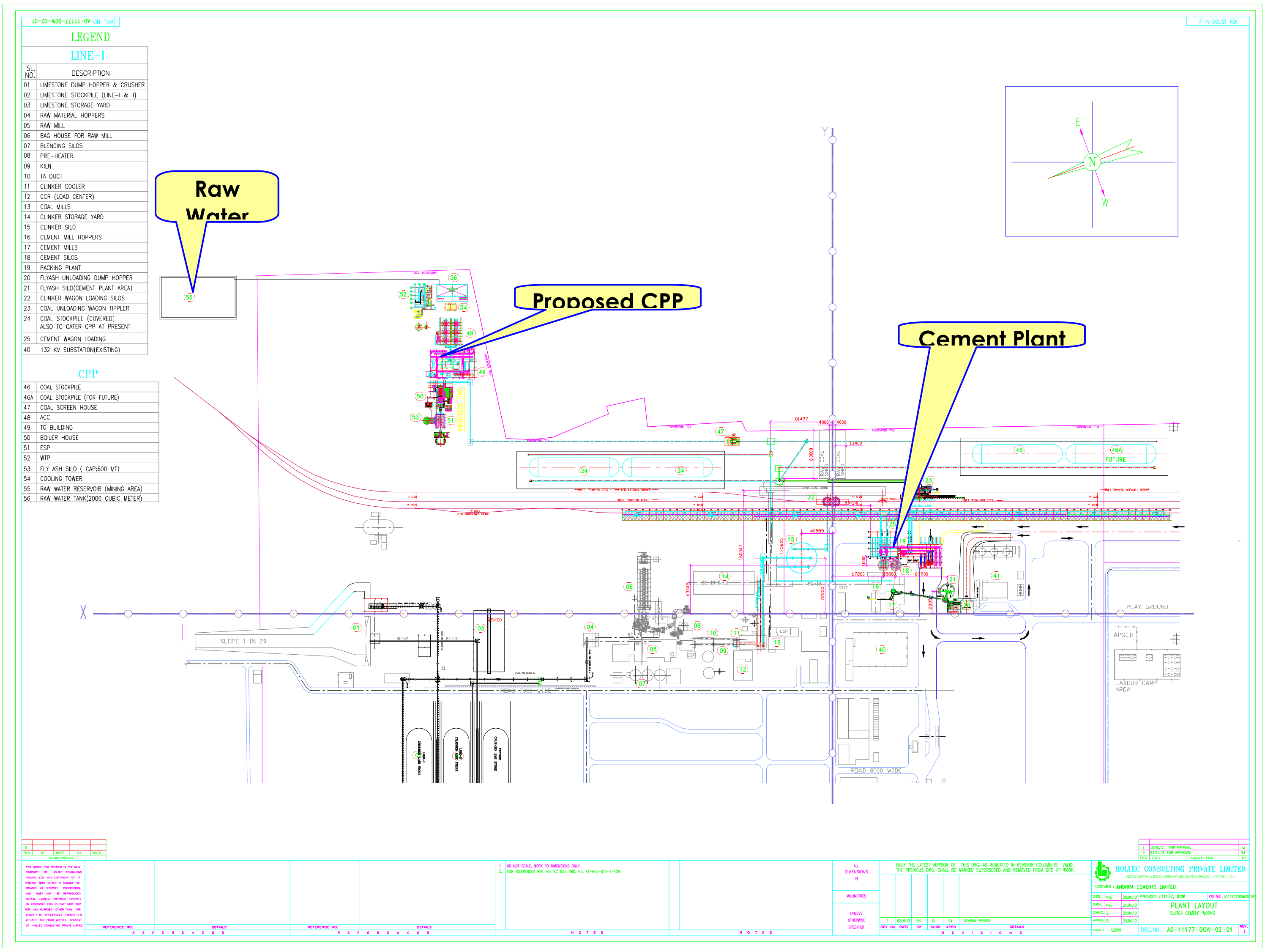


FIGURE-2.3(A)
PLANT LAYOUT

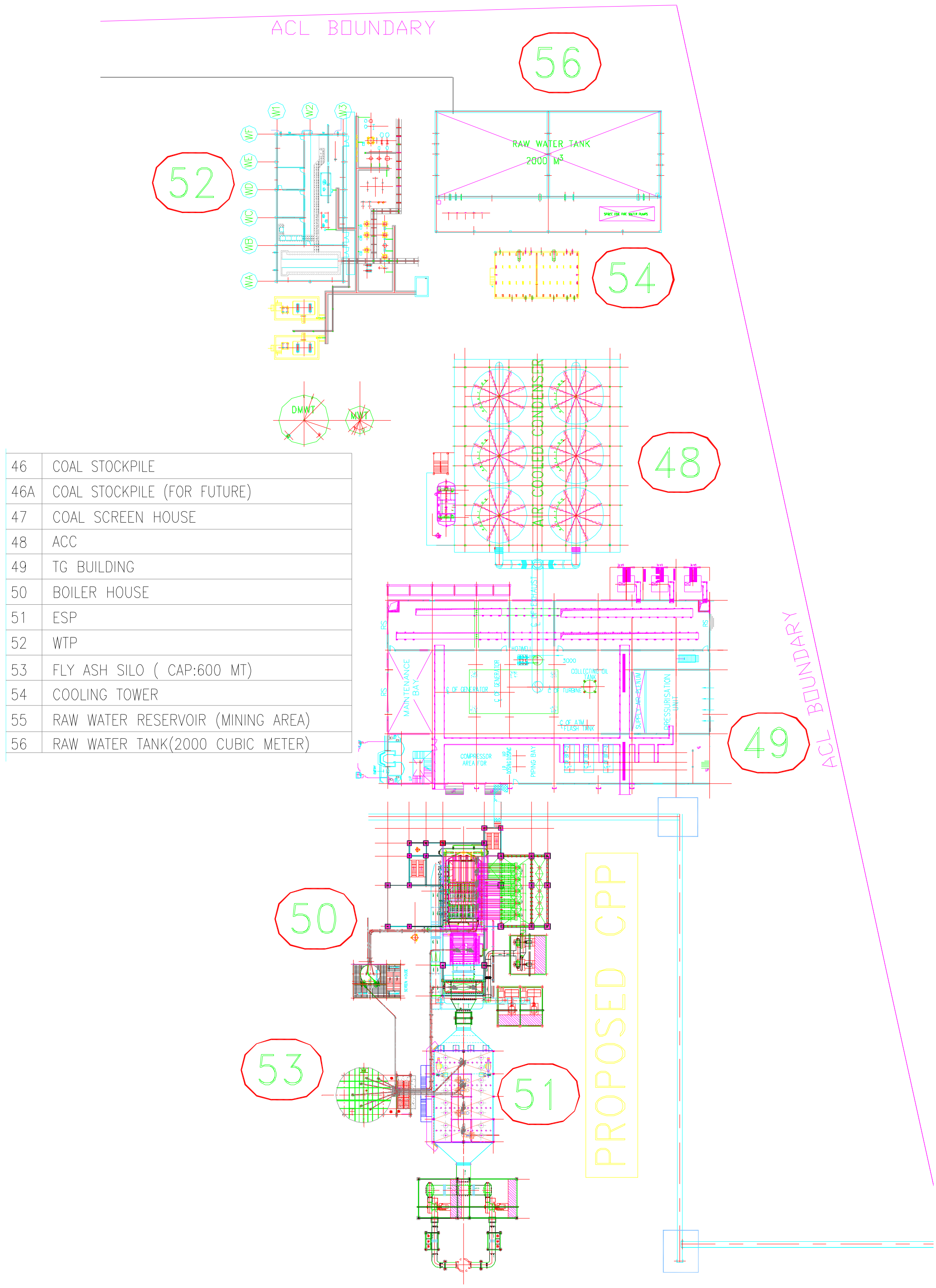


FIGURE-2.3(B)
PROPOSED CPP PLANT LAYOUT

2.4 Process Description

To meet the energy requirement of existing 2.31 MTPA cement plant, 30 MW coal based power plant with Atmospheric Fluidized Bed Combustion (AFBC) type boiler is proposed within the plant premises. The details of proposed power plant are presented in **Table-2.2**.

TABLE-2.2
DETAILS OF PROPOSED CAPTIVE POWER PLANT

Sr. No.	Features	Description
1	Boiler	132 TPH
2	Type of boiler	Atmospheric fluidized bed combustion boiler
3	Turbine	Steam turbine at 84 ata pressure 480 ±3^{0}c combined Rankin cycle
4	Generator	0.8 PF with cold air circuit water cooled housing
5	Exhaust steam condensation	Air cooled condenser
6	Power evacuation	132 Kv transmission line
7	Pollution control equipment	Electro Static Precipitator with 99.9% efficiency

2.4.1 Fuel Requirement and Quality

The annual coal requirement will be around 0.21 MPTA for the proposed 30 MW power plant which will be sourced from Singareni Collieries Limited with an average GCV Coal of 3200 Kcal/kg/ Imported with GCV of 5300 Kcal/kg.

2.4.2 Description of Plant and Machinery

2.4.2.1 Steam Turbine and Auxiliaries

The steam turbines would be single casing, non reheat, and regenerative, condenser type. The turbine is rated for 30 MW with rated steam inlet condition of 62 ata 480^{0}C and 0.1 ata condenser backpressure with associated feed water heaters in service. The turbine would be complete with all the accessories customarily supplied, by the manufacturers such as governing and protection system, turbine oil system its auxiliaries, turbine gland seal system, turning gear, supervisory and operating instruments with all necessary indicating and control devices to permit the unit to be replaced on turning gear, rolled, accelerated and synchronized from the central control room.

2.4.2.2 Steam Generator (Boiler)

The Steam Generator (Boiler) is of Atmospheric Fluidized Bed Combustion (AFBC), which is well-established mode of burning fuels, which permit the solids to escape from the combustor with the flue gas but then capturing them in external spacing device. The carried-over bed material and un-burnt fuel particles are returned to the bottom of combustor vessel. It has been proposed AFBC boilers with steam generation capacity of 132 TPH capacity attached to 30 MW capacity Turbo generator set respectively. The generator would be rated for 25000 kW, 11 kV, 50 Hz, 3000 rpm, 0.1 power factor with static excitation. The generator stator core, stator coil and rotor would be air-cooled.

2.4.2.3 Coal Handling System

The coal required for the power plant is being received at site through railway siding by railway wagons. The coal required will be about 0.21 MTPA. This requirement will met from the coal unloading and handling facilities. Crushed coal at the intermediate coal bunker from where a reclaim hopper and other series of proposed conveyors, crusher and screens would feed coal to proposed boilers. All the equipment will be designed for 132 TPH capacities.

2.4.2.4 Ash Handling System

Ash Handling Plant (AHP) design would be based on the worst coal quality and maximum ash content and the bottom ash and fly ash equipment parameters would be guided by the following:

- Coal consumption : 575.34 TPD
- Ash generation at 45% ash content : 258.90 TPD
- Fly ash : 207.12 TPD
- Bottom ash : 51.77 TPD

The ash handling system will include the collection of ash in various ash hoppers and transportation of both bottom and fly ash to storage silos by pneumatic pressure conveying. Each AFBC boiler consists of following hoppers for collection of ash:

i) Bottom ash hoppers with ash coolers;
ii) Economiser hopper for fly ash;
iii) Air heaters hopper for fly ash; and
iv) ESP hoppers for fly ash.

The bottom ash, which will be at a temperature of 200°C after bottom ash coolers of the boiler, is conveyed to bottom ash silo with the help of scrapper conveyor or dense phase system. Two 200 tonne capacity silo for fly ash and one number of 100 tonnes capacity silo for bottom ash is constructed.

The fly ash from the ESP and economizer hoppers is conveyed by installing dense phase pneumatic ash handling system to fly ash silo. From the fly ash silo, fly ash is being transferred to the cement plant for PPC production. Total fly ash generated in the power plant is being utilized in the cement plant for producing PPC. A separate silo near the cement mill will be constructed for storage of fly ash. The bottom ash collected will be sent to the bottom ash silo from where it will be suitably disposed depending on its quality. Typical coal handling scheme is shown in **Figure-2.4** and duct routing layout for coal crusher is shown in **Figure –2.5**

2.4.2.5 Ash Disposal

The CPP would generate ash about 258.90 TPD. Out of this quantity, about 207.12 TPD will be fly ash and the balance 51.77 TPD would be bottom ash. Fly ash generated at power plant will be 100% utilized by the cement plant. Thus, at any point of time, there will not be any disposal or stacking of the fly ash. The flow chart showing the process in power plant is shown in **Figure-2.6** and energy balance is given in **Figure-2.7**.

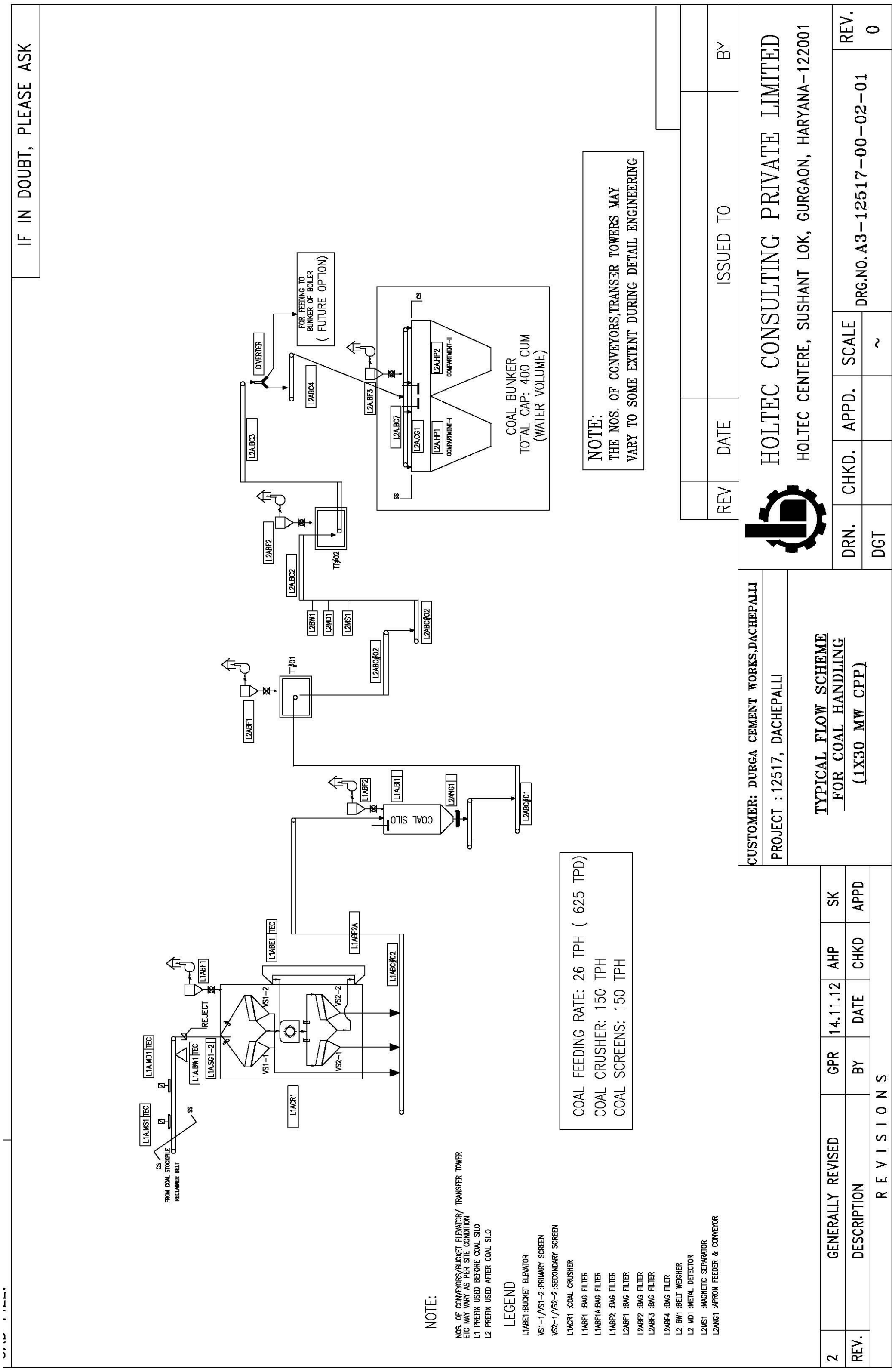


FIGURE-2.4
COAL HANDLING PLANT

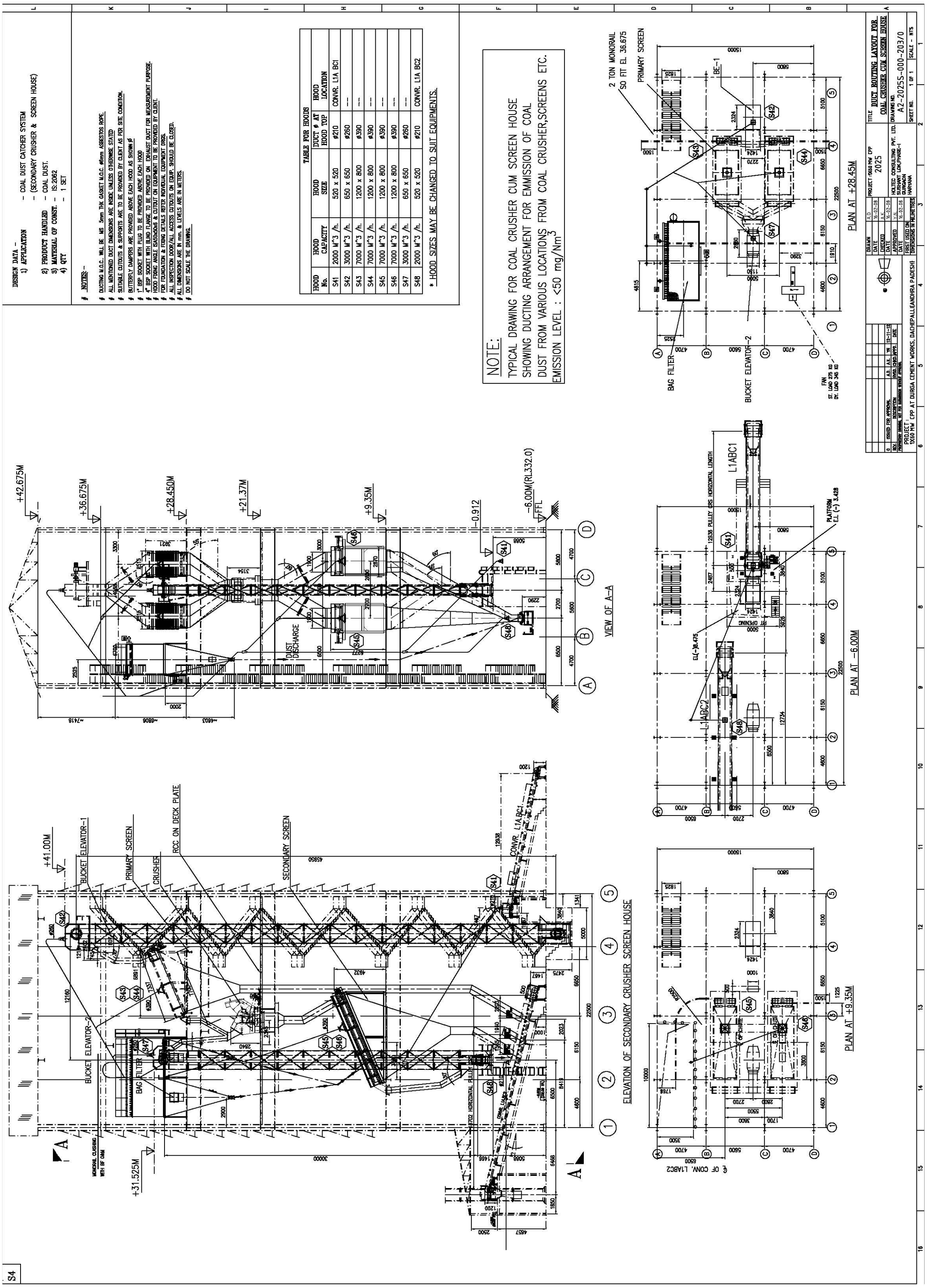


FIGURE-2.5
CRUSHER ROUTING –SCHEMATIC DIAGRAM

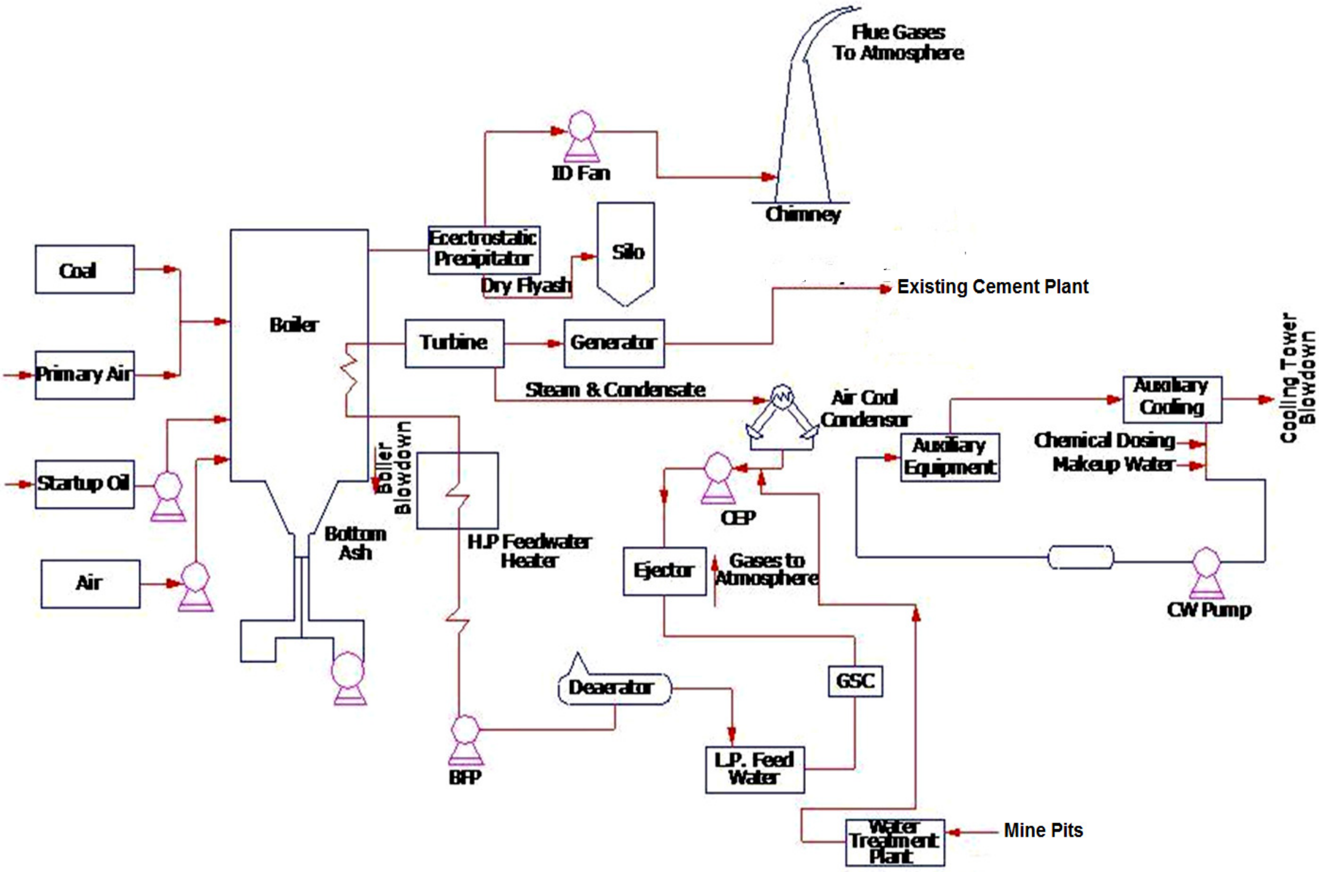


FIGURE-2.6
PROCESS FLOW CPP

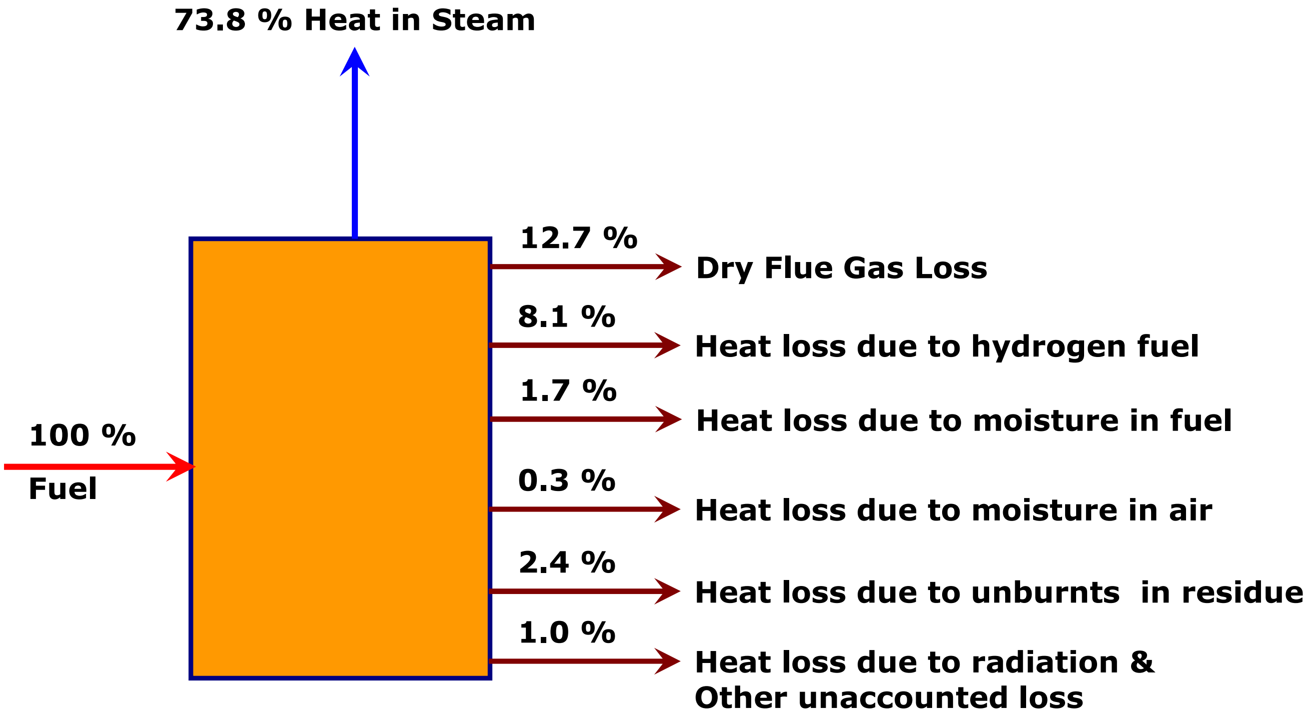


FIGURE-2.7
ENERGY BALANCE

2.4.2.6 Fire Protection System

Hydrant system is proposed for the interior and exterior of the station building, the boiler platforms, the bunker area and the electrostatic precipitator area, coal handling area, ash-handling area, WT plant and CW pump house. An automatic high velocity water spray system is proposed for the various transformers and turbine oil tanks. Automatic sprinkler system and fire detection system is proposed for the coal conveyor. Portable hand appliances are proposed for extinguishing small fires in the selected areas of the plant.

2.4.2.7 Air Cooled Condensers

Air-cooled condenser will be considered for condenser cooling system. The air-cooled condenser will have number of modules with each module having tube bundles. The tubes will be having finned type either of aluminum or carbon steel galvanized material. All necessary indicating and control instruments will be provided for operation of the turbine generators. The control panels will be located in the main plant control room at powerhouse building operating floor. Installation of Air-cooled condenser reduces the precious water requirement to a great extent.

2.4.2.8 Power Plant Control

The control system of the proposed power plant will be through distributed Digital Control Systems (DCS). This control system will utilize the state of the art technology so as to offer higher reliability, flexibility and availability.

2.5 Fuel Requirement

- ***Source of Coal***

Coal requirement will be 0.21 MTPA and is proposed to be sourced from Singareni Collieries. Application for the long term indigenous coal linkage has been submitted and is in process. Alternatively, it is also proposed to use the indigenous coal to be procured through e-auction which would be of E and F grade quality. The quality of the coal to procure either from Singareni Collieries or through e-auction is expected to be is presented in **Table-2.3**.

TABLE-2.3
EXPECTED COAL QUALITY

Sr. No.	Parameter	Worst Case
1	GCV, Kcal/kg	< 3000
2	Ash, %	45.0
3	Volatile matter, %	21
4	Moisture, %	15
5	Sulphur content, %	0.5

The characterization of and coal are given in **Table-2.4.**

TABLE-2.4
COAL CHARACTERIZATION

Sr. No.	Parameter	Concentration
1	Moisture %	10
2	Ash %	45
3	Sulphur %	0.5
4	Carbon	36.2
5	Hydrogen	1.7
6	Oxygen	6.0
7	Nitrogen	0.6
8	Calorific value (Gross on Dry) (Kcal/Kg)	3200
9	Size of coal	90 mm
10	Cadmium	2.9 mg/kg
11	Thalium	9.8 mg/kg
12	Mercury	0.3 mg/kg
13	Antimony	3.1 mg/kg
14	Arsenic	1.0 mg/kg
15	Lead	21.4 mg/kg
16	Chromium	19.8 mg/kg
17	Cobalt	2.9 mg/kg
18	Copper	9.8 mg/kg
19	Nickel	21.2 mg/kg
20	Manganese	49.8 mg/kg
21	Vanadium	27.6 mg/kg
22	Zinc	46.8 mg/kg
23	Selenium	0.36 mg/kg
24	Strontium	3.6 mg/kg

2.6 Land Requirement

Land requirement for the proposed CPP is around 3-ha, out of 141.57-ha land available for cement plant which is already in industrial use and in procession of DCW. The proposed power plant will be built within existing cement plant premises hence no change in landuse. No additional land acquisition. The existing land-use breakup within the cement plant complex is given in **Table-2.5**.

TABLE-2.5
LAND USE BREAK-UP

Sr. No.	Description	Area (ha)
1	Cement plant	91.86
2	Captive power plant	3.00
3	Green belt development	46.71
	Total	***141.57***

Source: DCW

Hence, no Rehabilitation & resettlement (R & R) issues involved as the land required is already in possession of DCW.

2.7 Water Requirement

The water requirement for the proposed project is about 550 m^3/day, which will be met from rain water collected in mines pit. Mine is located at about 1.2-km from boundary in NE direction. The break-up of water required for the CPP is as given in **Table-2.6.**

TABLE-2.6
WATER REQUIREMENT

Sr. No.	Particulars	Consumption
1	Boiler feed water make up considering DM plant process requirement	459.3
2	Ventilation System	6.1
3	Potable water in Plant	17.6
4	Washing & Sanitation	20.9
5	Gardening and landscaping	14.3
6	Water Treatment Losses	31.9
	Clarifier Sludge	-
	Total	**550**

- **Source of Water Required**

The water required for the plant including Cement plant and limestone mine will be sourced from mine pit where the rain water will be stored. The total area of the pit is about 120-ha where it can be capable of storing 395910 cubicmeter/annum. The detailed calculations pertaining to the storage of water is given below:

Pit area	-	120-ha (1200000 sqm)
Annual rainfall	-	439.9 mm (0.4399 m)
Infiltration factor	-	0.75
Water storage in pit	=	1200000*0.4399*0.75
	=	395910 cubicmeter/annum
	=	1084.68 cubicmeter/day

Water requirement in Integrated Plant

1. 30 MW CPP – Durga Cements	-	550 m^3/day
2. Andhra cements – Mine	-	60 m^3/day
3. Cement Plant	-	420 m^3/day
Total	**=**	***1030 m^3/day***
Water sourced from pit	=	1084.68-1030
	=	54.68 m^3/day (balance water in pit)

The water collected in mine pit is sufficient for plant requirement. Hence, no alternative water source is required.

2.8 Power Requirement

The estimated power demand for the plant is about 37 MW. 24 MW shall be catered by power plant and rest of the power requirement shall be met from State power grid.

2.9 Manpower

The requirement of personnel for the proposed power plant has been made keeping in view of the following:

- Technical concept of plant, including process control and instrumentation;
- Smooth and efficient operation of the plant;
- Effective co-ordination between the various departments within the plant;
- Optimum organization with well defined and judicious job distribution;
- Optimum utilization of different grades of workmen and supervisory staff; and
- Maximum capacity utilization of the facilities.

The total manpower requirement during construction stage will be about 300 no and during operation phase requirement will be about 50 nos. including skilled and unskilled workers. The shortfall of any technical manpower will be made up by gradual recruitment.

2.10 Proposed Schedule and Approval for Implementation

The plant construction will be completed in a period of 24-months from the date of receipt of all the approvals from statutory authorities.

2.11 Utilities and Services

2.11.1 Machinery Stores

Adequate storage facilities for machinery spares and other consumables, including an open yard, have been established to meet the requirement of plant.

2.11.2 Workshop

Based on the location of the plant, a reasonably good workshop facility has been established with the existing cement plant, both for mechanical and electrical equipment repairs and maintenance. Some facilities will be used for CPP requirement.

2.11.3 Time Office and Security Office

The time office and security office complexes will be established.

2.11.4 Fire Fighting System

For protection of the plant against fire, all yards and plants have been protected by any one or a combination of the following systems:

- Hydrant system;
- High pressure water sprinkler system;
- Foam system;
- Portable fire extinguishers; and
- Mobile high-pressure fire hydrant system.

Hydrant system will feed pressurized water to hydrant valves located throughout the plant and also at strategic locations within the cement plant colony.

2.11.5 Township

A full fledged township comprising of guest house, school, shopping centre, club, etc. is already in place, which will be used for accommodating the CPP persons also. The township will have essential facilities for key plant personnel.

2.11.6 Infrastructure Facilities for Labour Force

Presently no infrastructure, except an all weather good motorable public road, is available in the area. Thus, the infrastructure like offices, workshop, colony, electricity etc. will be added.

All the workers will be housed in labour colony to be built by respective contractor, which will be located near the project site. The colony which will be temporary in nature will have the following amenities:

1 Drinking water facility – Drinking water will be supplied through water tankers/community taps;
2 Community kitchen will be provided by contractor for the workers;
3 Sanitation facilities will be constructed which will include the adequate number of separate toilets for men and women. The make shift treatment plant will be installed and treated wastewater will be utilized in greenbelt development;
4 Bins will be installed to collect municipal waste from the colony;
5 Small play ground and child care centers will be developed in the colony;
6 Fuel (kerosene/LPG) will be supplied to the labours for cooking to prevent tree felling.
7 Medical facilities with first aid, pre medical visiting facilities & transportation facilities as required.

2.11.7 Canteen

Tea and snacks will be provided to the personnel working in the plant. A pantry will also be provided in the Office Complex.

2.11.8 First Aid Room

First aid room of adequate size with required equipment will be established within CPP premises near the office, whereas the first aid station near the workings is of mobile type. Rest shelter of standard design will be provided near the first aid station. Cool and wholesome drinking water will be provided at the shelter in suitable container

2.12 Sources of Pollution

2.12.1 General

In the process as well as the auxiliary plants, along with the useful products and by-products, different waste materials will also be generated. These waste materials mainly include gaseous emissions, wastewater and solid wastes from the utilities:

- The emissions include the dust from handling operations;
- The main atmospheric pollutant in the stack and fugitive emissions would be Particulate Matter (PM);
- The CPP and sanitation are the source of wastewater generation; and
- Ash is the solid waste generated in coal based power plant where it is 100 % utilized for manufacturing of cement.

2.12.2 Gaseous Emissions

- ***Stack Emissions***

In the proposed power plant the main sources of emissions will be from stack attached to boiler. The emission of particulate matter from all the stacks will be limited to 50 mg/Nm^3. The details of stacks emission and proposed controlled equipment are given in **Table-2.7**.

TABLE-2.7
SOURCE OF EMISSION

Stack Attached to	Stack Height (m)	Stack Dia (m)	Velocity (m/s)	Temp (^{0}C)	Particulate Emission rate (mg/Nm^3)	Control equipment
Boiler	77	2.0	15.96	140	50	ESP
Crusher	40	1	12	70	50	Bagfilter
Raw Mill-I & II	70	3.5	10	120	50	Bagfilter
Cooler	30	3	10	80	50	Bagfilter
Coal Mill – I	30	1	14	80	50	Bagfilter
Coal Mill-II	30	1	14	80	50	Bagfilter
Cement Mill – I	32	1.25	12	80	50	Bagfilter
Cement Mill – II	31	1	12	80	50	Bagfilter
Cement Mill- III	35	1.25	12	80	50	Bagfilter

2.12.3 Wastewater Generation and Treatment

Water requirement for the proposed power plant is estimated to be 550 m^3/day. The water balance for the proposed plant is presented in **Table-2.8**.

TABLE-2.8
WATER BALANCE

Sr. No.	Units	Requirement	Losses/use	Wastewater Generation	Remarks
1	Boiler feed water make up considering DM plant process requirement	459.3	216.0	243.1	Sent to STP and sent to guard pond after neutralization
2	Ventilation System	6.1	4.9	1.5	Sent to Guard Pond
3	Potable water in Plant	17.6	3.4	14.1	For greenbelt after treatment in STP
4	Washing & Sanitation	20.9	4.1	16.9	Treated water from STP sent to guard pond
5	Gardening and landscaping	14.3	14.1	-	-

Sr. No.	Units	Requirement	Losses/use	Wastewater Generation	Remarks
6	Water Treatment Losses	31.9	-	22.1	Sent to Guard Pond
	Clarifier Sludge	-	-	9.8	Low lying area
	Total	**550**	**243**	**307**	120-Dust suppression 9.8-Landfill 14.1-Greenbelt 120- IBD quenching

➢ ***Wastewater Generation at Power plant***

The total wastewater generated from various units of the CPP is about 243.1 m^3/day and about 64 m^3/day is the domestic & other waste water generated which will be treated in the Sewage treatment plant. Therefore the total wastewater for handling at the power plant is about 307 m^3/day.

Wastewater from filtration unit, softener and DM plant will be neutralized before disposal to guard pond. Wastewater from plant drains (service water) and cooling water) along with wastewater from neutralization tank will be let into the guard pond.

➢ ***Wastewater Generation from Sanitary Uses***

Wastewater generation will be mainly due to the sanitary wastewater generated due to domestic uses. The sanitary wastewater will be treated in Sewage Treatment Plant (STP) and will be utilized for green belt development.

2.12.4 Solid Waste Generation and Utilization

Bottom ash and Fly ash will be generated from the proposed Coal based captive power plant. The coal consumption is estimated at 575.34 TPD at 100% installed capacity. The ash content of the coal is estimated to be in 45%. Based on the above ash content, the bottom ash (20%) and fly ash (80%) generation is estimated to be 51.77 and 207.12 tons/day respectively. The fly ash generated from the proposed 30 MW power plant is (100%) utilized in cement plant for manufacturing the Portland Pozzolona Cement (PPC).

➢ ***ETP***

Solid waste in the form of sludge is generated from the STP and ETP. The dried waste is used as manure for green belt development.

The details of the solid waste generated from the proposed power plant are given in **Table-2.9.**

TABLE-2.9
DETAILS OF SOLID WASTE GENERATION

Sr. No.	Unit	Solid Waste	Method of Disposal
1	Fly ash from CPP	207.12 TPD	Utilized for manufacture of PPC
2	Bottom ash from CPP	51.77 TPD	Utilized in land filling and in raw mill
3	Sludge from STP	30 TPM	Used as manure in horticulture

2.12.5 Scheme for Fly Ash Loading, Storage and Transport

The flyash, from ESP hopper, is unloaded pneumatically into the silo. This storage silo is also provided with a high efficiency bag filter for the purpose of venting. Hence the fine flyash, carried away with this venting air gets collected in the bag filter, leaving unpolluted air into the atmosphere. These fines are put back into the process. Now, the fly ash from silo will be transported, by pneumatic means, to either raw mill or cement mill, for taking it into the process. Fly ash taken to the surge bins of raw mill/cement mill area, is put into the mill or corresponding point, for further process. Here rotary air locks are employed for the purpose of discharging the material from bins and thus eliminating the leakage.

The following are the measures taken to eliminate the possible problems of pollution due to fly ash.

- Pneumatic transportation of fly ash from power plant to cement mills;
- During loading/unloading the direct coupling of the flexible duct with the opening of bulker, ensures a totally dust free atmosphere at these stations;
- High efficiency bag filter for silo venting;
- Another bag filter at pumping area, for venting of pumps and extraction equipment;
- Rotary air locks adopted for the discharge of surge bins;
- High efficiency air tight seals at the entry/exit of ducting from silo; and
- Transfer point dust collectors.

2.12.6 Noise Pollution

The noise generation from the proposed power plant can be broadly categorized into two types *viz.* Area and Point sources. All the equipment used can be categorized as point sources and the vehicular traffic movement can be treated as area source. The noise levels of existing machinery are given in **Table-2.10**.

TABLE-2.10
NOISE LEVELS OF MACHINERIES IN CPP

Sr. No.	Location	Noise Levels dB(A)
1	Turbine	85
2	Cooling towers	61
3	CW pump house	63
4	Air compressor	84

All these noise generating equipment are enclosed and continuous presence of workers is not required at these equipment. People working at high noise generating equipment are provided with earplugs.

2.13 Greenbelt Development

Total 33% of the plant area will be developed as green belt/ green cover. Local species will be selected in greenbelt and plantation. Density of plantation 2500 trees/ha will be maintained. The treated sanitary wastewater will be used in green belt development.

3.0 BASELINE ENVIRONMENTAL STATUS

3.1 Introduction

This chapter illustrates the description of the existing environmental status of the study area with reference to the prominent environmental attributes. The study area covers 10 km radius from project boundary. The existing environmental setting is considered to adjudge the baseline environmental conditions, which are described with respect to climate, hydrogeological aspects, atmospheric conditions, water quality, soil quality, ecology, land use and socio-economic profiles of people. The baseline studies are carried out for three months, representing pre-monsoon season 2012 in the various domains of environment.

EIA notification requires that 10-km radius area surrounding the project site shall be covered under the study and the same is denoted as study area. As part of the study, description of biological environment and Human environment such as environmental settings, demography & socio-economics, land-use/ land cover, ecology & biodiversity have been carried out for entire 10-km radius. However, as a universally accepted methodology of EIA studies, physical environmental attributes such as Ambient Air Quality, Water Quality, Soil Quality, Noise Levels, Physiography, Hydrology, Odour, Solid Waste Generation have been studies at selective locations representing various land uses such as industrial, rural/ residential, commercial and sensitive locations including the densely populated areas, agricultural lands, forest lands and other ecologically sensitive areas, if any falling within 10-km radius study area.

This Report incorporates the baseline data monitored for three months (March – May 2012) representing pre monsoon season and secondary data collected from various Government and Semi-Government organizations. The methodology for sampling and analysis has been detailed in Annexure-IV.

3.2 Hydrology

3.2.1 Hydrogeology

According to the study conducted by the Central Ground Water Board, Ministry of Water Resources, Govt of India in Guntur district of Andhra Pradesh in the year 2007 the findings are given below. The Guntur district is underlain by various rock types of different age groups ranging from Archaean to Recent. The Archaean basement complex comprising the granite-gneisses, Schists, Khondalites, Charnockites and basic dykes of dolerites form the predominant rock types. It occupies around 1/3rd part of the district mainly in the central part of the district. These are the predominant water bearing formations in the district. These formations lack primary porosity. They developed secondary porosity through fracturing and subsequent weathering over ages and become water bearing, although very much limited. The movement of ground water is controlled by the degree of interconnections of the secondary pores and voids. The depth of weathered mantle ranges from about 8 to 15m bgl and below this zone fractured rocks are known to occur down to 40.0 m bgl. The depth to water level ranges from less than a meter to 12 m bgl. Dug wells generally yield 10 to 80 or even up to 200 m^3/day, depending on the location of the well. Bore wells drilled in these formations are 30 to 40m deep and generally yield 1.5 to 5 lps and sometimes even more depending upon the fractured zone encountered in the bore well. The dug wells sustain four to six hours of pumping and capable of irrigating about 0.8 to 3.0 ha. A perennial spring, with a discharge of about 200 lpm is located along a fault, near Bugga Melleswara temple of Papayapalem in the Bellamkonda Mandal, and it is reported that this spring is being used to irrigate 10 ha.

The fringe of the Archaeans in the central part of the district is represented by the northeastern part of the Cuddapah basin, namely Nallamalai group of Upper Cuddapahs. In a sequential order, the younger Kurnools occurring in the Cuddapahs and those in the western parts of the district are thrust over by the Cuddapahs and these in turn by the Archaean granite-gneisses. The Upper Gondwana group of sandstones and shales out crop are seen at places between Guntur and Tenali. The youngest rock types of the district appear to be of Mio-Pliocene age followed by the Alluvial deposits of Recent to Sub-Recent age. In the Cuddapah and Karnool group of rock slaty phyllites, quartzites and lime stones the ground water occurs in the joints, bedding planes and the weathered portions. However, the quartzite do not form good aquifers in the area because of their compactness and occurrence at high relief. The ground water is developed in slaty phyllites by dug, dug-cum bore wells and few bore wells. The general depth of wells varies from 3 to 25 m bgl, with moderate to very poor yields ranging between 10 to 70 m^3/day. The depth to water levels range from 0.4 to over 7.0 m bgl, but in phyllites and slates it varies from 4 to 15 m bgl. The general yield of wells ranges from 20 to 80 m^3/day, with exceptions in the highly fractured locations.

The rocks of Upper Gondwanas occur as isolated out crops in the eastern part of the district, viz., around Mutkuru, Sangam, Jagarlamudi and Kolkalur areas. The Gondwana formations are of fluviatile or lacustrine origin and also contain intercalated marine sediments, suggesting the marine transgression. The upper Gondwanas in the district are divided into three divisions, viz., the basal Budavada sandstones, which are buff coloured and of marine origin; the middle thin bedded, buff coloured and fossiliferous (plant) Vemavaram shales and the upper brown to red coloured and un-fossiliferous Pavaluru sandstones. The ground water occurs under water table and confined conditions. The shales overlying the sandstone act as the confining medium. The ground water is tapped by means of dug wells, dug-cum-bore wells and bore wells. The depth to water ranges from 2.20 to 10.60 m bgl and the depth of dug wells varies between 5.50 and 18.50 m bgl. The tube wells in the area range in depth from 40.0 to 75.0 m bgl, with yield ranges from 28 to 1300 lpm for drawdowns of 8.0 to 15.0m. The quality of ground water in these formations at places is found to be brackish other wise in general it is good for potable purposes.

The alluvial formations which are of recent to sub-recent in age were formed from the weathering of the older rocks and also as fluvial/Marine alluvial materials and residual soils. The fluvial alluvial deposits in the district are mainly restricted to the Krishna River and its stream courses. Extensive tracts of alluvium can be observed in the east and southeastern parts of the district and comprises of intercalation of clay, silt, sand, gravel, pebbles and Kankar of variable thicknesses. The thickness of alluvium varies from a few metres to over 100m. These are of deltaic origin and marked at places by shallow to about 30m thick sandy to gravelliferous palaeo/buried channels. The beach sands are combined to the areas along the sea coast with the occurrence of beach ridges and back swamps. Laterite, lateritic shingle and gravel occur in many parts of the district as superficial deposits. The thickness of the alluvium along the stream courses vary from 2 to over 10.0m bgl. Ground water is being developed in the flood plain areas of Krishna river course mostly through filter-point wells and shallow bore wells with yields ranging from 3 to over 15 lps as observed around Rayapudi and Borepalem areas of Amaravati and Thullur mandals. The depth to water level in the alluvium of fluviatile origin ranges from almost ground level to 5m bgl. The wells located in the river terraces and alluvial ridges register deep water level conditions of 7.0 to over 12.0 m bgl with poor to moderate discharges. The extensive deltaic alluvium occurring along the eastern and southeastern parts of the district comprises alluvium of over 100 m in thickness but due to their sandy clay nature are poorly permeable and the ground water movement is rather sluggish. As a result the ground water is highly mineralized and at places it is found to be brackish. The ground water utilization for irrigation in these areas is observed to be negligible due to poor quality. The palaeo-channels, buried channels and flood plains occurring in this region, especially, in the mandals of Dugirala, Tenali, Ponnur and Repalle, are found to be potential aquifers with good quality water. The palaeo/buried channels at places are thin to about 30m thick and consist of sandy, gravelliferous formations and yield fresh water. The extent of these formations vary from a few meters to as much as 2.5 km in width and hundreds of meters to several kilometers in length. Filter-point wells and shallow tube wells are the common ground water abstraction structures in these areas.

Ground water is brackish to saline at shallow depths especially in the areas bordering the coast. Only the beach ridges at shallow depths yield fresh water. In the deltaic and coastal alluvial areas, the depth to water level ranges from less than 1m to 5m bgl. The depth of open wells ranges from 2m to 12 m bgl and the depth of shallow tube wells and filter point wells range from 10m to 27m, with yields of 25 to over 75 cu.m/hr.

- **Ground Water Regime Studies**

In order to monitor the ground water regime in space and time, the Central Ground Water Board (CGWB) has been conducting Ground Water Regime Studies by the establishing and monitoring National Hydrograph Network Stations (NHNS) in the entire district. The Board so far had established 39 such hydrograph stations in various hydrogeological environments of the district which are being monitored four times in a year ie. in the months of January, May, August and November. These studies throw light on the pace of ground water development vis-a-vis recharge in different areas and the variation in the quality of ground water with time. The comparative study of the historical water levels highlight the areas extent of water logging, ground water behaviour and stage of development, over exploitation if any and fluctuations of water levels and quality changes with time and in space, effects of surface water on ground water, rainfall (Pre-and post-monsoon) recharge, chemical and other anthropogenic activities on the ground water regime. While analyzing the ground water regime in the district the data of 220 observation wells monitored by Andhra Pradesh State Ground water Department is also utilized. The State department collects water levels every month and water samples twice in a year to monitor the quality variations. The study of hydrographs of National Hydrograph Network Stations indicate the changes in the ground water scenario of each station from time to time. The data of all the observation wells when correlated with rainfall as well as with the release and stoppage periods of canal water, there appears to be a clear relationship. There is a perceptible rise in the water levels from June/July onwards till December every year. Then the water levels fall from December onwards till May. Just after the onset of monsoon (say June) to March of the following year there is due to release of canal water in different irrigation commands in the district and between middle of March to May/June, the canal water is stopped.

This is reflected in the hydrographs with a steep rise and decline. The fall in the levels of hydrographs of the district may be attributed to the cessation of canal waters, apart from the lessening effects of rainfall. Based on the hydrograph data, hydrographs have been generated for the period since 1978 onwards. On perusal of the hydrographs it is observed that even though the annual rainfall received by the district for the last 4 years have been below normal it is observed that out of the 39 hydrographs 9 show raising trends during pre monsoon as well as during post monsoon periods. This may be attributed to the application of canal water in the area where these wells are located however the wells located near Guntur such as Prattipadu, Chebrolu, Sekuru and Guntur itself indicate that the ground water is no longer being extensively used. On analysis of the chemical data of water samples of these wells it is inferred that the ground water around these wells have become saline due to saline water ingress. The hydrographs of the wells at Repalle, Ponnuru, Chikaluripet, Medikondur show long term horizontal trends of the permonsoon as well as for post monsoon periods this may be attributed to the availability for surface water through canal and streams in the area and the less dependency on ground water resources due its slightly saline in nature with EC reaching to 1200 microseimens/cm. The hydrographs of the wells located at Rentachintala, Macheri, Sirigiripadu, Nekarikallu, Mangalagiri, Ipur, Vadlamudi, Pondugula show falling trends both for pre-monsoon as well as for post monsoon periods. This is because of the failure of rainfall over a period of time, more dependency on ground water in this area due to non availability of the surface water in the vicinity. Over all the picture of ground water indicates that the district average shows a ground water raising trends.

- **Depth to Water and its Behaviour in the District**

Taking the large extent of canal command areas as well as the resulting ground water build up in the district, the depth to water level zones were demarcated in the following order. The depth to water level distribution maps are prepared for May, 03 (Pre-monsoon), November, 03 (Post monsoon) and are shown in **Figure-3.2.1 and Figure-3.2.2** and in the prevailing conditions in the district.

Ground water depth levels of surrounding villages are as given in the **Table 3.2.1**

On perusal of the two maps indicates logging conditions during pre-monsoon period in a small area located in the south-central part of the district i.e. in the area located just north of Bapatla.

But during Post-monsoon period, water logging conditions were observed in areas around Atchempet, Nekarikallu, Pallapatla, Varagami, Chebrolu and Coastal areas. About 75% of the area in the district especially in the central and coastal areas show water logged (less than 2.0m bgl) to near water logged conditions (DTW 2.0 to 5.0 m bgl) during post-monsoon period. But most of these areas are occupied by areas prone to water logging (i.e. DTW 2 m to 5.0m bgl) during premonsoon time accompanied by the stoppage of canal water. The upland areas, pediment areas especially occupied by the quartzites, phyllites and slates and alluvial ridges, areas along the Krishna river, registered deep water levels of over 10 m bgl. An appraisal of the depth to water level maps reveals that water levels are shallow towards the branch canals and distributaries of NSRCCA.

TABLE 3.2.1
GROUND WATER DEPTH LEVELS

Sr. No.	Location/Village	Borewell/ Openwell	Depth of water from ground level (mtr)	Depth of water Level (mtr)
1	Shrinagar	Openwell	15	5.4
2	Ramapuram	Openwell	18.6	1
3	Gamalapadu	Openwell	3.2	3.2
4	Batrupalem	Borewell	16	--
5	Shankarapuram/ Kotayyanagaram	Borewell	16	--
6	Pondugula	Openwell	12	6.8

- **Study of Long Term Water Level Trends in the District**

To assess the long-term trends of water levels in the district, the National Hydrograph Network Stations data for 20 years (1984-2003) period were analyzed and the results show a declining trend from 0 to 1.0m during post-monsoon period and the rising trend from 0 to 2.0 m during pre-monsoon period in the larger parts of the canal command areas of the district. The trends are just opposite for the tail end areas during these periods.

3.2.2 Ground Water Resources

According to the study conducted by the Central Ground Water Board, Ministry of Water Resources, Govt of India in 2007 in Guntur district of Andhra Pradesh the findings are given below.

The ground water potential in the Guntur district, as on March, 2004 is estimated as per the GEC-1997 and the Report has been published by State Ground water board in consultation with Central Ground Water Board. The mandal wise ground water resources of Guntur district are given in **Table-3.2.1(A)**

- **Ground Water Recharge**

The sources of recharge to the ground water body in the district are rainfall, seepage from canals, return seepage from surface water irrigation, seepage from tanks/lakes/ponds. The trend of rainfall departure curve indicates the consistent nature of recharge in recent years.

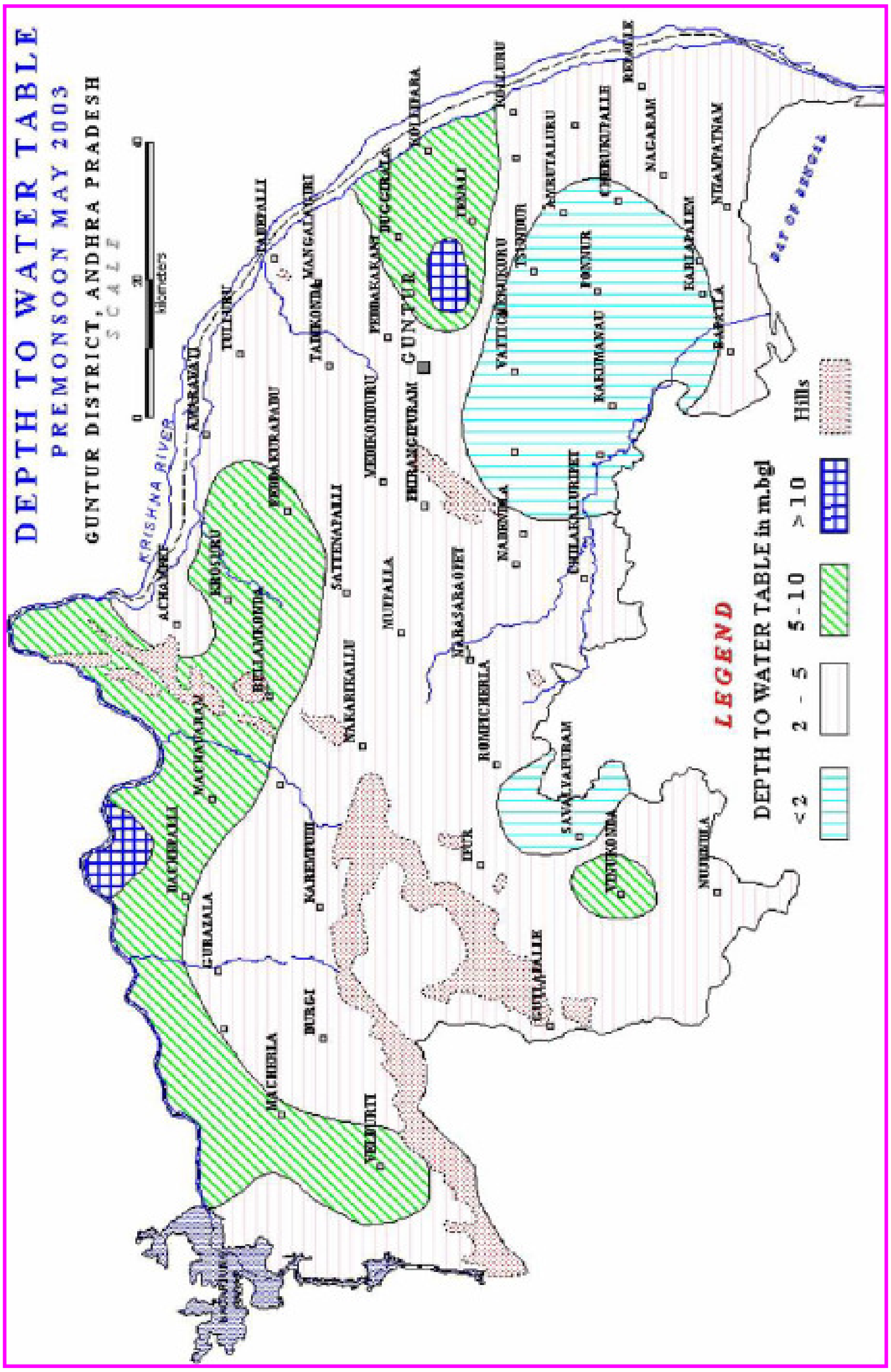


FIGURE-3.2.1
DEPTH TO WATER TABLE (PREMONSOON - MAY 2003)

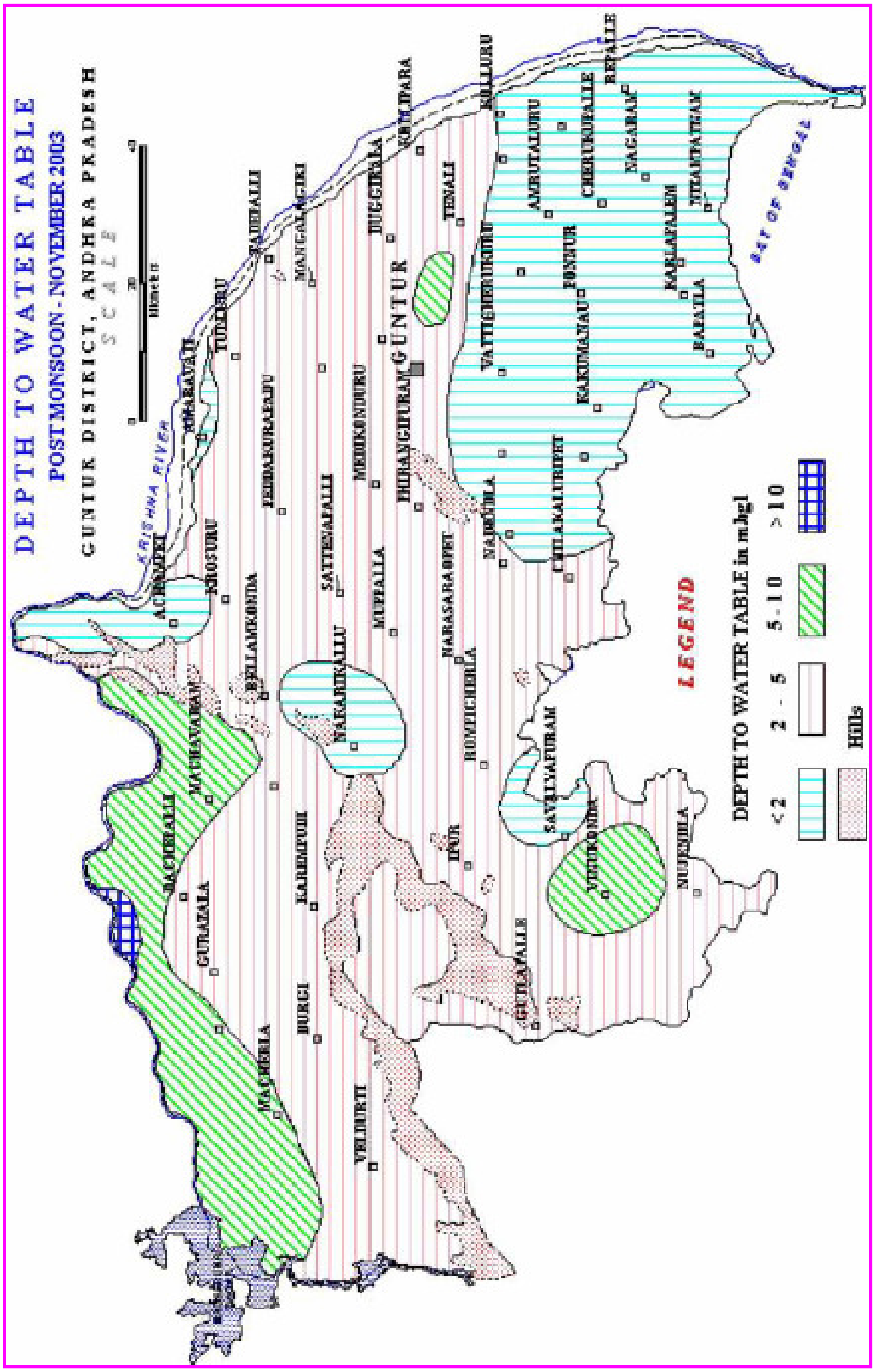


FIGURE-3.2.2
DEPTH TO WATER TABLE (POSTMONSOON – NOVEMBER 2003)

TABLE-3.2.1(A)
MANDAL WISE GROUNDWATER RESOURCE 2004, GUNTUR DISTRICT, A.P.

Sr. No	Mandal	Ground water availability ha.m			Ground water utilisation ha.m			Ground water balance ha.m			Stage of development %			Category		
		C	NC	T	C	NC	T	C	NC	T	C	NC	T	C	NC	T
1	2	3			4			5 = (3-4)			6=[(4/3)*100]			7		
1	Amaravathi	5113	0	5113	751	0	751	4362	0	4362	15	NA	15	Safe	NA	Safe
2	Amarthalur	5686	0	5686	506	0	506	5179	0	5179	9	NA	9	Safe	NA	Safe
3	Atchampet	5313	131	5445	674	50	724	4639	81	4721	13	38	13	Safe	Safe	Safe
4	Bapatla	9429	0	9429	1089	0	1089	8340	0	8340	12	NA	12	Safe	NA	Safe
5	Bellamkonda	3856	450	4306	208	87	295	3648	363	4011	5	19	7	Safe	Safe	Safe
6	Bhattiprolu	4954	0	4954	1304	0	1304	3650	0	3650	26	NA	26	Safe	NA	Safe
7	Bollapali	1336	2423	3759	80	3070	3150	1256	-648	609	6	127	84	Safe	OE	SC
8	Chebrolu	6686	0	6686	531	0	531	6155	0	6155	8	NA	8	Safe	NA	Safe
9	Cherukupally	4030	0	4030	1091	0	1091	2939	0	2939	27	NA	27	Safe	NA	Safe
10	Chilakaluripet	5760	0	5760	629	0	629	5131	0	5131	11	NA	11	Safe	NA	Safe
11	Dachapalli	10725	0	10725	1093	2	1096	9632	-2	9630	10	NA	10	Safe	NA	Safe
12	Duggirala	4743	0	4743	1178	0	1178	3565	0	3565	25	NA	25	Safe	NA	Safe
13	Durgi	1349	2452	3801	222	1070	1292	1126	1382	2509	16	44	34	Safe	Safe	Safe
14	Edlapadu	6007	0	6007	329	0	329	5678	0	5678	5	NA	5	Safe	NA	Safe
15	Guntur	6305	0	6305	230	0	230	6075	0	6075	4	NA	4	Safe	NA	Safe
16	Gurajala	12945	0	12945	627	0	628	12318	0	12318	5	NA	5	Safe	NA	Safe
17	Ipuru	4521	151	4672	569	59	628	3952	92	4044	13	39	13	Safe	Safe	Safe
18	Kakumanu	7087	0	7087	20	0	20	7067	0	7067	0	NA	0	Safe	NA	Safe
19	Karampudi	7748	644	8392	1307	270	1577	6441	373	6815	17	42	19	Safe	Safe	Safe
20	Karlapalem	3690	0	3690	162	0	162	3529	0	3529	4	NA	4	Safe	NA	Safe
21	Kollipara	4120	0	4120	1364	0	1364	2756	0	2756	33	NA	33	Safe	NA	Safe
22	Kollur	6156	0	6156	1685	0	1685	4471	0	4471	27	NA	27	Safe	NA	Safe
23	Krosuru	9689	0	9689	895	1	896	8795	-1	8793	9	NA	9	Safe	NA	Safe
24	Machavaram	3995	0	3995	720	0	720	3276	0	3276	18	NA	18	Safe	NA	Safe
25	Macheria	2870	1774	4644	242	320	562	2628	1454	4082	8	18	12	Safe	Safe	Safe
26	Mangalagiri	6869	0	6869	319	0	319	6550	0	6550	5	NA	5	Safe	NA	Safe
27	Medikonduru	3969	0	3969	151	0	151	3818	0	3818	4	NA	4	Safe	NA	Safe
28	Muppalla	6043	0	6043	174	0	174	5869	0	5869	3	NA	3	Safe	NA	Safe
29	Nadendla	7080	0	7080	181	0	181	6899	0	6899	3	NA	3	Safe	NA	Safe
30	Nagaram	8323	0	8323	519	0	519	7804	0	7804	6	NA	6	Safe	NA	Safe
31	Nakerikallu	6749	0	6749	977	0	977	5772	0	5772	14	NA	14	Safe	NA	Safe
32	Narasaraopet	8022	0	8022	429	0	429	7592	0	7592	5	NA	5	Safe	NA	Safe
33	Nizampatn	6955	0	6955	107	0	107	6848	0	6848	2	NA	2	Safe	NA	Safe
34	Nujendla	18455	0	18455	340	0	340	18116	0	18115	2	NA	2	Safe	NA	Safe
35	Pedakakani	7886	0	7886	33	0	33	7853	0	7853	0	NA	0	Safe	NA	Safe
36	Pedakurapadu	5600	0	5600	228	0	228	5372	0	5372	4	NA	4	Safe	NA	Safe
37	Pedanandipadu	6154	0	6154	46	0	46	6108	0	6108	1	NA	1	Safe	NA	Safe
38	Phyrangipuram	8661	1	8662	226	0	226	8435	1	8436	3	0	3	Safe	Safe	Safe
39	Piduguralla	5446	149	5595	763	0	763	4684	149	4832	14	14	14	Safe	Safe	Safe
40	Ponnur	11176	0	11176	1421	0	1421	9755	0	9755	13	13	13	Safe	NA	Safe
41	Prathipadu	3361	0	3361	143	0	143	3218	0	3218	4	NA	4	Safe	NA	Safe
42	PV palem	3052	0	3052	224	0	224	2828	0	2828	7	NA	7	Safe	NA	Safe
43	Rajupalem	4230	0	4230	826	1	827	3404	-1	3404	20	NA	20	Safe	NA	Safe
44	Rentachintala	6322	77	6399	146	100	246	6175	-23	6153	2	130	4	Safe	OE	Safe
45	Repalle	9546	0	9546	355	0	355	9192	0	9192	4	NA	4	Safe	NA	Safe
46	Rompicherla	6844	0	6844	305	0	305	6539	0	6539	4	NA	4	Safe	NA	Safe
47	Sattenapalli	10561	0	10561	242	0	242	10319	0	10319	2	NA	2	Safe	NA	Safe
48	Savalyapuram	4760	0	4760	171	0	171	4589	0	4589	4	NA	4	Safe	NA	Safe
49	Tadepalli	3714	0	3714	306	0	306	3408	0	3408	8	NA	8	Safe	NA	Safe
50	Tadikonda	3627	0	3627	411	0	411	3216	0	3216	11	NA	11	Safe	NA	Safe
51	Tenali	6731	0	6731	695	0	695	6036	0	6036	10	NA	10	Safe	NA	Safe
52	Thulluru	3129	0	3129	1065	0	1065	2064	0	2063	34	NA	34	Safe	NA	Safe
53	Tsundur	6583	0	6583	729	0	729	5854	0	5854	11	NA	11	Safe	NA	Safe
54	Vatticherukuru	4247	0	4247	20	0	20	4226	0	4227	0	NA	0	Safe	NA	Safe
55	Veldurthi	0	2425	2425	0	1079	1079	0	1346	1346	NA	44	44	NA	Safe	Safe
56	Vemur	5149	0	5049	674	0	674	4375	0	4375	13	NA	13	Safe	NA	Safe
57	Vinukonda	9402	52	9454	690	9	698	8713	43	8756	7	17	7	Safe	Safe	Safe
	Grand Total	352660	10729	363388	30421	6120	36542	322238	4609	326847	9	57	10	Safe	Safe	Safe

Note OE =Over exploited; SC = Semi critical ; C= critical ; C=Command ; NC = Non Command ; NA = Not applicable W

Leaving the flood plain and palaeo-channel areas, the ground water utilization in the large parts of the district is very limited because of the intensive canal irrigation, especially by the Nagarjunasagar Right Canal Command Area (NSRCCA), Krishna Western Delta (KWD) canal system and the Guntur Channel Scheme in these areas. In the tail end areas of the canal system, upland areas, flood plain, palaeo/buried channel areas, the ground water is being tapped both for domestic and irrigation purposes. These areas include Veldurti, Bollapalli, Chilakaluripeta, Krosur, Atchampet, Amaravati, Tadepalli, Mangalagiri, Thallur, Tadikonda, Dugirala, Kollipara, Kollur, Bhattiprolu, Tenali, Vemuru, Amarthalur, Tsundur and Ponnur mandals, where the ground water is developed through open wells, energized dug, dug-cum-bore wells, shallow tube wells and filter-point wells On the basis of the hydrogeological and other related information, the net annual recharge for the entire district is estimated as 3633.88 MCM/year and the net annual ground water draft in the district is worked to be as 365.42 MCM/year. Thus the ground water balance for future utilization is 3268.47 MCM/year based on the balance potential available for future development.

- **Stage of Development**

In order to check over-exploitation of ground water and to utilize the available resource in a planed way, the Ground Water Estimation Committee (GEC) 1997 has introduced certain norms so as to classify the areas as White, Grey and Dark categories. The blocks or mandals, where the stage of ground water development, in a period of five years, is below 65%, the area is categorized as 'White' or safe; those falling in the range of 65 to 85% as Semi critical and those 85%-100% 'Critical' and above 100% over exploited . The present stage of ground water development in the district is 10% with a net draft of 365.42 MCM out of the Ground water resource of 3633.88 MCM/year. Taking the annual growth rate as 2%, the stage of ground water development after five years is projected as 14% which comes under safe or 'White' category for further ground water development. Similar computations were made to assess the ground water potential and development prospects for each mandal and tabulated in Table and are shown in Plate. A perusal of the table highlights that Bollapalli mandal as Semi critical, with the present stage of development at 84%. It is seen from the Table that the stage of ground water development is around 10% as most of the mandals are covered under surface water irrigation. The water levels in most of these areas are shallow, i.e.., within 5.0 m bgl, with the prevalence of water logged and near water logged conditions. In such areas, ground water development through conjunctive use of surface and ground waters would mitigate not only water logging conditions but also improve the quality of ground water. However, when resource is calculated at the village level it seen that about 46 villages are falling under semi-critical/critical/over exploited category. These villages are listed in table- along with the level of development. It is seen that 13 villages are under semi-critical stage where as 8 villages are under critical stage and the rest 25 are under over exploited stage of development (**Table-3.2.2**).

It can be observed that Dachepalli and Machavaram mandals in which the mine lease is located does not come under the critical areas of exploitation and comes under safe category.

TABLE-3.2.2
MANDAL-WISE VILLAGES FALLING UNDER SEMI-CRITICAL/CRITICAL/OVER EXPLOITED CATEGORIES IN GUNTUR DISTRICT

Sr. No/ Category	Mandal	Village / Habitation	Level of Ground Water Development (%)	
			N	NC
Semi Critical				
1.	Amaravathi	Karlapudi / Amaravathi	75	0
2	Atchmpet	Madinpadu Agrap	0	67
3	Bellomkonda	Venkatayapallem	0	79
4	Ipuru	Angaluru	65	0
5	Kollipara	Bommuvaripalem	65	0
6	Kollipara	Thumuluru	67	0
7	Macherla	Macherla	0	66
8	Mangalagiri	Krishnyapalem	85	0
9	Thulluru	Ananthavaram	75	0
10	Thulluru	Nekkallu	71	0
11	Thulluru	Lingayapalem	77	0
12	Thulluru	Uddandarayunipadu	74	0
13	Veldurthi	Pathlaveedu	0	68
Critical				
1	Amaravathi	Amaravathi/Jupudi	94	0
2	Atchampet	Tallachervu	98	0
3	Atchampet	Challagaria	0	93
4	Durgi	Polepalli/Durgi	0	98
5	Tadikonda	Mothadaka/Tado	98	0
6	Tadikonda	Nidumukkala	98	0
7	Veldurthi	Veldurthi	0	88
8	Veldurthi	Veldurthi	0	99
Over Exploitation				
1	Bellamkonda	Kethavaram	0	218
2	Bhattriprolu	Peesaralanka	183	0
3	Bollapalli	Bollapalli / Ganding	0	381
4	Bollapalli	Ravulapalem	0	130
5	Bollapalli	Gutlapalli	0	306
6	Bollapalli	Bollapalli	0	313
7	Bollapalli	Ayyannapalem	0	150
8	Bollapalli	Mellavagu	0	618
9	Bollapalli	Gummanampadu	0	140
10	Bollapalli	Remidicher;a	0	163
11	Bollapalli	Garkapadu	0	243
12	Durgi	Darmavaram	0	283
13	Durgi	Poleypally	0	187
14	Ipuru	Agnigundala	0	182
15	Karampudi	Naramalapadu	0	342
16	Krosuru	Krosur / Peesapadu	158	0
17	Macherla	Koppunur	0	108
18	Nakerikallu	Chejerla / Nagank	123	0
19	Nakerikallu	Narsingapadu	135	0
20	Nakerikallu	Tripurapuram	107	0
21	Rajupalem	Kubadpuram	163	0
22	Rentachintala	Durgi / Darivemula	0	123
23	Tadepalli	Tadepalli	151	0
24	Thulluru	Vaddamenu / Thulluru	134	0
25	Veldurthi	Uppalapadu	0	199

➢ **Status of Ground Water Development**

An abstract of the ground water structures existing in the Guntur district is given in **Table-3.2.3.**

TABLE-3.2.3
FORMATION WISE DETAILS OF DIFFERENT GROUND WATER ABSTRACTION STRUCTURES AND THEIR YIELDS IN THE DISTRICT

Sr. No.	Formation	Rock /Aquifer	Type of well	Depth range	Yield ranga	Lifting device
1	Archaean Group of rocks	Granite Gneisses, Schists Charnokites	Dug wells	12-20 m	10-8- m^3 /day(200 m^3 / day)	Centrifugal pumps
			Borewlls	30-40 m	1.5 to 5 lps	Submersible Pump
2	Cuddapah Formation	Phyllites, Quartzites, limestone	Dug wells	3-25 m	20-80 m^3/ day	Centrifugal pumps
			Borewells	30-60 m	0.5-105 lps	Submersible Pump
3	Kurnjool Formation	Shales, Limestone Quartzites	Dug wells	4-15 m	10-70 m^3/ day	Centrifugal pumps
			Borewells	25-55 m	0.5-1.5 lps	Submersible Pump
4	Gondwana Group of Formation	Sandstones	Dug wells	5.5-18.5 m	12-90 m^3/ day	Centrifugal pumps
			Tube wells	40-75 m	28-1300 lpm	Submersible Pump
5	Alluvium	Sand, silt, Kankar, clay	Dug wells	2-12 m	200-320 m^3/ day	Centrifugal pumps
			Shallow Tube wells, filter points	25-75 m	25-75 m^3/ hr	Centrifugal pumps & submersible Pump

Most of the Guntur district is traversed by good network of irrigation canals of the Nagarjunasagar Right Bank Canal Command Area (NSRCCA), Krishna Western Delta (KWD) Canal System and Guntur Channels Scheme. Only the up land areas of the district are not covered in any of the irrigation scheme. About 77.61% of the total irrigated area in the district is through canal network and 2.94% through lift irrigation. 15.72% area is irrigated through Tubewells and filter points and the rest 3.72% area is irrigated through Tanks and other sources. The area irrigated under different sources in the district is given in **Table-3.2.4** and the Mandal wise and source wise details of irrigated area is given in **Table-3.2.5**. Wells and filter points irrigate 7.98% and the rest of the area accounts for 3.72 % are irrigated by tanks and other sources.

TABLE-3.2.4
AREA IRRIGATED BY DIFFERENT SOURCE DURING 2002-03

Sr. No.	Source of Irrigation	Kharif	Rabi	Total (Gross)
1	Canals	203466	1021	2,04,487
2	Tanks	2287	116	2,403
3	Bore Wells/Tube Wells Filter-Point wells	41339	8795	50,134
4	Dug Wells & Other sources	5808	1403	7,211

TABLE-3.2.5
MANDAL-WISE SOURCE-WISE AREA IRRIGATED 2002-03

Sr. No	Mandal	Net Area Irrigated By							Area Irrigated More than once
		Canals	Tanks	Tubewells and filter points	Other wells	Lift Irrigation	Other sources	Total	
1	Macherla	2437	45	3074	168	148	0	5872	522
2	Rentachintala	3898	0	251	2	0	0	4151	20
3	Gurazala	4637	0	0	0	0	0	4637	64
4	Dachepalli	2639	0	818	45	342	0	3844	73
5	Machavaram	137	85	189	0	6	219	636	17
6	Bellamkonda	258	0	326	147	138	40	909	32
7	Atchempet	303	84	0	128	58	0	573	0
8	Krosuru	120	246	0	44	184	0	594	0
9	Amaravathi	3	63	0	463	215	106	850	0
10	Thullur	40	55	3209	0	973	51	4328	293
11	Tadepalli	140	0	1468	141	944	0	2693	1292
12	Mangalagiri	2161	0	1962	187	1600	0	5910	1556
13	Tadikonda	118	0	182	0	0	0	300	144
14	Pedakurapadu	577	0	0	855	0	0	1432	0
15	Sattenapalli	3363	0	1	1004	200	0	4568	0
16	Rajupalem	1646	89	16	230	51	0	2032	36
17	Piduguralla	3987	50	0	0	0	0	4037	0
18	Karempudi	2983	0	701	0	0	0	3684	296
19	Durgi	333	20	6946	0	0	0	7299	1193
20	Veldurthy	0	0	4963	0	0	0	4963	73
21	Bollaplli	0	40	3549	211	0	60	3860	0
22	Nakarikallu	3888	220	505	279	0	0	4892	221
23	Muppalla	2075	32	0	96	27	0	2230	0
24	Phirangipuram	1919	0	72	11	0	0	2002	0
25	Medikondur	2685	0	2	89	0	17	2793	0
26	Guntur	459	0	103	43	0	0	605	0
27	Pedakakani	5633	37	121	51	168	8	6018	127
28	Duggirala	7713	0	2840	0	0	0	10553	834
29	Kollipara	6269	0	2531	0	0	0	8800	882
30	Kolluru	5034	0	2893	0	36	0	7963	656
31	Vemuru	8430	0	274	0	8	0	8712	417
32	Tenali	8634	0	972	0	0	0	9606	273
33	Tsundur	8270	0	779	0	0	0	9049	79
34	Chebrolu	6472	0	13	302	281	0	7068	340
35	Vatticherukur	6085	0	0	0	0	0	6085	0
36	Prathipadu	509	0	35	4	0	0	548	0
37	Edlapadu	45	0	0	3	0	0	48	0
38	Nadendla	293	0	0	309	251	0	853	0
39	Narasaraopet	2515	40	0	64	177	0	2796	65
40	Rompicherla	3435	102	0	149	0	295	3981	66
41	Ipur	412	428	89	231	10	145	1315	21
42	Savalyapuram	229	119	18	39	135	36	576	0
43	Vinukonda	0	408	25	182	422	0	1037	0
44	Nuzendla	0	171	33	163	184	0	551	0
45	Chilakaluripet	0	0	0	78	0	252	330	0
46	Pedanandipadu	98	0	0	0	20	0	118	0
47	Kakumanu	9915	0	0	0	0	0	9915	0
48	Ponnur	13143	0	885	0	85	0	14113	294
49	Amrthalur	10433	0	284	0	0	0	10717	22
50	Cherulupalli	6649	0	13	151	0	0	6813	123
51	Bhattiprolu	6224	0	1255	0	0	0	7479	116
52	Repalle	9734	0	26	0	0	0	9760	43
53	Nagaram	9926	0	74	0	308	0	10308	75
54	Nizampatnam	4028	0	1	0	555	0	4584	12
55	P.V.Palem	4641	0	0	32	0	0	4673	3
56	Karlapalem	5430	0	0	76	235	0	5741	93
57	Bapatla	13840	0	0	288	0	0	14128	152

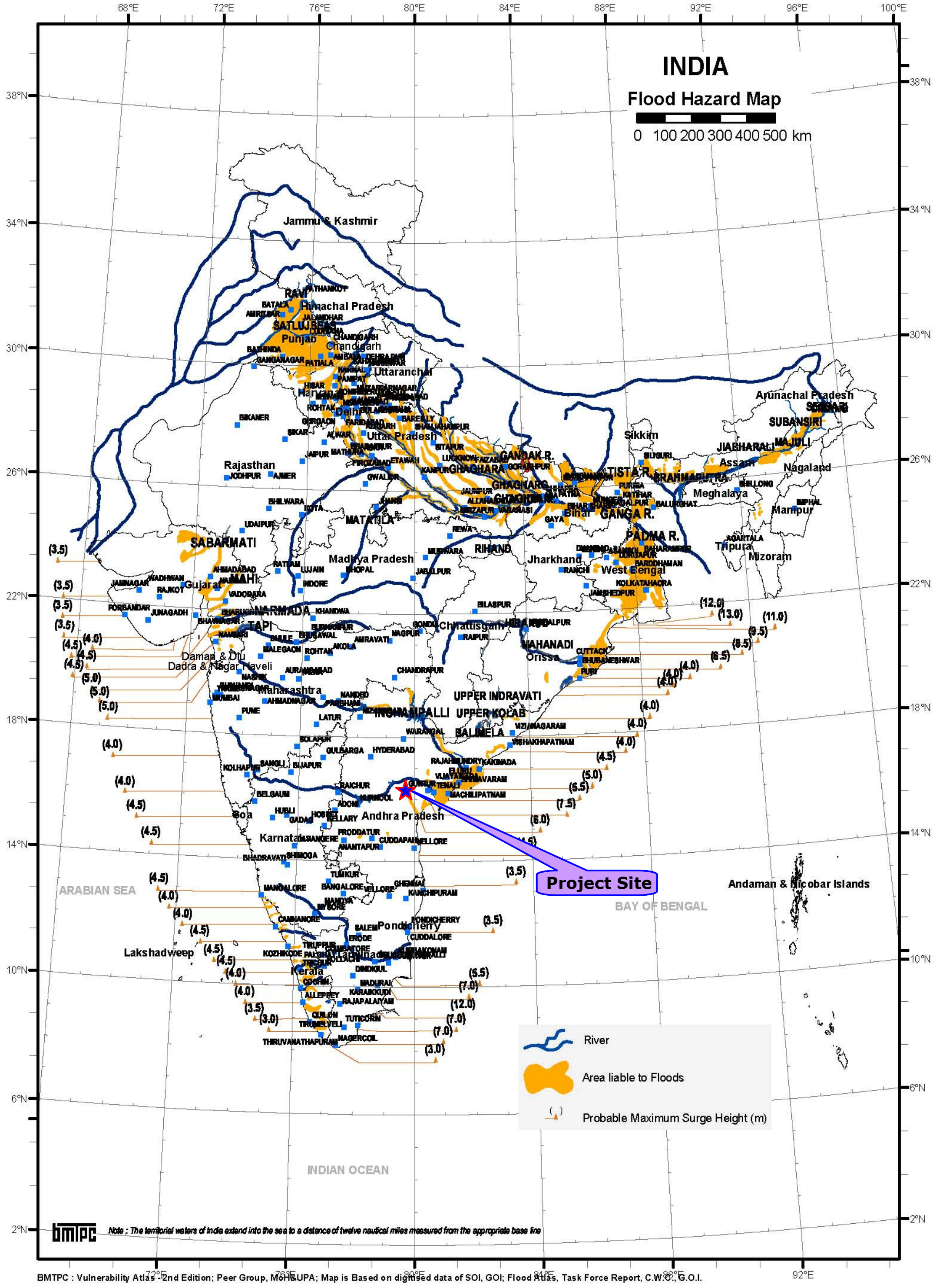


FIGURE-3.2.3
FLOOD ZONE MAPPING

3.3 Land Use Studies

Studies on land use aspects of eco-system play important roles for identifying sensitive issues, if any, and taking appropriate actions for maintaining the ecological balance in the development of the region.

3.3.1 Objectives

The objectives of land use studies are:

- To determine the present land use pattern;
- To analyze the impacts on land use due to plant activities in the study area; and
- To give recommendations for optimizing the future land use pattern vis-a-vis growth of plant activities in the study area and its associated impacts.

3.3.2 Methodology

For the study of land use, literature review of various secondary sources such as District Census Handbooks, regional maps regarding topography, zoning settlement, industry, forest etc., were taken. The data was collected from various sources like District Census Handbook, Revenue records, state and central government offices and Survey of India (SOI) Toposheets and also through primary field surveys.

3.3.3 Land use Based on Secondary Data

Based on the census report, 10-km radial distance around this Plant Centre has been considered in the study. These areas were studied in detail to get the idea of land use pattern in the study area. The land use pattern of the study area is given in **Table-3.3.1** and in detail presented in **Annexure-VI.**

TABLE-3.3.1
LAND USE PATTERN IN THE STUDY AREA

Sr.No	Particulars of Landuse	0-3 km	3-7 km	7-10 km	0-10 km	Area %
1	ForestLand (Ha)	146.23	4251.82	4135.02	35129.2	24.29
2	Land under Cultivation (Ha)					
	a) IrrigationLand (Ha)	1658.98	1358.19	2867.47	5884.64	16.75
	b) Un Irrigated Land (Ha)	255.55	3702.25	7214.39	11172.19	31.80
3	Cultivable WasteLand (Ha)	79.91	867.85	2102	3049.76	8.68
4	Area not Available for Cultivation (Ha)	1452.33	2006.57	3030.64	6489.54	18.47
	Total Area (Ha)	**3593.00**	**12186.68**	**19349.52**	**35129.2**	**100.00**

Source: District Census Hand Books – 2001

- ***Forest***

The revenue forestland under the study area consists 100 ha (24.29 %) of the total geographic area.

- ***Land under Cultivation***

The percentage of un-irrigated land is about31.80 % of the total land in the study area.

- ***Cultivable Waste***

This land includes that land, which was cultivated sometime back and left vacant during the past 5 years in succession. Such lands may either be fallows or covered with shrubs, which are not put to any use. Lands under thatching grass, bamboo bushes, other grooves useful for fuel etc., and all grazing lands and village common lands are also included in this category. The study area comprises about 8.68% cultivable wastelands.

- ***Land not available for Cultivation***

The land not available for cultivation is 18.47 % of the total study area.

3.3.4 Land Use Based on Satellite Imagery

Present land use based on remote sensing satellite imageries were collected and interpreted for the 10 km radius study area for analyzing the land use pattern of the study area. Based on the satellite data, land use/ land cover maps have been prepared.

- ***Land use/Land Cover Classification System***

The present land use / land cover maps were prepared based on the classification system of National standards. For explanation for each of the land use category the details as given in **Table-3.3.2** are considered.

TABLE-3.3.2
LAND USE/LAND COVER CLASSIFICATION SYSTEM

Sr. No.	Level-1	Level-2
1	Built-up Land	Town/cities
		Villages
		Institution/Industry/Godown etc
		Plotted Area/Layout
2	Agriculture Land	Crop Land
		Plantations
		Fallow
3	Forest	Evergreen/Semi evergreen
		Deciduous
		Forest Plantation
4	Wastelands	Rocky/Stony Waste
		Land with /without scrubs
		Saline/sandy & Marshy/swampy
5	Water Bodies	River/Stream
		Lake/Reservoir/Tanks
6	Others	Orchard/Other Plantation
		Shifting cultivation
		Salt Pans, Snow covered/Glacial
		Barren/Vacant Land

➢ ***Data Requirements***

IRS-P6 Geo-Coded FCC of LISS-III was acquired for 28^{th} January, 2008 and was used for the mapping and interpretation. Besides, other collateral data as available in the form of maps, charts, census records, other reports and especially topographical survey of India maps are used. In addition to this, ground truth survey was also conducted to verify and confirm the ground features.

➢ ***Methodology***

The methodology adopted for preparation of landuse/ landcover thematic map is monoscopic visual interpretation of geocoded scenes of IRS-P6 satellite LISS-III and field observations are taken. The various steps involved in the study are preparatory field work, field survey and post field work.

➢ ***Pre-field Interpretation of Satellite Data***

The False Color Composite (FCC) of IRS-P6 satellite data are used for pre-field interpretation work. Taking the help of topo sheets, geology, geo-morphology and by using the image elements the features are identified and delineated the boundaries roughly. Each feature is identified on image by their image elements like tone, texture, colour, shape, size, pattern and association. A tentative legend in terms of land cover and land use, physiography and erosion was formulated. The sample areas for field check are selected covering all the physiography, land use / land cover feature cum image characteristics.

➢ **Software's used**

a) ERDAS Imagine for image processing/rectification/geocoding;
b) AutoCAD for data preparation after visual interpretation of the image; and
c) Arc View for Image/Landuse presentation.

➢ ***Ground Truth Collection***

Both toposheets and imagery were taken for field verification and a transverse plan using existing road network was made to cover as many representative sample areas as possible to observe the broad landuse features and to adjust the sample areas according to field conditions. Detailed field observations and investigations were carried out and noted the landuse features on the imagery.

➢ ***Post Field Work***

The base maps of the study area were prepared, with the help of Survey of India Toposheet. Preliminary interpreted land use and the land cover features boundaries from IRS-P6 False Colour Composite were modified in light of field information and the final thematic details were transferred onto the base maps. The final interpreted and classified thematic map was catrographed. The cartographic map was coloured with standard colour coding and detailed description of feature with standard symbols. All the classes noted and marked by the standard legend on the map.

- ***Final Output***

The final output would be the landuse/land cover map and numerals were given different colour code for each category as shown in map. Area estimation of all features of Land use/Land cover categories was noted. The thematic map and land use pattern is shown in **Figure-3.3.1.** The details of the land use in 10-km radial study area are given in **Table-3.3.3.**

TABLE 3.3.3
LAND USE BREAK UP OF THE STUDY AREA

Sr. No.	Land Use	Area (Hectares)	Percentage (%)
Built-up Land			
1	Settlements	609	1.60
2	Industry/Institutional Area	575	1.51
Forest			
3	Dry Deciduous Forest	2622	6.89
4	Degraded Scrub Land	3905	10.27
5	Forest Blank	548	1.44
Agricultural Land			
6	Plantation	11	0.03
7	Double Crop/Irrigated Land	7800	20.51
8	Other Agriculture Land	13201	34.71
9	Fallow Land	128	0.34
Waste Land			
10	Land with scrub	1865	4.90
11	Land without scrub	3277	8.62
12	Rocky / Stony/Barren land	1325	3.49
13	Quary/Mining land	587	1.54
Water Body			
14	Stream/River/Tank/Reservoir	1103	2.90
15	Dry River	474	1.25
Total		**38029**	**100**

- ***Observations***

The land use pattern of the study area indicates no forest land in the study area. The land under agriculture is about 55.59%.

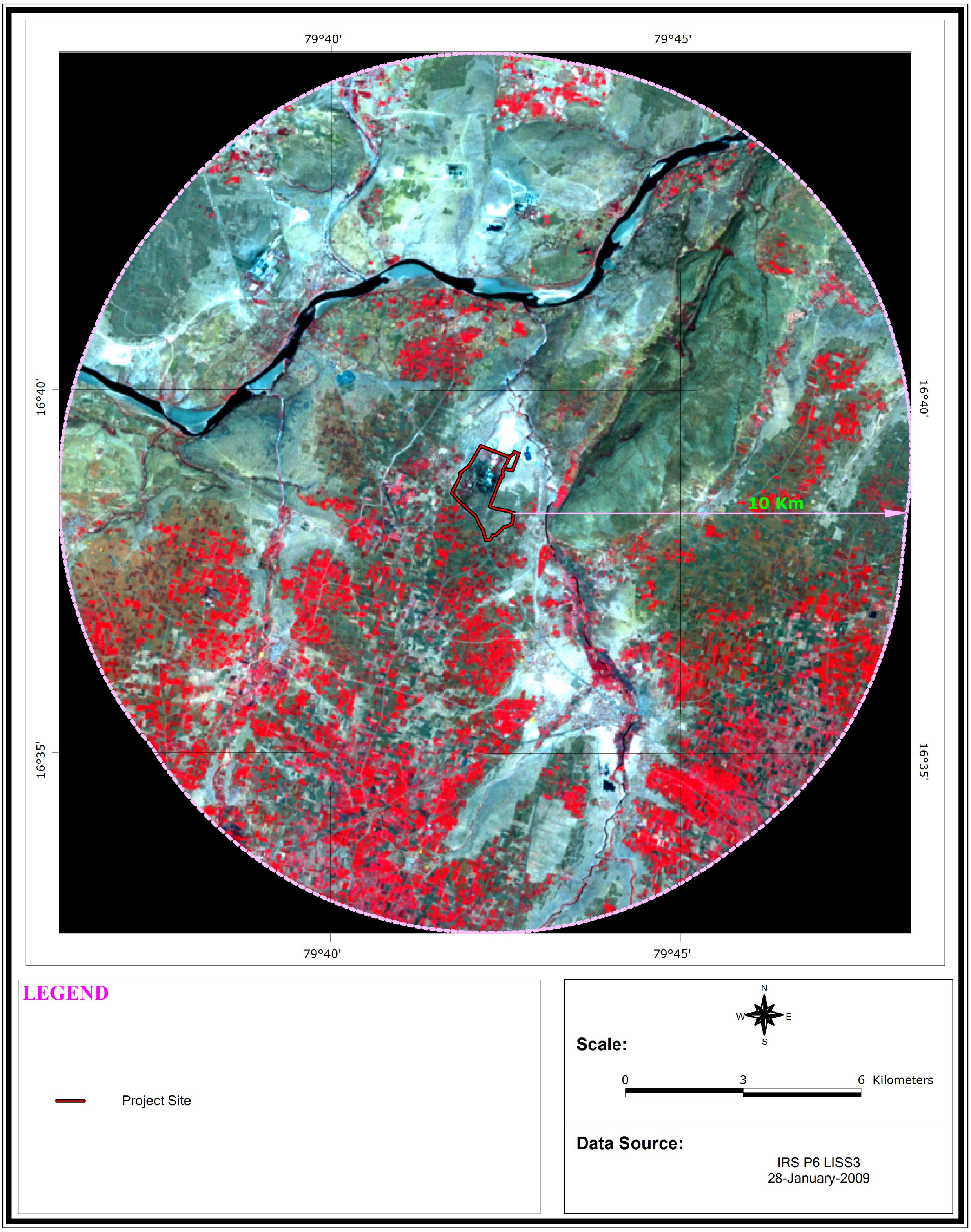


FIGURE-3.3.1
SATELLITE IMAGERY

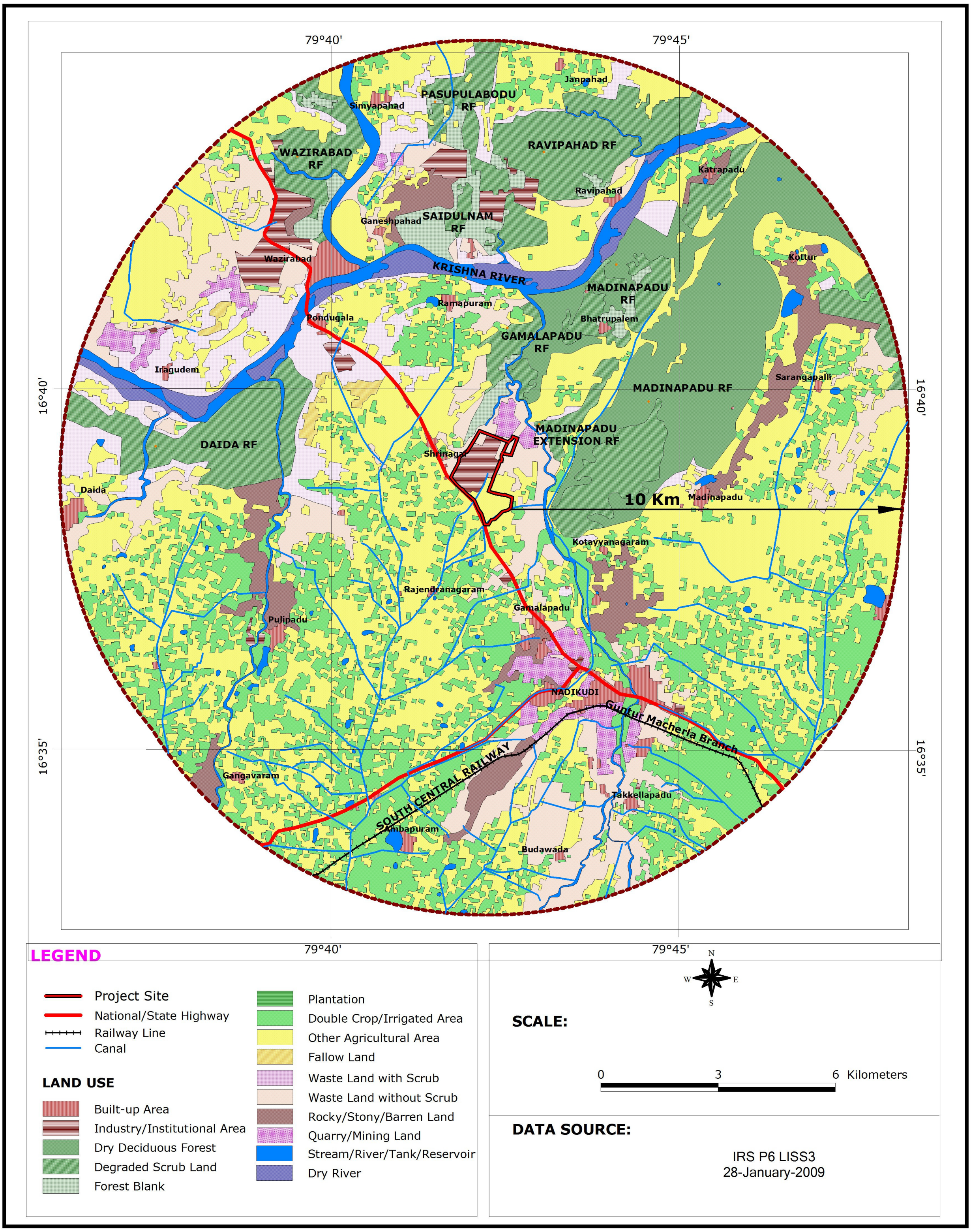


FIGURE-3.3.2
LAND USE MAP

3.4 Soil Characteristics

It is essential to determine the potential of soil in the area and identify the impacts of urbanization and industrialization on soil quality. Accordingly, a study of assessment of the soil quality has been carried out.

3.4.1 Data Generation

For studying soil profile of the region, sampling locations were selected to assess the existing soil conditions in and around the plant area representing various land use conditions. The physical, chemical and heavy metal concentrations were determined. The samples were collected by ramming a core-cutter into the soil upto a depth of 90 cm. A total of eight samples within the study area were collected and analysed. The details of the soil sampling locations are given in **Table-3.4.1** and are shown in **Figure-3.4.1**. The sampling has been carried out once in the study period.

TABLE-3.4.1
DETAILS OF SOIL SAMPLING LOCATIONS

Code	Location	Arial Distance (km) with respect to plant Centre	Bearing w.r.t Plant
S1	Plant Site	--	--
S2	Kotayya Nagaram	2.5	SE
S3	Gamalapadu	2.7	SSE
S4	Madinapadu	4.9	E
S5	Shrinagar	0.8	NW
S6	Ramapuram	3.4	N
S7	Pondugala	4.9	NW
S8	Srinivasapuram	2.9	WSW

The soil quality at all the locations during the study period is given in **Table-3.4.2**. The results are compared with standard classification given in **Table-3.4.3**.

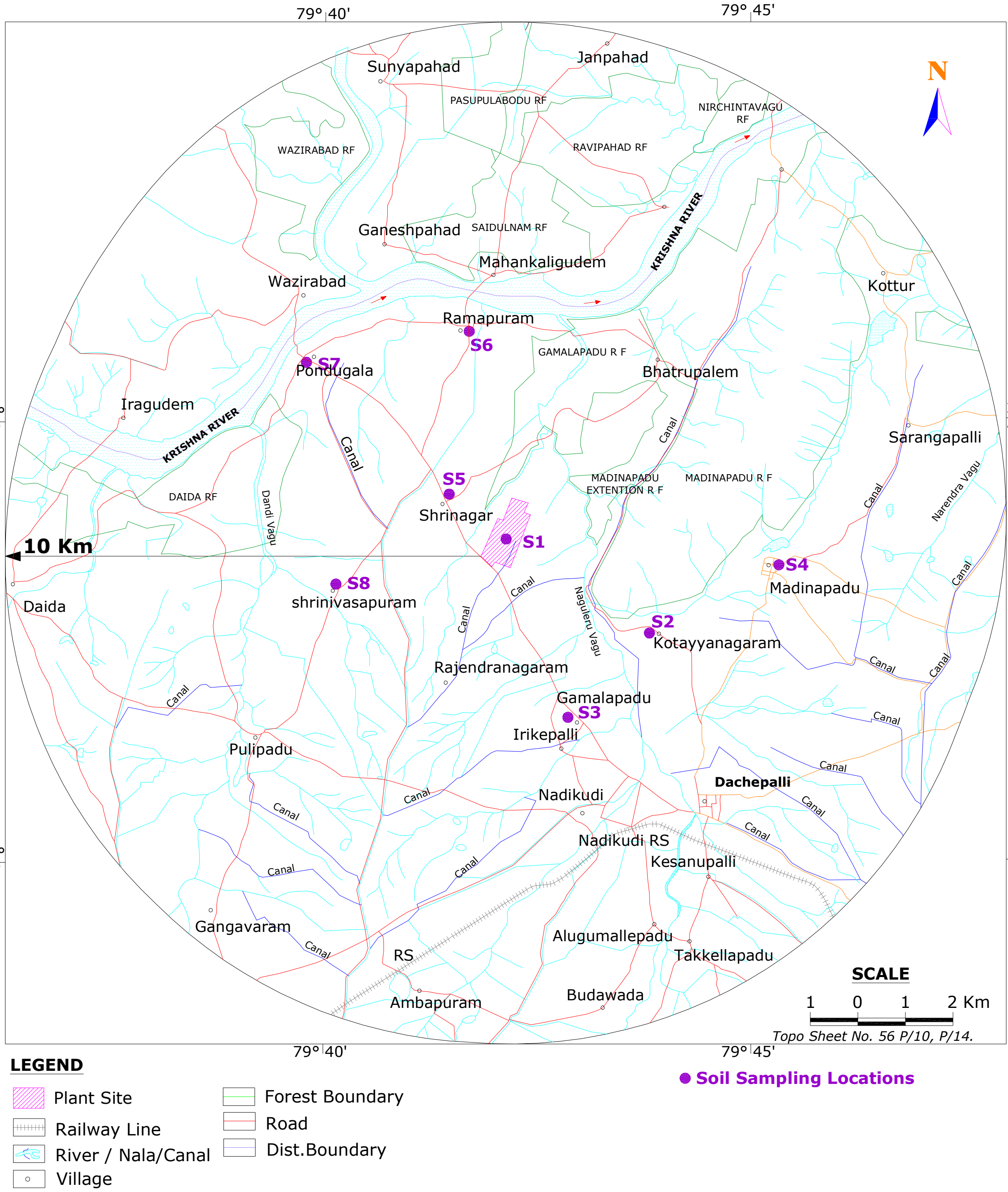


FIGURE-3.4.1
SOIL SAMPLING LOCATIONS

TABLE-3.4.2
SOIL ANALYSIS RESULTS

Parameters	S1	S2	S3	S4	S5	S6	S7	S8
pH (1:2.5 soil water extract)	7.9	7.8	7.8	8.1	8.2	8.1	7.9	8.2
Conductivity (µs/cm) (1:5 soil water extract)	466	263	226	245	338	344	305	326
Texture	Sandy clay	Sandy clay	Sandy clay	Sandy clay	Sandy clay	Sandy clay	Sandy clay	Sandy clay
Sand (%)	50	52	48	50	50	45	48	44
Silt (%)	10	12	16	14	16	15	14	16
Clay (%)	40	36	36	36	37	40	38	40
Bulk Density (gm/cc)	1.1	1.2	1.2	1.1	1.2	1.2	1.2	1.1
Exchangeable Calcium as Ca (mg/kg)	17397	11764	16916	16892	16180	10089	14286	16414
Exchangeable Magnesium as Mg (mg/kg)	2463	399	1253	1420	1223	1379	1081	1544
Exchangeable Sodium as Na (mg/kg)	1520	154	342	562	1526	616	204	194
Available Potassium as K (kg/ha)	860	676	838	1196	1060	550	1258	472
Available Phosphorus (kg/ha)	82	48	56	68	52	56	62	48
Available Nitrogen as N (kg/ha)	112	74	92	102	94	71	82	80
Organic Matter (%)	1.06	0.7	0.95	0.88	0.97	0.74	0.77	0.69
Organic Carbon (%)	0.61	0.4	0.55	0.51	0.56	0.43	0.45	0.4
Water soluble Chlorides as Cl (mg/kg)	940	656	373	563	574	689	622	648
Water soluble Sulphates as SO_4 (mg/kg)	100	88	88	89	83	86	69	90
Sodium Absorption Ratio	1.07	0.12	0.26	0.42	1.4	0.58	0.17	0.15
Aluminium	5.24	1.48	3.6	3.8	4.76	2.41	4.08	5.05
Total Iron (mg/kg)	2.36	2.72	1.98	2.01	3.09	2.65	2.82	3.11
Manganese (mg/kg)	520	502	290	360	3359	435	420	606
Boron (mg/kg)	37	40	42	62	48	64	32	44
Zinc (mg/kg)	62	39	68	69	60	90	48	52

TABLE-3.4.3
STANDARD SOIL CLASSIFICATION

Sr. No.	Soil Test	Classification
1	pH	<4.5 Extremely acidic 4.51- 5.00 Very strongly acidic 5.00 - 5.50 slightly acidic 5.51-6.0 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 Neutral 7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline 9.01 very strongly alkaline
2	Salinity Electrical Conductivity (mmhos/cm) (1 ppm = 640 µmhos/cm)	Upto 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops (sensitive to salts)
3	Organic Carbon	Upto 0.2: very less 0.21-0.4: less 0.41-0.5 medium, 0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient
4	Nitrogen (Kg/ha)	Upto 50 very less 51-100 less 101-150 good 151-300 Better >300 sufficient

Sr. No.	Soil Test	Classification
5	Phosphorus (Kg/ha)	Upto 15 very less 16-30 less 31-50 medium, 51-65 on an average sufficient 66-80 sufficient >80 more than sufficient
6	Potash (Kg/ha)	0 -120 very less 120-180 less 181-240 medium 241-300 average 301-360 better >360 more than sufficient

Source : Hand Book of Agriculture, ICAR

3.4.2 Baseline Soil Status

It has been observed that the texture of soil is mostly sandy clay in the study area. The common color of the soil ranged from light brown to black. It has been observed that the pH of the soil quality ranged from 7.8 – 8.2 indicating that the soil is usually moderately alkaline in nature. The pH values indicate that the soil is moderately alkaline in nature.

The Electrical Conductivity was observed to be in the range of 226 - 466 μS/cm, with the maximum (466 μS/cm) observed at S1 and with the minimum (226 μS/cm) observed at S3.

The Nitrogen values ranged between 71 – 112 Kg/ha. The maximum value (112 kg/ha) was found at S1 indicating that the soil is having good quantity of Nitrogen. The minimum value (71 kg/ha) was observed at S6 indicating that the soil has less quantity of Nitrogen.

The Phosphorus values range between 48 – 82 Kg/ha. The maximum value (82 kg/ha) was found at S1 indicating that the soil has more than sufficient quantity of Phosphorus. The minimum value (48 Kg/ha) was observed at S2 & S8 indicating that the soil has medium quantity of Phosphorus.

The Potassium values range between 472 – 1258 kg/ha. The maximum value (1258 kg/ha) was found at S4 indicating that the soil has more than sufficient quantity of Potassium. The minimum value (472 Kg/ha) was observed at S8 indicating that the soil has more than sufficient quantity of Potassium.

3.5 Meteorology

The meteorological data recorded during the monitoring period is very useful for proper interpretation of the baseline information as well as for input prediction models for air quality dispersion. Historical data on meteorological parameters will also play an important role in identifying the general meteorological regime of the region.

The year may broadly be divided into four seasons:

- Winter season : December to February
- Pre-monsoon season : March to May
- Monsoon season : June to September
- Post-monsoon season : October to November

On-site monitoring was undertaken for various meteorological variables in order to generate the site-specific data. Data was collected at site every hour continuously from 1st March 2012 to 31st May 2012 and four locations during June and July. The generated data then compared with the meteorological data generated by nearest India Meteorological Department (IMD) station located at Rentachintala. The available meteorological data of IMD, Rentachintala station has been collected and analyzed.

3.5.1 Methodology

Site specific data covering micro-meteorological parameters were recorded on hourly basis during the study period and comprises of parameters like wind speed, wind direction (from 0 to 360 degrees), temperature, relative humidity, atmospheric pressure, rainfall and cloud cover. The minimum, maximum and average values for all the parameters except wind speed and direction are presented in **Table-3.5.1**.

TABLE-3.5.1
SUMMARY OF THE METEOROLOGICAL DATA GENERATED AT SITE

Month	Temperature (^oC)		Relative Humidity (%)		Rainfall (mm)	Atmospheric Pressure (mb)	
	Min	Max	Min	Max		Min	Max
Pre Monsoon Season 2012							
March	21.5	36.1	41.8	58.3	0	996.3	1008.7
April	24.8	38.6	36.4	53.7	5.4	993.2	1006.3
May	29.1	42.5	39.7	57.6	12.3	991.5	1001.4
Range	***21.5-42.5***		***36.4-58.3***		***17.7***	***991.5-1008.7***	

- ***Wind Speed/ Directions***

The windrose for the study period representing Pre-Monsoon and a part of Pre-monsoon season is shown in **Figure-3.5.1** and presented in **Table-3.5.2**.

TABLE-3.5.2
SUMMARY OF WIND PATTERN AT THE STUDY AREA

Season	Pre-Monsoon season 2012
First Predominant Wind Direction	SE
Second Predominant Wind Direction	S
Predominant Wind Speeds (kmph)	1.3 to 5.0 5.1to 11.0 11.1 to 19.0
Calm conditions (%)	%

Note: Figures in parenthesis indicates percentage of time wind blows

- ***Pre-monsoon Season, 2012***

Predominant winds from SE direction were observed for 15.7% of the total time. In the S direction winds were observed for 9.9% of the total time. Whereas, in W direction the winds were observed for 8.9% of the total time. In other directions, the percentage frequencies observed were SSE (7.4%), E (6.8%), ESE (5.4%), NNE (4.4%), SW (4.2%), N (3.5%), NNW (2.5%), WSW (2.5%), SSW (2.0%), ve (2.0%), WNW (1.5%), NW (0.7%) and ENE (0.5%). Calm conditions prevailed for 22.1% of the time.

3.5.2 Secondary Data collected from IMD- Rentachintala

Secondary data from IMD-Rentachintala has been collected for pressure, temperature, relative humidity, rainfall, evaporation, wind speed and direction. The data at IMD is usually measured twice a day viz., at 0830 and 1730 hr.

3.5.2.1 Meteorological Data

The meteorological data is collected from the IMD-Rentachintala (about 30 km from the proposed project site), which is the nearest operating IMD station to the proposed project site. The data collected from IMD includes wind speed, wind direction (recorded in sixteen directions), temperature, relative humidity, atmospheric pressure and rainfall over a period of 10 years. The monthly maximum, minimum and average values are collected for all the parameters except wind speed and direction. The collected data is tabulated in **Table-3.5.3**.

3.5.2.2 Wind Speed/Direction

Generally, light to moderate winds prevail throughout the year. Winds were light and moderate particularly during the morning hours. While during the afternoon hours the winds were stronger. The wind roses for the study period representing pre-monsoon, monsoon, post-monsoon and winter seasons along with annual windroses are shown in **Figure-3.5.2** to **Figure-3.5.6** and presented in **Table-3.5.4**.

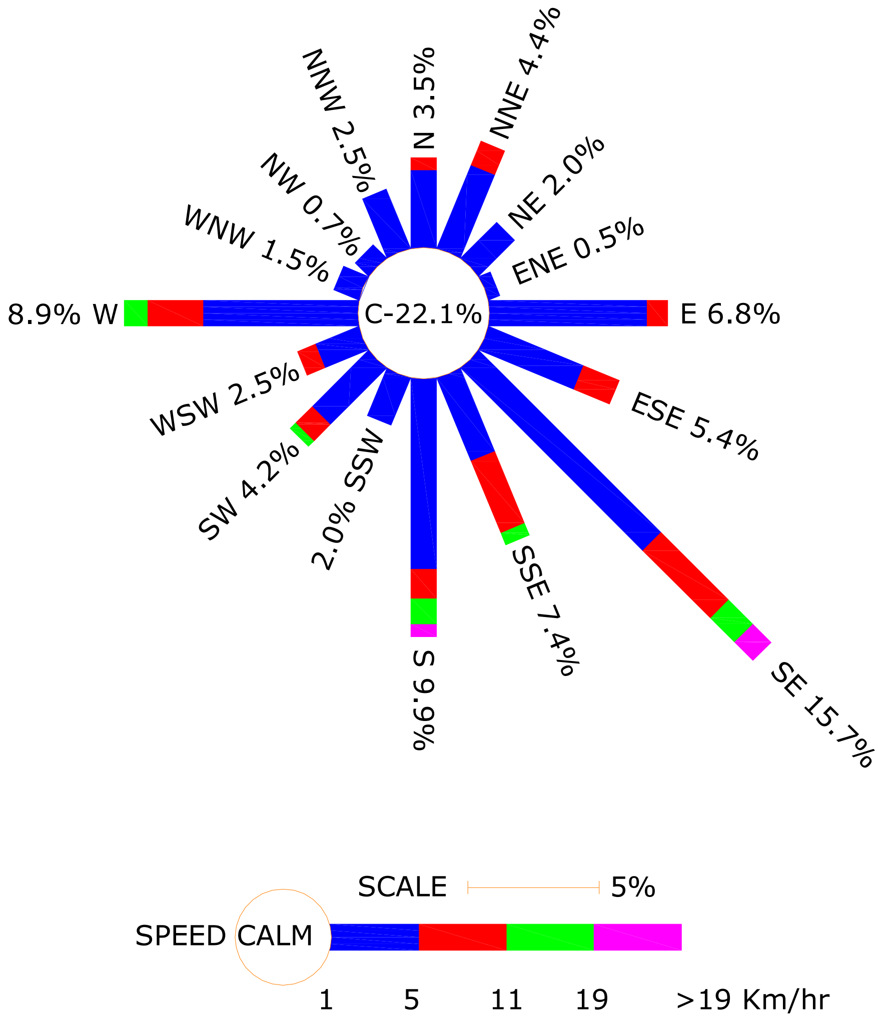


FIGURE-3.5.1
SITE SPECIFIC WINDROSE- PREMONSOON SEASON

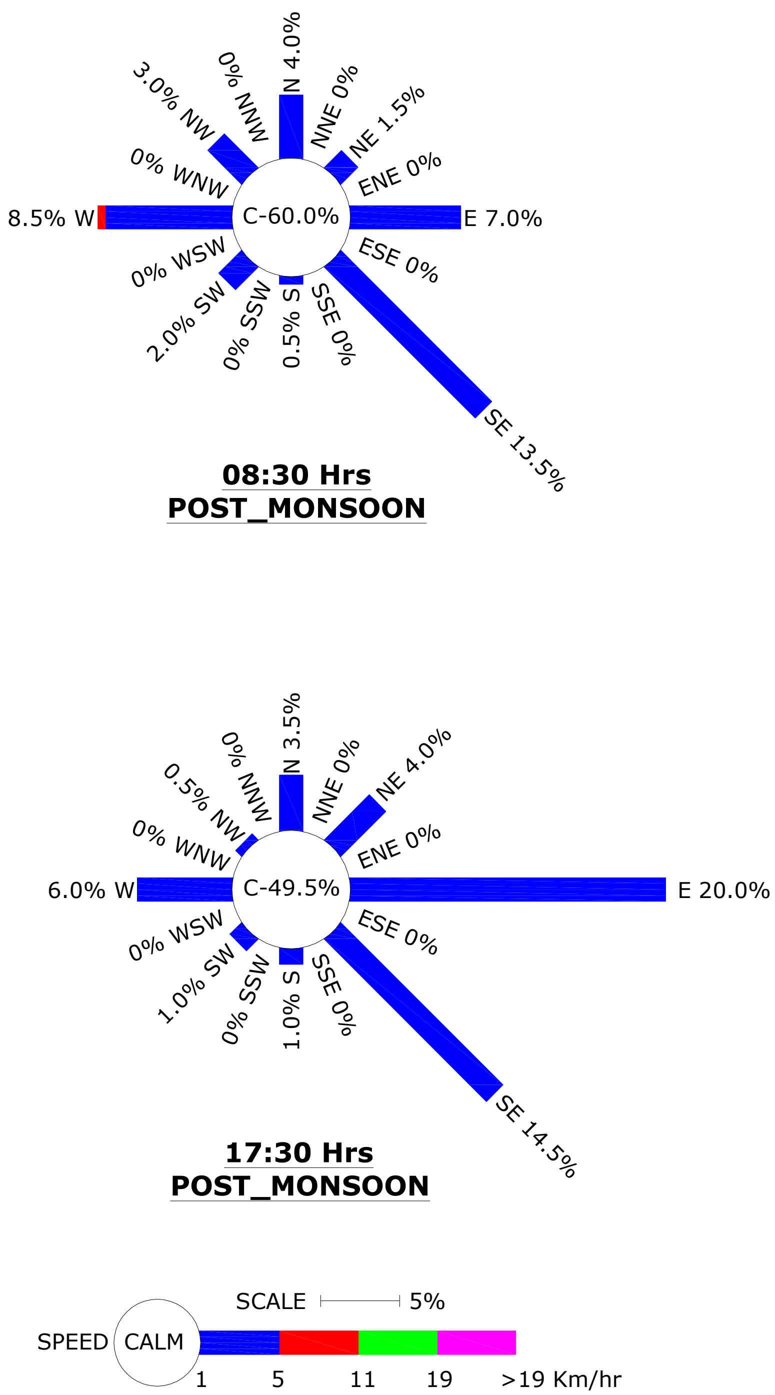
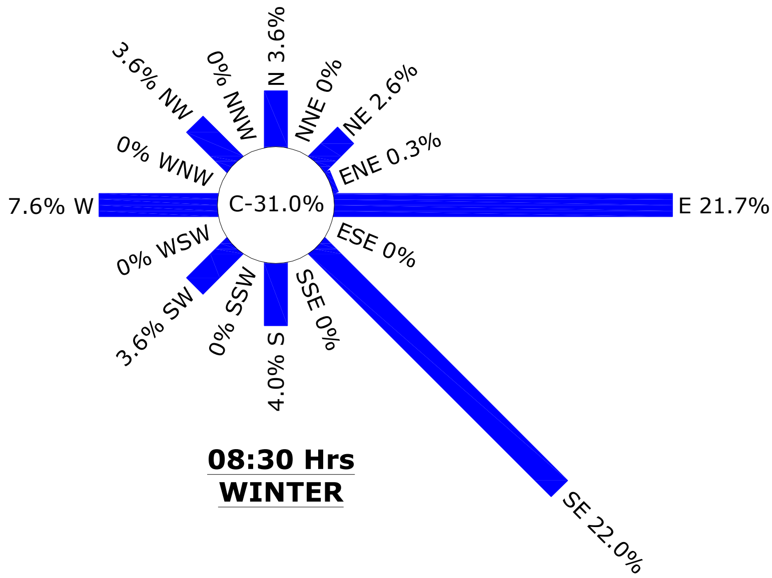


FIGURE-3.5.2
POST MONSOON WINDROSE - IMD RENTACHINTALA



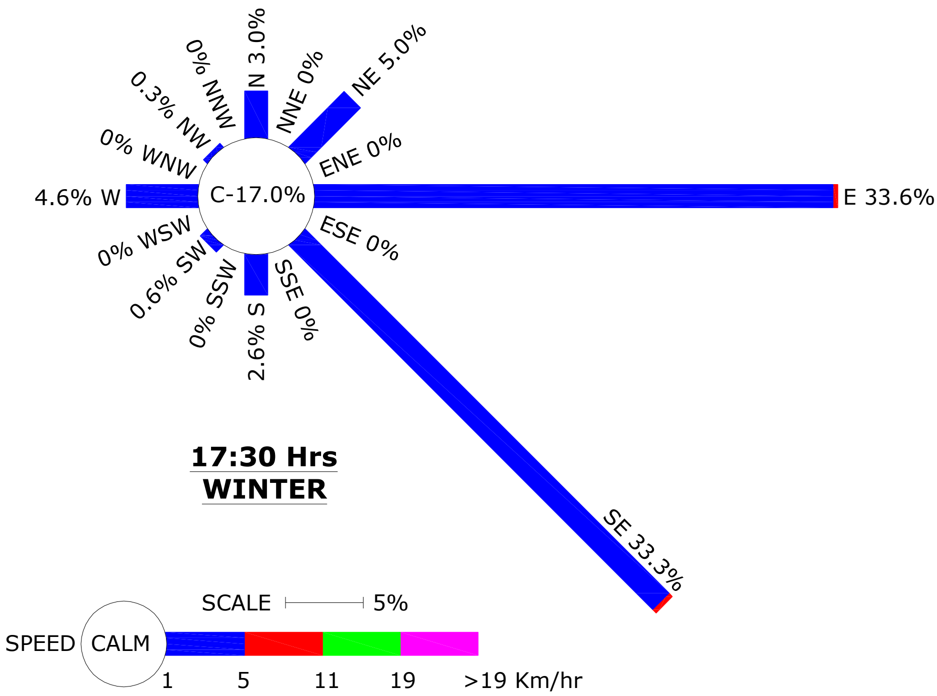


FIGURE-3.5.3
WINTER WINDROSES – IMD RENTACHINTALA

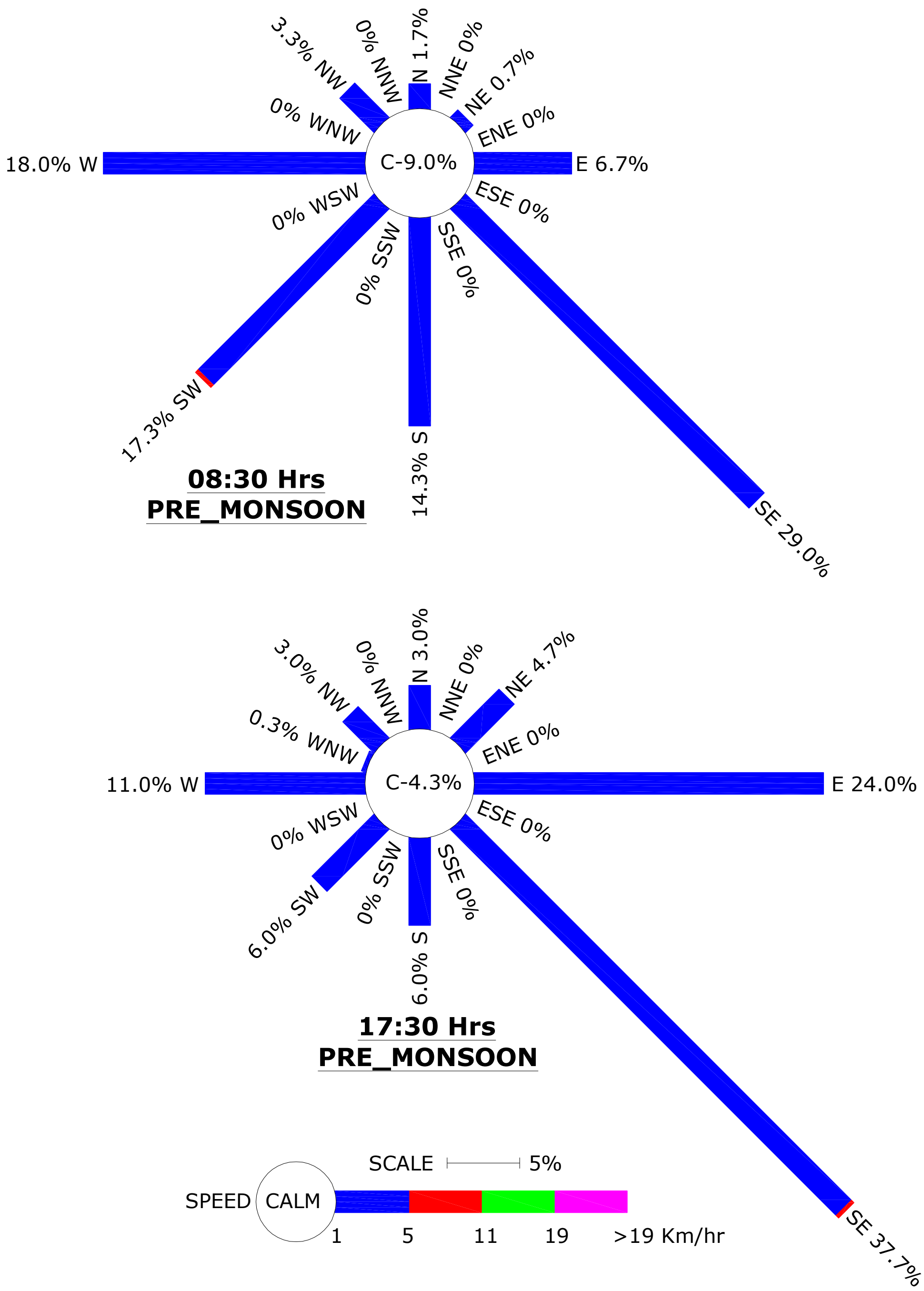
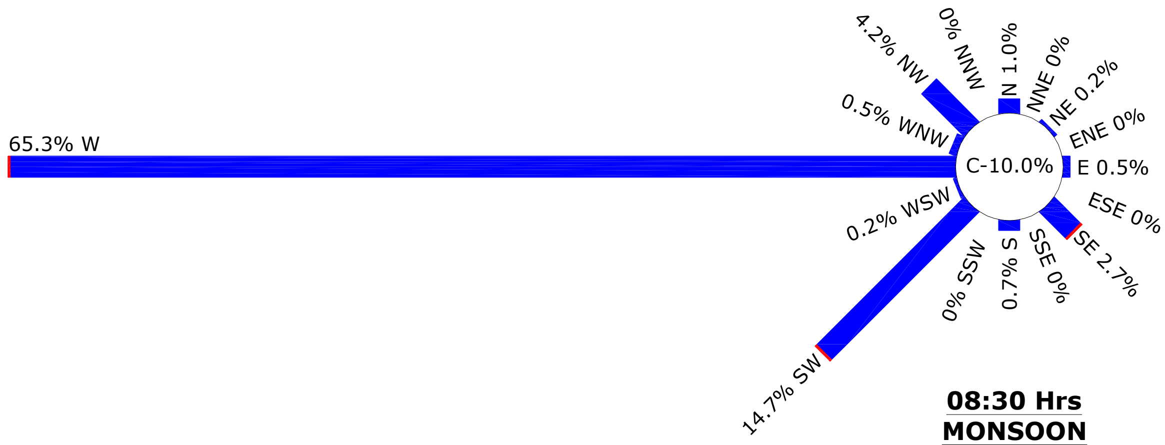
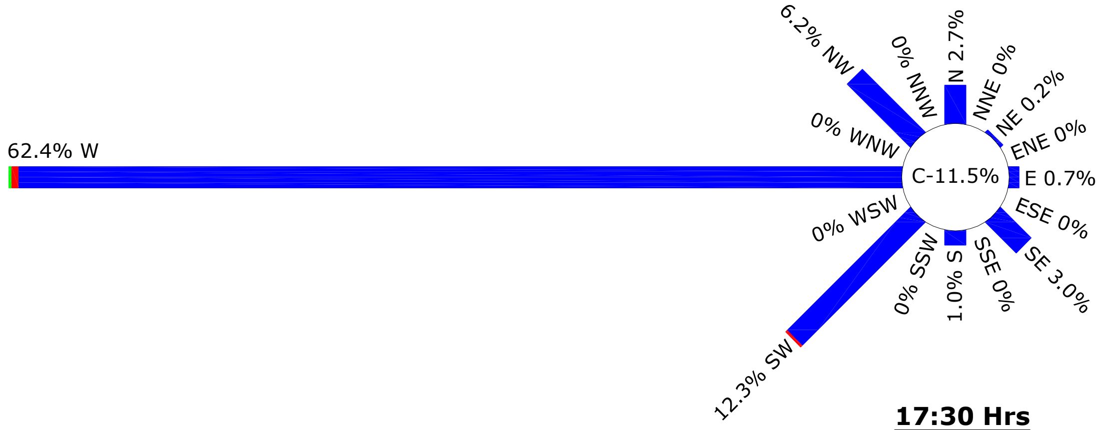


FIGURE-3.5.4
PRE-MONSOON WINDROSES – IMD RENTACHINTALA



08:30 Hrs
MONSOON



17:30 Hrs
MONSOON

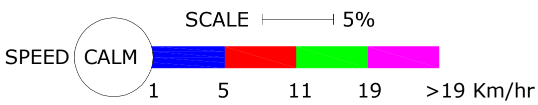


FIGURE-3.5.5
MONSOON WINDROSES – IMD RENTACHINTALA

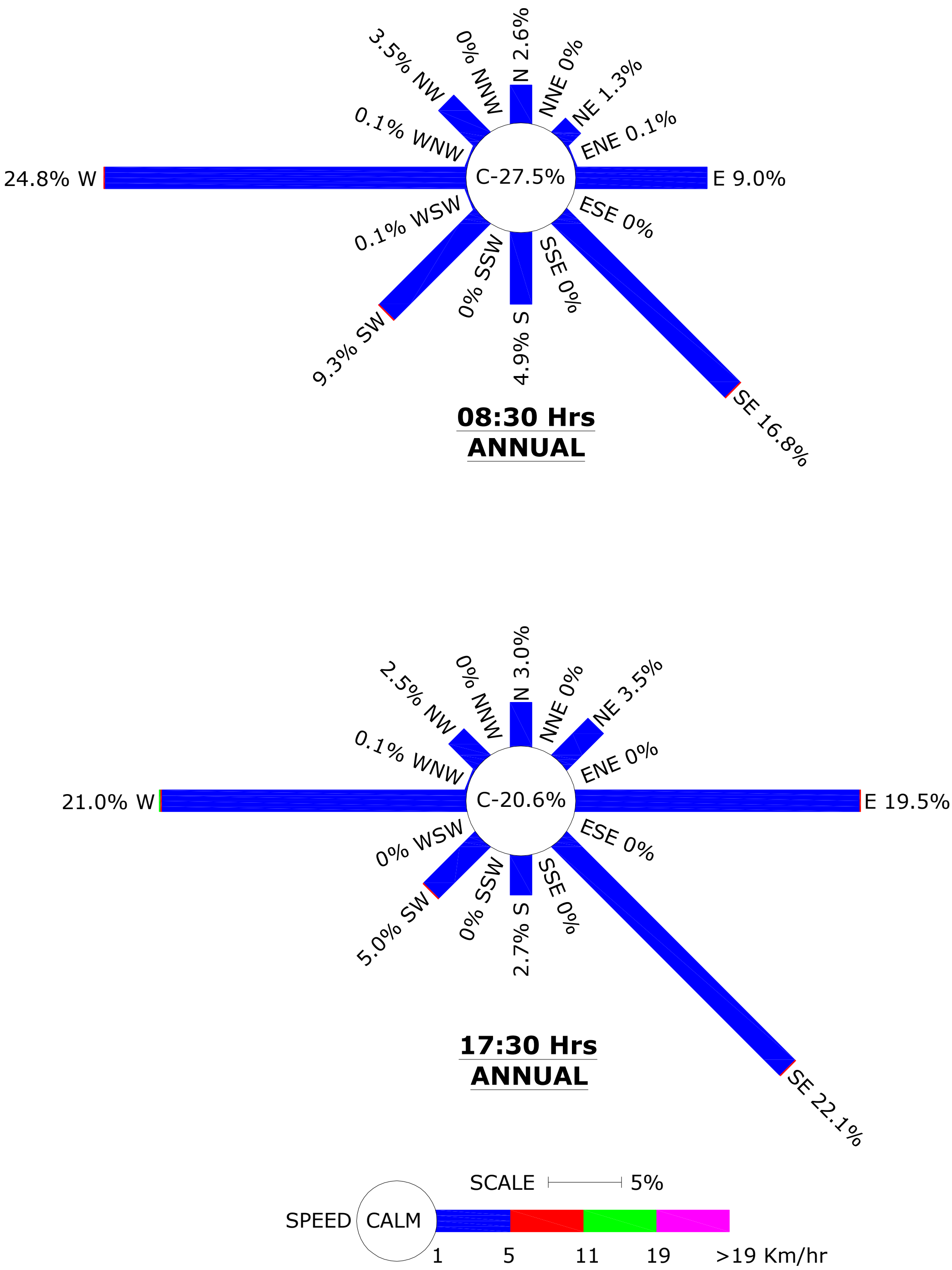


FIGURE-3.5.6
ANNUAL WIND ROSE (IMD- RENTACHINTALA)

TABLE-3.5.3
CLIMATOLOGICAL DATA-STATION: IMD, RENTACHINTALA

Month	Atmospheric Pressure (mb)	Temperature (^oC)		Relative Humidity (%)	Rainfall (mm)
		Max	Min		Monthly Total
January	1014.1	30.7	17.2	72.7	4.5
February	1011.7	33.4	19.7	67.7	4.1
March	1009.1	37.1	22.7	62.4	1.5
April	1007.0	39.5	25.7	59.2	13.9
May	1003.3	41.3	28.8	51.6	21.0
June	1002.3	37.6	28.0	59.1	83.2
July	1002.5	35.2	26.7	65.4	60.9
August	1003.9	33.3	25.8	73.1	111.4
September	1005.6	33.8	25.5	73.1	43.2
October	1008.5	32.6	24.0	79.9	71.3
November	1011.7	31.6	21.0	74.9	18.5
December	1014.0	30.3	17.2	71.7	6.4
	1002-1004.1	***17.2-41.3***		***51.6-79.9***	***439.9***

TABLE-3.5.4
SUMMARY OF WIND PATTERN-IMD RENTACHINTALA

Season	First Predominant Winds		Second Predominant Winds		Predominant Wind Speeds		% Calm Conditions	
	0830	1730	0830	1730	0830	1730	0830	1730
Post Monsoon	SE (13.5%)	E (20.0%)	W (8.5%)	SE (14.5%)	1.0 to 5.0, 11.0 to 19.0	1.0 to 5.0, 5.0 to 11.0	60.0	49.5
Winter	SE (22.0%)	E (33.6%)	E (21.7%)	SE (33.3%)	1.0 to 5.0, 5.0 to 11.0	1.0 to 5.0, 5.0 to 11.0	31.0	17.0
Pre-monsoon	SE (29.0%)	SE (37.7%)	W (18.0%)	E (24.0%)	1.0 to 5.0, 5.0 to 11.0	1.0 to 5.0, 5.0 to 11.0	9.0	4.3
Monsoon	W (65.3%)	W (62.4%)	SW (14.7%)	SW (12.3%)	1.0 to 5.0, 5.0 to 11.0	1.0 to 5.0, 5.0 to 11.0	10.0	11.5
Annual	W (24.8%)	SE (22.1%)	SE (16.8%)	W (21.0%)	1.0 to 5.0, 11.0 to 19.0	1.0 to 5.0, 5.0 to 11.0	27.5	20.6

Note: Figures in parenthesis indicates % of time wind blows

3.5.3 Comparison of Primary and Secondary Data

The India Meteorological Department (IMD) records the data twice a day viz. 0830 hr and 1730 hr while the site-specific data has been recorded at an hourly interval. On comparison of site specific data generated for study period vis-à-vis the IMD data, slight variations were observed. The following observations are brought out:

- The predominant wind direction observed at the proposed project site during the study period of Pre-Monsoon season were SE for 15.7 % of the total time and followed by S direction for 9.9 % of the total time, whereas the predominant wind direction and wind speed as recorded by IMD, Rentachintala during the Pre-Monsoon season are SE (33.3 %) and W (14.5 %) followed by SW (11.6 %);

- The temperature recorded on site when compared vis-à-vis the IMD data, slight variations was found. The mean maximum and mean minimum temperatures recorded at site during study period were 42.5^{o}C and 21.5 ^{o}C, whereas the maximum and minimum values recorded at IMD-Rentachintala during the same period are 41.3 ^{o}C and 22.7 ^{o}C respectively;

- The Relative Humidity was observed to range from 36.4-58.3 % during the study period at the site, whereas according to IMD-Rentachintala, the Relative Humidity was observed to be in the range of 51.6-62.4% during the same season.

The data generated at proposed project site when compared with the data recorded at IMD, it is observed that the data generated at the site is broadly in comparison with regional meteorology, except for minor variations as described above.

3.6 Air Quality

The ambient air quality with respect to the study zone of 10-km radius around the plant forms the baseline information. The prime objective of the baseline air quality study was to assess the existing air quality of the area. This will also be useful for assessing the conformity to standards of the ambient air quality during the operation of cement plant. The study area represents mostly rural/residential environment.

This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling. Ambient air quality monitoring has been carried out during March 2012 to May 2012 representing pre-monsoon season.

3.6.1 Methodology adopted for Air Quality Survey

Selection of Sampling Locations

The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality-monitoring network. The design of monitoring network in the air quality surveillance program has been based on the following considerations:

- Meteorological conditions on synoptic scale;
- Topography of the study area;
- Representatives of regional background air quality for obtaining baseline status; and
- Representatives of likely impact areas.

Ambient Air Quality Monitoring (AAQM) stations were set up at eight locations with due consideration to the above mentioned points during March to May 2012 and June & July, 2012 **Table-3.6.1** and **Table 3.6.1(A)** gives the details of environmental setting around each monitoring station. The locations of the selected stations with reference to the plant are given in the same table and shown in **Figure-3.6.1.**

Frequency and Parameters for Sampling

Ambient air quality monitoring was carried out at a frequency of two days per week for three months at each location representing pre-monsoon and a part of winter season. Ambient air quality at 8 locations within the study area of 10-km radial distance from project site within two down wind directions is presented in **Table-3.5.1.** The baseline data of air environment was monitored for parameters mentioned below:

- Particulate Matter ($PM_{2.5}$);
- Particulate Matter (PM_{10});
- Sulphur dioxide (SO_2);
- Oxides of Nitrogen (NOx);
- Carbon monoxide (CO); and
- Hydrocarbons.

TABLE-3.6.1
DETAILS OF AMBIENT AIR QUALITY MONITORING – PRE MONSOON

Station Code	Name of the Station	Aerial Distance (km) w.r.t. Plant	Direction w.r.t. Plant	Environmental Setting
AAQ1	Plant Site	--	--	--
AAQ2	Kotayyanagaram	2.5	SE	Upwind
AAQ3	Gamalapadu	2.7	SSE	Crosswind
AAQ4	Madinapadu	4.9	E	Crosswind
AAQ5	Shrinagar	0.8	NW	Downwind
AAQ6	Ramapuram	3.4	N	Crosswind
AAQ7	Pondugala	4.9	NW	Downwind
AAQ8	Srinivasapuram	2.9	WSW	Crosswind

TABLE-3.6.1(A)
DETAILS OF AMBIENT AIR QUALITY MONITORING – MONSOON

Station Code	Name of the Station	Aerial Distance (km) w.r.t. Plant	Direction w.r.t. Plant
AAQ1	Shrinagar	0.8	NW
AAQ2	Ramapuram	3.4	N
AAQ3	Batrupalem	3.6	NE
AAQ4	Gamalapadu	2.7	SSE

➢ ***Duration of Sampling***

The sampling duration for $PM_{2.5}$, PM_{10}, SO_2 and NOx is twenty four hourly continuous samples per day and CO and HC are sampled for 8 hours continuously thrice a day. This is to allow a comparison with the present revised standards mentioned in the latest Gazette Notification of the Central Pollution Control Board (CPCB) (November 2009).

3.6.2 Presentation of Primary Data

Various statistical parameters like 98th percentile, average, minimum and maximum values have been computed from the observed raw data for all the AAQ monitoring stations. The results of monitoring carried out are presented in **Annexure-VII**. The summary of these results representing pre-monsoon season and partly monsoon seasons are given in **Table-3.6.2** and **Table 3.6.2(A)**. These are compared with the standards prescribed by Central Pollution Control Board (CPCB) for rural and residential zone and industrial zone.

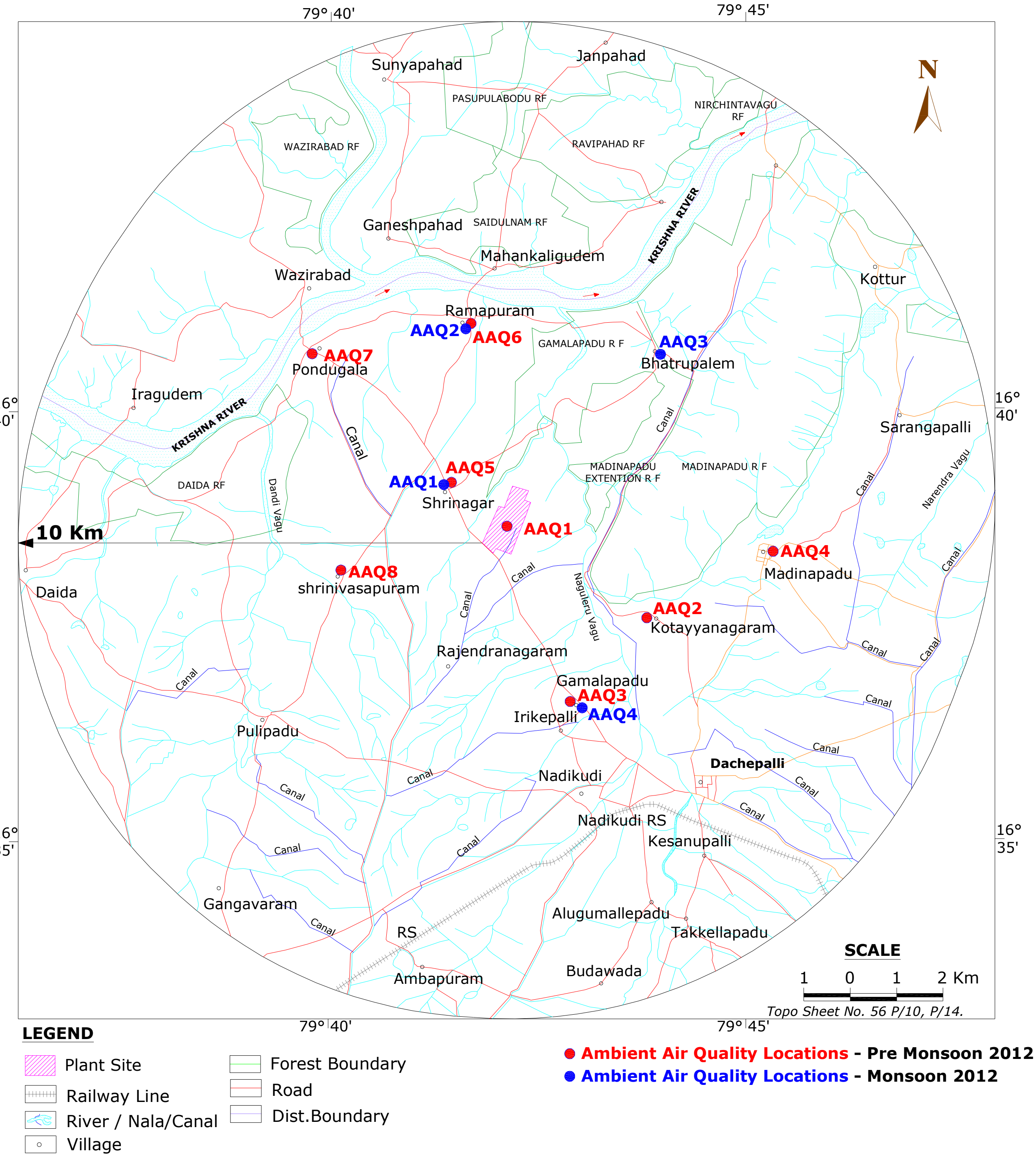


FIGURE-3.6.1
AIR QUALITY SAMPLING LOCATIONS

TABLE-3.6.2
SUMMARY OF AMBIENT AIR QUALITY RESULTS - PRE MONSOON 2012

Station Code	Location/ Village	PM2.5				PM10			
		Min	Max	Avg	98%	Min	Max	Avg	98%
AAQ1	Plant Site	15.6	23.8	20.1	23.2	41.7	67.3	54.3	66.7
AAQ2	Kotayyanagaram	11.4	17.1	13.8	16.8	27.8	43.9	34.7	43.4
AAQ3	Gamalapadu	11.9	17.7	14.3	17.4	29.4	46.7	38.8	46.3
AAQ4	Madinapadu	12.3	18.4	15.3	17.8	33.1	50.8	42.9	49.6
AAQ5	Shrinagar	14.8	22.2	17.9	21.7	40.5	63.1	52.8	62.5
AAQ6	Ramapuram	13.4	20.3	16.7	19.8	36.6	56.2	46.9	55.6
AAQ7	Pondugala	14.1	21.6	17.4	21.1	39.4	58.5	48.7	57.8
AAQ8	Srinivasapuram	12.7	19.1	15.3	18.7	35.3	53.7	43.1	53.1
Range		***11.4 – 23.8***				***27.8 – 67.3***			

Station Code	Location/ Village	SO2				NOX			
		Min	Max	Avg	98%	Min	Max	Avg	98%
AAQ1	Plant Site	10.7	13.9	11.8	13.4	11.6	14.9	13.1	14.6
AAQ2	Kotayyanagaram	7.9	10.2	8.8	9.9	<9.0	11.6	10.1	11.3
AAQ3	Gamalapadu	8.1	10.8	9.3	10.5	9.6	12.7	10.9	12.4
AAQ4	Madinapadu	8.9	11.5	9.9	11.2	10.3	12.9	11.4	12.6
AAQ5	Shrinagar	10.2	13.5	11.7	13.2	11.8	14.9	13.1	14.6
AAQ6	Ramapuram	9.3	12.4	10.5	12.1	10.8	13.7	12.1	13.3
AAQ7	Pondugala	9.7	12.8	10.8	12.4	10.4	14.3	12.1	13.9
AAQ8	Srinivasapuram	8.5	11.1	9.5	10.8	9.5	13.5	11.1	12.8
Range		***7.9 – 13.9***				***<9.0 – 14.9***			

Station Code	Location/ Village	CO				HC			
		Min	Max	Avg	98%	Min	Max	Avg	98%
AAQ1	Plant Site	228	371	313	366	112.4	131.3	119.9	130.4
AAQ2	Kotayyanagaram	220	369	316	367	98.4	109.5	102.3	108.4
AAQ3	Gamalapadu	255	375	323	371	101.1	111.4	105.8	110.9
AAQ4	Madinapadu	238	371	322	368	103.8	118.7	110.5	117.8
AAQ5	Shrinagar	228	372	315	369	109.9	128.5	119.2	127.9
AAQ6	Ramapuram	273	362	318	361	102.3	121.8	112.7	121.1
AAQ7	Pondugala	245	362	313	356	108.4	124.3	116.3	123.5
AAQ8	Srinivasapuram	226	376	323	372	101.7	113.2	106.9	112.6
Range		***220-376***				***98.4 – 131.3***			

Except CO all values mentioned above are expressed in µg/m^3

TABLE-3.6.2(A)
SUMMARY OF AMBIENT AIR QUALITY RESULTS - MONSOON 2012

Station Code	Location/ Village	PM2.5				PM10			
		Min	Max	Avg	98%	Min	Max	Avg	98%
AAQ1	Shrinagar	12.5	15.6	13.7	15.3	33.7	60.4	47.4	59.8
AAQ2	Ramapuram	10.1	12.9	11.3	12.6	28.5	53.2	40.5	52.6
AAQ3	Batrupalem	9.4	11.8	10.3	11.6	24.4	50.2	39.2	49.9
AAQ4	Gamalapadu	8.9	10.7	9.5	10.4	20.2	45.8	33.2	44.8
Range		***8.9 – 15.6***				***20.2 – 60.4***			

Station Code	Location/ Village	SO2				NOX			
		Min	Max	Avg	98%	Min	Max	Avg	98%
AAQ1	Shrinagar	8.1	11.9	9.6	11.6	9.6	14.2	11.5	13.9
AAQ2	Ramapuram	6.9	9.7	7.9	9.4	8.6	10.9	9.5	10.7
AAQ3	Batrupalem	6.5	8.9	7.6	8.7	8.1	10.4	9.2	10.2
AAQ4	Gamalapadu	7.2	10.5	8.8	10.2	9.1	12.5	10.7	12.3
Range		***6.5 – 11.9***				***8.1 – 14.2***			

Except CO all values mentioned above are expressed in µg/m^3

❖ **Pre monsoon season, 2012**

- ***Particulate Matter ($PM_{2.5}$)***

The minimum and maximum concentrations for $PM_{2.5}$ were recorded as 11.4 $\mu g/m^3$ and 23.8 $\mu g/m^3$ and respectively. The minimum concentration was recorded near AAQ2 maximum concentration was recorded at AAQ1 which falls in down wind direction.

- ***Particulate Matter (PM10)***

The minimum and maximum concentrations for PM_{10} were recorded as 27.8 $\mu g/m^3$ and 67.3 $\mu g/m^3$ and respectively. The minimum concentration and the maximum concentrations were recorded AAQ2 and AAQ1.

- ***Sulphur Dioxide***

The minimum and maximum SO_2 concentrations were recorded as 7.9 $\mu g/m^3$ and 13.9 $\mu g/m^3$. The minimum concentration was recorded at AAQ2 and the maximum concentration was recorded at AAQ1.

- ***Nitrogen Oxide***

The minimum of <9.0 $\mu g/m^3$ observed at AAQ2 and maximum concentration of 14.9 $\mu g/m^3$ for NOx was recorded at AAQ1.

- ***Carbon Monoxide***

The minimum and maximum carbon monoxide concentrations were recorded as 220 $\mu g/m^3$ and 376 $\mu g/m^3$.

- ***Hydrocarbons***

The values of hydrocarbons are in the range of 98.4 – 131.3 $\mu g/m^3$.

Air quality monitoring was carried out as per G.S.R no. 826 (E), dated 16th November 2009 and the observations at all the monitored locations are well within the limits as per prescribed standards.

3.7 Water Quality

Selected water quality parameters of ground water and surface water resources within 10-km radius of the study area has been studied for assessing the water environment and evaluate anticipated impact of the plant. Understanding the water quality is essential in preparation of Environmental Impact Assessment and to identify critical issues with a view to suggest appropriate mitigation measures for implementation.

The purpose of this study is to:

- Assess the water quality characteristics for critical parameters; and
- Predict the impact of water quality by these mining and related activities.

The information required has been collected through primary surveys and secondary sources.

Eight groundwater sources and five surface water sources covering 10-km radial distance were examined for physico-chemical, heavy metals and bacteriological parameters in order to assess the effect of existing industrial and other activities on water.

The samples were collected and analysed once during the study period. The samples were analyzed as per the procedures specified in 'Standard Methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA).

3.7.1 Water Sampling Locations

Water samples were collected from thirteen sampling locations. These samples were taken as grab samples and were analyzed for various parameters to compare with the standards for drinking water as per IS: 10500. The water sampling locations are listed below in **Table-3.7.1** and are shown in **Figure-3.7.1**. The results of monitoring carried out for the study are presented in **Table-3.7.2**.

TABLE-3.7.1
DETAILS OF WATER SAMPLING LOCATIONS

Code	Location	Arial Distance (km)	Direction
		wrt Plant	
Ground Water			
GW1	Plant site	--	--
GW2	Kattayanagaram	2.5	SE
GW3	Gamalapadu	2.7	SSE
GW4	Madinapadu	4.9	E
GW5	Shrinagar	0.8	NW
GW6	Ramapuram	3.4	N
GW7	Pondugala	4.9	NW
GW8	Srinivasapuram	2.9	WSW
Surface Water			
SW1	Dandi vagu	4.4	W
SW2	Nala near Shrinagar	0.1	NW
SW3	Naguleru vagu near Kotayanagaram	1.7	SE
SW4	Krisnha river near Ramapuram	4.0	N
SW5	Baturalem	4.8	NNE

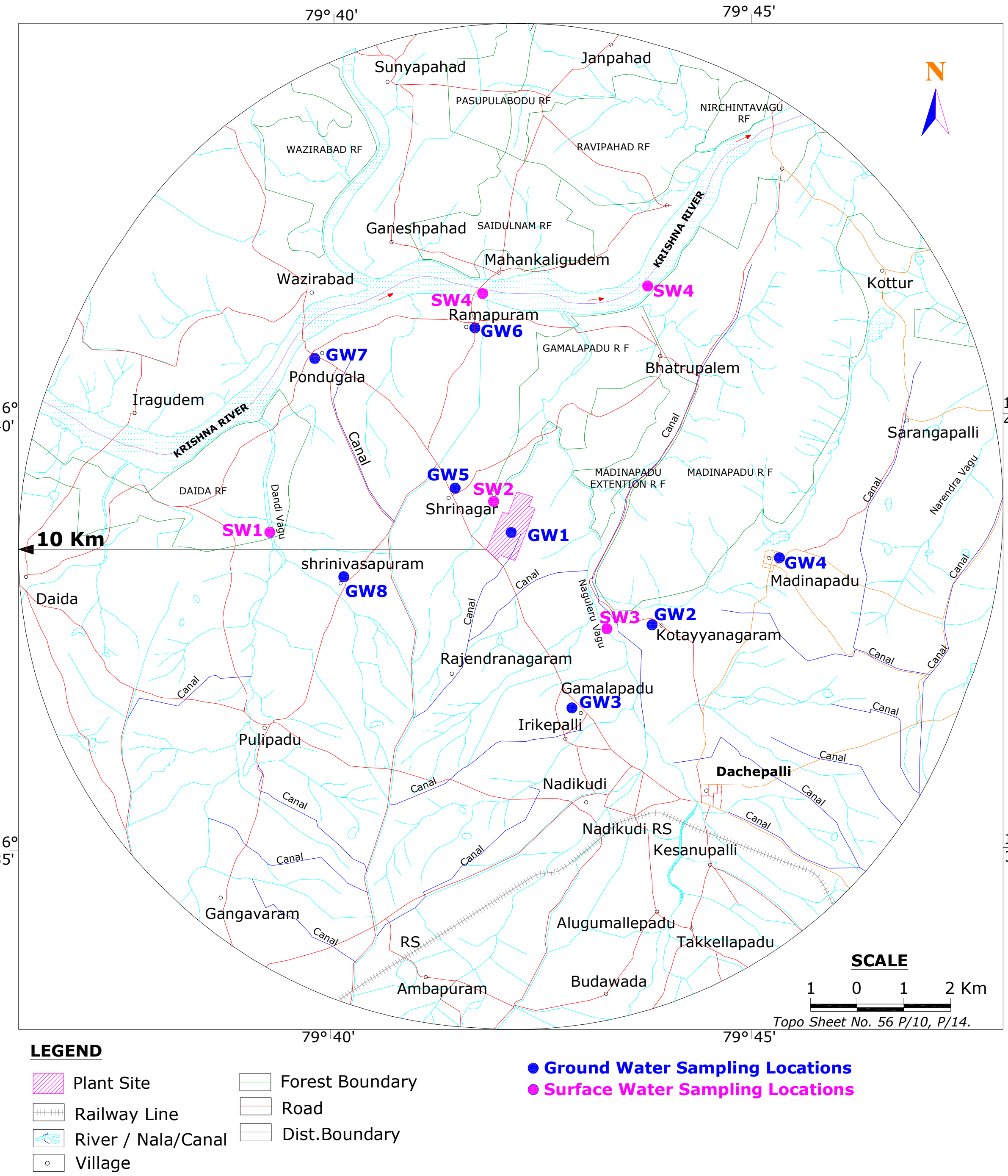


FIGURE-3.7.1
WATER SAMPLING LOCATIONS

TABLE-3.7.2(A)
GROUND WATER QUALITY

Sr. No.	Parameter	Unit	Limits as per IS10500	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
1	pH	-	6.5-8.5 (NR)	7.7	7.9	7.9	7.7	7.6	7.2	7.3	7.5
2	Colour	Hazen	5(25)	2	2	2	3	2	2	2	2
3	Taste	-	Agreeable	Ag	Ag	Ag	Ag	Ag	Ag	Ag	Ag
4	Odour	-	UO	UO	UO	UO	UO	UO	UO	UO	UO
5	Conductivity	µS/cm	$	2940	989	2150	1051	2100	1776	1847	2250
6	Turbidity	NTU	5(10)	3	4	3	4	3	3	3	3
7	TDS	mg/l	500(2000)	1996	674	1458	710	1422	1202	1254	1528
8	Total Hardness as CaCO3	mg/l	300(600)	690	345	590	388	540	480	572	580
9	Total Alkalinity	mg/l	200(600)	305	200	195	210	315	315	335	345
10	Calcium as Ca	mg/l	75(200)	216	94	164	87.2	184.0	158.4	169.6	156.0
11	Magnesium as Mg	mg/l	30(100)	36.5	26.7	43.7	41.3	19.4	20.4	36.0	46.2
12	Residual Chlorine	mg/l	0.2 Min	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
13	Boron	mg/l	1	0.53	0.09	0.36	0.11	0.37	0.23	0.22	0.40
14	Chlorides as Cl	mg/l	250(1000)	389	111	333	108	330	240	264	375
15	Sulphates as SO_4	mg/l	200(400)	576.4	91.3	400.6	87.2	233.6	166.1	106.7	223.8
16	Fluorides as F	mg/l	1.0(1.5)	1.2	0.3	1.0	0.3	1.0	0.5	0.4	1.1
17	Nitrates as NO_3	mg/l	45(NR)	24.4	31.1	39.9	58.4	22.8	77.4	135.4	28.9
18	Sodium as Na	mg/l	$	360.2	56.7	239.9	51.6	233.9	183.6	132.8	256.9
19	Potassium as K	mg/l	$	2.1	1.9	22.1	2.7	1.8	1.8	50.7	1.8
20	Phenolic Compounds	mg/l	0.001(0.002)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
21	Cyanides	mg/l	0.05(NR)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
22	Anionic Detergents	mg/l	0.2(0.1)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
23	Mineral Oil	mg/l	0.01(0.03)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Cadmium as Cd	mg/l	0.01(NR)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Arsenic as As	mg/l	0.01(NR)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
26	Copper as Cu	mg/l	0.05(1.5)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
27	Lead as Pb	mg/l	0.05(NR)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Manganese as Mn	mg/l	0.1(0.3)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02
29	Iron as Fe	mg/l	0.3(1.0)	0.05	0.05	0.08	0.03	0.07	0.03	0.05	0.05
30	Chromium as Cr+6	mg/l	0.05(NR)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01
31	Selenium as Se	mg/l	0.01(NR)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Zinc as Zn	mg/l	5(15)	1.43	0.01	0.02	0.05	4.80	0.05	0.03	0.56
33	Aluminium as Al	mg/l	0.03(0.2)	0.04	0.04	0.08	0.06	0.05	0.06	<0.01	<0.01
34	Mercury as Hg	mg/l	0.001(NR)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
35	Pesticides	mg/l	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
36	E.Coli	-	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
37	Total Coliforms	MPN/100 ml	10	<2	<2	<2	<2	<2	<2	<2	<2

 # Values in parenthesis are maximum permissible limits in absence of alternate source.$: Limits not specified, NR: No Relaxation, UO: Un-Objectionable, Ag: Taste agreeable, Abs: Absent

TABLE-3.7.2(B)
SURFACE WATER QUALITY

Sr. No.	Parameter	Unit	Limits as per IS10500	SW1	SW2	SW3	SW4	SW5
1	pH	-	6.5-8.5 (NR)	8.0	7.9	7.7	8.1	7.9
2	Colour	Hazen	5(25)	3	4	3	3	4
3	Taste	-	Agreeable	Ag	Ag	Ag	Ag	Ag
4	Odour	-	UO	UO	UO	UO	UO	UO
5	Conductivity	µS/cm	$	1125	702	1805	693	709
6	TDS	mg/l	500(2000)	5	5	4	4	5
7	Turbidity	NTU	5(10)	768	482	1230	468	478
8	Total Hardness as CaCO3	mg/l	300(600)	280	174	370	170	185
9	Total Alkalinity	mg/l	200(600)	210	215	330	165	165
10	Calcium as Ca	mg/l	75(200)	44.0	41.6	96.8	33.6	30.0
11	Magnesium as Mg	mg/l	30(100)	41.3	17.0	31.1	20.9	26.7
12	Residual Chlorine	mg/l	0.2 Min	<0.2	<0.2	<0.2	<0.2	<0.2
13	Boron	mg/l	1	0.10	<0.01	0.27	0.08	0.08
14	Chlorides as Cl	mg/l	250(1000)	208	60	340	92	94
15	Sulphates as SO_4	mg/l	200(400)	44.7	50.9	85.3	44.0	49.3
16	Fluorides as F	mg/l	1.0(1.5)	1.2	0.4	0.8	0.5	0.5
17	Nitrates as NO_3	mg/l	45(NR)	0.3	<0.1	0.3	0.4	0.7
18	Sodium as Na	mg/l	$	123.6	73.4	239.9	78.9	75.1
19	Potassium as K	mg/l	$	5.1	15.6	10.6	0.8	3.0
20	Phenolic Compounds	mg/l	0.001(0.002)	<0.001	<0.001	<0.001	<0.001	<0.001
21	Cyanides	mg/l	0.05(NR)	<0.02	<0.02	<0.02	<0.02	<0.02
22	Anionic Detergents	mg/l	0.2(0.1)	<0.1	<0.1	<0.1	<0.1	<0.1
23	Mineral Oil	mg/l	0.01(0.03)	<0.01	<0.01	<0.01	<0.01	<0.01
24	Cadmium as Cd	mg/l	0.01(NR)	<0.01	<0.01	<0.01	<0.01	<0.01
25	Arsenic as As	mg/l	0.01(NR)	<0.01	<0.01	<0.01	<0.01	<0.01
26	Copper as Cu	mg/l	0.05(1.5)	<0.01	<0.01	<0.01	<0.01	<0.01
27	Lead as Pb	mg/l	0.05(NR)	<0.01	<0.01	<0.01	<0.01	<0.01
28	Manganese as Mn	mg/l	0.1(0.3)	<0.01	0.21	0.02	<0.01	<0.01
29	Iron as Fe	mg/l	0.3(1.0)	0.02	0.12	0.07	0.03	0.02
30	Chromium as Cr+6	mg/l	0.05(NR)	<0.05	<0.05	<0.05	<0.05	<0.05
31	Selenium as Se	mg/l	0.01(NR)	<0.01	<0.01	<0.01	<0.01	<0.01
32	Zinc as Zn	mg/l	5(15)	0.01	0.13	0.02	0.014	0.02
33	Aluminium as Al	mg/l	0.03(0.2)	0.05	0.03	0.04	0.03	0.02
34	Mercury as Hg	Mg/l	0.001(NR)	<0.001	<0.001	<0.001	<0.001	<0.001
35	Pesticides	Mg/l	Absent	Absent	Absent	Absent	Absent	Absent
36	E.Coli	-	Absent	Absent	Absent	Absent	Absent	Absent
37	Total Coliforms	MPN/100 ml	10	<2	<2	<2	<2	<2

 # Values in parenthesis are maximum permissible limits in absence of alternate source.$: Limits not specified, NR: No Relaxation, UO: Un-Objectionable, Ag: Taste agreeable, Abs: Absent

3.7.2 Presentation of Results

➢ ***Ground Water***

The results for the parameters analyzed for ground water samples are presented in **Table-3.7.2(A)** and are compared with standards for drinking water as per IS: 10500-1991 "Specifications for Drinking Water".

The residents of the villages make use of these water for drinking and other domestic uses. In total 8 water samples were collected from different sources around the project site within the periphery of 10 km.

The pH of the water samples collected ranges in between 7.2 to 7.9. The conductivity recorded in between 989 to 2940 μmhos/cm in the sample.

Sodium and potassium concentrations varied in between 51.6 to 360.2 mg/l and 1.8 to 50.7 mg/l respectively. The higher concentration of Sodium is observed at GW7 bore well.

Total hardness expressed as $CaCO_3$ ranges between 345 to 690 mg/l. The concentration of Nitrate fluctuates between 22.8 to 135.4 mg/l with higher concentration of nitrate observed in GW7 sample.

The chemical analysis of ground water samples revealed that these water samples are slightly alkaline in nature. This may be attributed to the local geologic conditions.

➢ ***Surface Water***

Five surface water samples have been collected from near by river (60 m upstream and downstream) and other surface drains. The physical, chemical and biological characterization is given in **Table-3.7.2(B)**. The results for the parameters analyzed for ground water samples are presented in Table-3.6.2(B) and are compared with standards for drinking water as per IS: 10500-1991 "Specifications for Drinking Water".

The pH of the surface water samples collected ranges in between 7.7 to 8.1. The conductivity recorded in between 693 to 1805 μs/cm in the sample. The sodium and potassium concentrations varied between 73.4 to 239.9 mg/l and 0.8 to 15.6 mg/l respectively.

Total hardness expressed as $CaCO_3$ ranges between 170 to 370 mg/l. The concentration of nitrate fluctuates between <0.1 to 0.7 mg/l.

3.8 Noise Level Survey

The physical description of sound concerns its loudness as a function of frequency. Noise in general is sound which is composed of many frequency components of various types of loudness distributed over the audible frequency range. Various noise scales have been introduced to describe, in a single number, the response of an average human to a complex sound made up of various frequencies at different loudness levels. The most common and universally accepted scale is the A weighted Scale which is measured as dB (A). This is more suitable for audible range of 20 to 20,000 Hz. The scale has been designed to weigh various components of noise according to the response of a human ear.

The impact of noise sources on surrounding community depends on:

- Characteristics of noise sources (instantaneous, intermittent or continuous in nature). It can be observed that steady noise is not as annoying as one which is continuously varying in loudness;
- The time of day at which noise occurs, for example high noise levels at night in residential areas are not acceptable because of sleep disturbance; and
- The location of the noise source, with respect to noise sensitive landuse, which determines the loudness and period of exposure.

The environmental impact of noise can have several effects varying from Noise Induced Hearing Loss (NIHL) to annoyance depending on loudness of noise. The environmental impact assessment of noise from the existing plant, construction activity, and vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses.

The main objective of noise monitoring in the study area is to establish the baseline noise levels, and assess the impact of the total noise generated by the cement plant operations around it.

3.8.1 Identification of Sampling Locations

A preliminary reconnaissance survey has been undertaken to identify the major noise generating sources in the area. Noise at different noise generating sources has been identified based on the activities in the village area, ambient noise due to industries and traffic and the noise at sensitive areas like hospitals and schools.

The noise monitoring has been conducted for determination of noise levels at eight locations in the study area. The noise levels at each location were recorded for 24 hours. The environment setting of each noise monitoring location is given in **Table-3.8.1** and shown in **Figure-3.8.1**.

TABLE-3.8.1
DETAILS OF NOISE MONITORING LOCATIONS

Location Code	Location	Arial Distance (km)	Direction	Zone
		w.r.t. Plant Area		
N1	Plant Site	--	--	Industrial
N2	Kotayyanagaram	2.5	SE	Rural / Residential
N3	Gamalapadu	2.7	SSE	Rural / Residential
N4	Madinapadu	4.9	E	Rural / Residential
N5	Shrinagar	0.8	NW	Rural / Residential
N6	Ramapuram	3.4	N	Rural / Residential
N7	Pondugala	4.9	NW	Rural / Residential
N8	Srinivasapuram	2.9	WSW	Rural / Residential

3.8.2 Method of Monitoring

Sound Pressure Level (SPL) measurements were measured at all locations. The readings were taken for every hour for 24 hours. The day noise levels have been monitored during 6 am to 10 pm and night levels during 10 pm to 6 am at all the locations covered in 10 km radius of the study area.

3.8.3 Presentation of Results

The statistical analysis is done for measured noise levels at **eight** locations during pre monsoon season. The parameters are analyzed for L_{day}, L_{night}, and L_{dn}. These results are tabulated in **Table-3.8.2.**

TABLE-3.8.2
NOISE LEVELS IN THE STUDY AREA

Code	Location	L_{10}	L_{50}	L_{90}	L_{eq}	L_{day}	L_{night}	L_{dn}
N1	Plant Site	49.8	46.3	42.5	47.2	48.0	44.3	51.5
N2	Kotayyanagaram	44.6	40.1	36.7	41.1	43.1	38.2	45.7
N3	Gamalapadu	43.9	40.0	36.3	41.0	41.8	38.2	45.3
N4	Madinapadu	41.3	37.5	33.7	38.5	39.7	35.8	43.0
N5	Shrinagar	45.7	41.5	37.6	42.6	43.6	39.2	46.6
N6	Ramapuram	43.5	39.7	35.9	40.7	42.3	38.0	45.3
N7	Pondugala	46.4	41.6	38.0	42.8	44.9	39.1	47.0
N8	Srinivasapuram	44.4	40.5	36.6	41.5	42.4	37.8	45.2

a) Daytime Noise Levels (L_{day})

The daytime noise levels at all the locations are observed to be within the range of 39.7 to 48.0 dB (A). The minimum noise level was observed to be 39.7 dB (A) at Madinapadu (N4) and maximum noise level was observed to be 48.0 dB (A) at Plant site (N1).

b) Night time Noise Levels (L_{night})

The night time noise levels at all the locations were found to be in the range of 35.8 to 44.3 dB (A). The minimum night time noise level was observed to be 35.8 dB (A) at Madinapur (N4) and maximum night time noise level was observed to be 44.3 dB (A) at Plant site (N1).

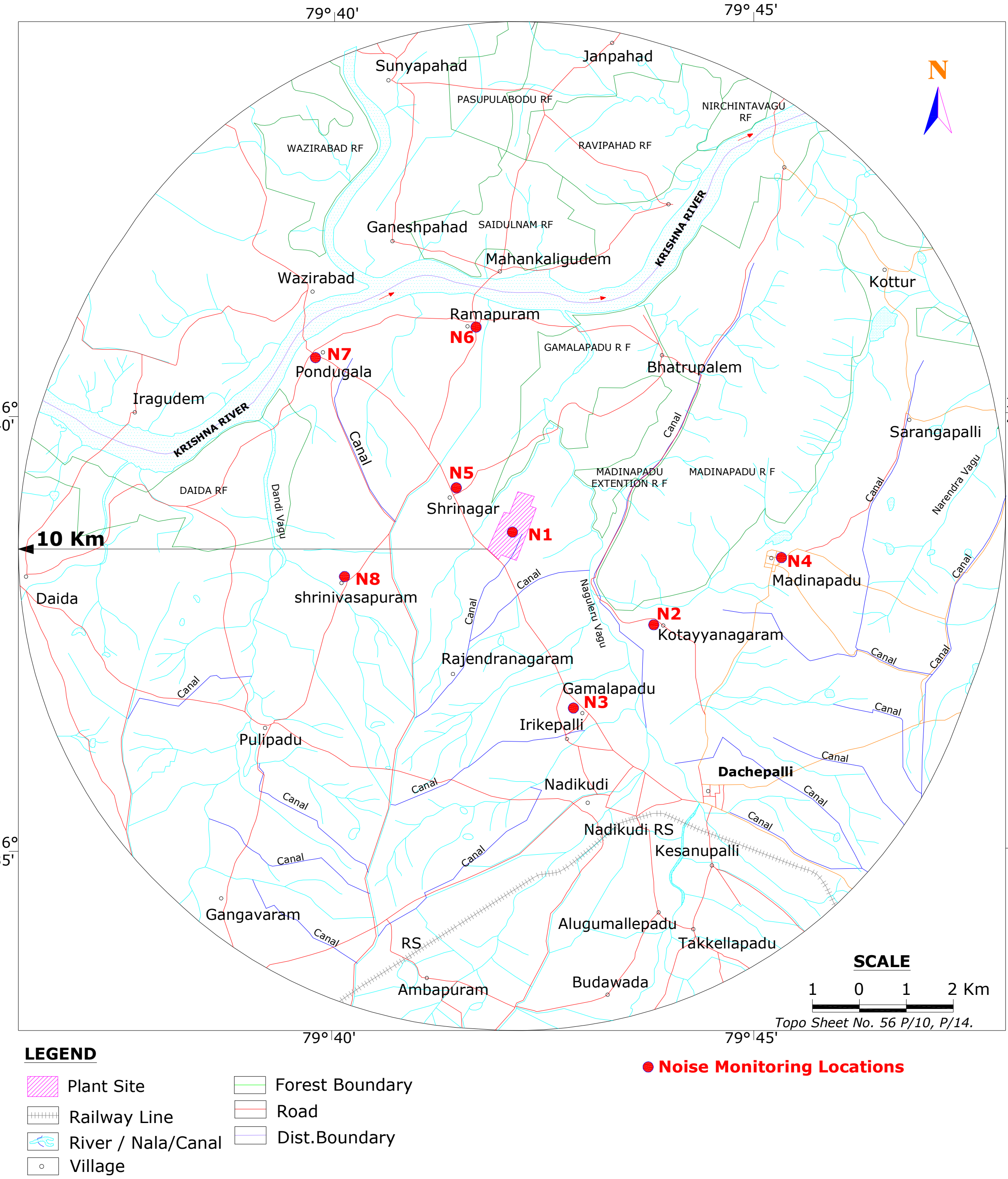


FIGURE-3.8.1
NOISE MONITORING LOCATIONS

3.9 Flora and Fauna Studies

An ecological survey of the study area was conducted during Pre monsoon season 2012 period to assess the existing floristic structure and record the biological resources.

3.9.1 Terrestrial Ecological Studies

3.9.1.1Objectives of Ecological Study

The objectives of the present study are intended to:

- Generate baseline data from field observations from various terrestrial ecosystems; and
- Compare the data so generated with authentic past records to understand changes.

3.9.1.2 Methods Adopted for the Study

To accomplish the above objectives, a general ecological survey covering an area of 10 km radius from the proposed project as centre.

- Reconnaissance survey for selection of sampling sites;
- Generation of primary data to understand baseline ecological status, important floristic elements;
- Generation of primary data to understand baseline fauna structure; and
- Collection of secondary data from Forest Working Plan and Gazetteers.

3.9.1.3 Criteria adopted for Selection of Sampling Locations

Reconnaissance survey was conducted to list of plant species on the basis of following criteria:

- In project area;
- Downwind direction of the proposed project area; and
- Upwind direction of the proposed project lease area.

A preliminary survey was made and six locations for detailed study within 10 km radius were selected. The selected locations are given in **Table-3.9.1** and shown in **Figure-3.9.1.**

The primary data was generated through:

- Preparing a general checklist of all plants encountered in the study area. This would indicate the biodiversity for wild and cultivated plants. The plants so encountered were classified into life form spectrum according to the classification of Raunkiaer's (Braun Blanquet) classification of life form spectrum.
- Phytosociological studies by using list count quadrate method. Sufficient number of quadrates of 100 m^2 size was employed for this. The number of quadrates depended on actual field requirements.

- Estimating basal areas of trees and shrubs at breast height [132 cm from ground or above buttresses].
- Herbaceous flora was studied by taking 10 quadrates in each location, each quadrate having 10 m^2.
- Determining frequency, abundance, relative frequency, relative density, relative dominance and importance value indices using Mueller-Dombois-Ellenberge [1974] Method.
- Determining the bird population of migratory and local birds by taking 10 random readings at every location.
- Observing mammals, amphibians and reptiles, noting their calls, droppings, burrows, pugmarks and other signs.
- Local inhabitants were interviewed for uses of plants and animals and to get ethnobiological data.

TABLE-3.9.1
SAMPLING LOCATIONS FOR ECOLOGICAL STUDIES

Location Code	Name of Village	Plant	
		Distance (km)	Direction
TE-1	Kotayyanagaram	2.5	SE
TE-2	Gamalapadu	2.7	SSE
TE-3	Madinapadu	4.9	E
TE-4	Shrinagar	0.8	NW
TE-5	Ramapuram	3.4	N
TE-6	Pondugala	4.9	WSW

3.9.2 Floristic Composition- Primary Survey

- **Floristic Richness**

Field survey conducted in pre monsoon season revealed a total of 251 species of plants of which 112 were phanerophytes, 108 were therophytes, 22 hemicryptophytes, and 9 geophytes. Among angiosperms 112 were woody members and rest belongs to herbaceous plants.

- **Flora recorded from core zone area**

The recorded list of plant species in core zone are presented in **Table-3.9.2.**

TABLE-3.9.2
FLORISTIC COMPOSITION IN CORE ZONE

Sr. No.	Technical Name	Family	Life Form
I. Agricultural Crops			
1	*Sorghum vulgare*	Poaceae	Hemicryptophyte
2	*Triticum vulgare*	Poaceae	Hemicryptophyte
3	*Zea mays*	Poaceae	Hemicryptophyte
4	*Oryza sativa*	Poaceae	Hemicryptophyte
5	*Pennisetum typhoideum*	Poaceae	Hemicryptophyte
II. Commercial Crops (including Vegetables)			
6	*Abelomoschus indicus*	Malvaceae	Therophyte
7	*Allium cepa*	Liliceae	Geophyte
8	*Arachis hypogia*	Fabaceae	Geophyte
9	*Cajanus cajan*	Fabaceae	Therophyte
10	*Carica papaya*	Caricaceae	Therophyte
11	*Catharanthes pusillus*	Compositae	Therophyte
12	*Cicer arietinum*	Fabaceae	Hemicryptophyte

Sr. No.	Technical Name	Family	Life Form
13	*Citrus lemon*	Ruataceae	Therophyte
14	*Colacasia esculenta*	Areaceae	Geophyte
15	*Mangifera indica*	Anacardiaceae	Phanerophyte
16	*Memordia charantia*	Cucurbitaceae	Therophyte
17	*Psidium guava*	Myrtaceae	Phanerophyte
III. Plantations			
18	*Acacia nilotica*	Mimosaceae	Phanerophyte
19	*Azadirachta indica*	Meliaceae	Phanerophyte
20	*Bambusa arundanacea*	Poaceae	Phanerophyte
21	*Butea superba*	Caesalpinaceae	Phanerophyte
22	*Leucena leucophloe*	Caesalpinaceae	Phanerophyte
IV. Natural Vegetation/Forest Type			
23	*Abrus precatorius*	Fabaceae	Therophyte
24	*Abutilon indicum*	Malvaceae	Phanerophyte
25	*Acacia nilotica*	Mimosaceae	Phanerophyte
26	*Acacia leucophloe*	Mimosaceae	Phanerophyte
27	*Argemone mexicana*	Papevaraceae	Phanerophyte
28	*Blepharis madaraspatens*	Acanthaceae	Therophyte
29	*Boerheavia diffusa*	Nyctaginaceae	Therophyte
30	*Caesalpina pulcherima*	Caesalpinaceae	Phanerophyte
31	*Calotropis procera*	Asclipiadaceae	Phanerophyte
32	*Canna indicda*	Cannaceae	Therophyte
33	*Capparis aphylla*	Capparidaceae	Therophyte
34	*Carissa carandus*	Apocyanaceae	Phanerophyte
35	*Cassia auriculata*	Caesalpinaceae	Therophyte
36	*Cassia occidentalis*	Caesalpinaceae	Therophyte
37	*Cleome gynandra*	Capparidaceae	Therophyte
38	*Cleome viscose*	Capparidaceae	Therophyte
39	*Commelina benghalensis*	Commelinaceae	Therophyte
40	*Crotalaria medicagenia*	Fabaceae	Therophyte
41	*Croton bonplandinum*	Amaryllidaceae	Therophyte
42	*Cuscuta reflexa*	Cuscutaceae	Epiphyte
43	*Datura metal*	Solanaceae	Therophyte
44	*Desmodium triflorum*	Asclepiadaceae	Therophyte
45	*Eclipta alba*	Compositae	Heliophyte
46	*Eclipta prostrate*	Compositae	Hemicryptophyte
47	*Emblica officinale*	Euphorbiaceae	Phanerophyte
48	*Euphorbia antiquorum*	Euphorbiaceae	Phanerophyte
49	*Euphorbia hirta*	Euphorbiaceae	Therophyte
50	*Euphorbia neruri*	Euphorbiaceae	Therophyte
51	*Euphorbia nivula*	Euphorbiaceae	Therophyte
52	*Euphorbia tricauli*	Euphorbiaceae	Hemicryptophyte
53	*Evolvulus alsinoides*	Convolvulaceae	Therophyte
54	*Ficus benghalensis*	Moraceae	Phanerophyte
55	*Ficus hispida*	Moraceae	Phanerophyte
56	*Gossypium herbaceum*	Malvaceae	Therophyte
57	*Grewia abutifolia*	Tiliaceae	Phanerophyte
58	*Hibiscus micronthus*	Malvaceae	Therophyte
59	*Jatropha gossypifolia*	Euphorbiaceae	Therophyte
60	*Justia diffusa*	Acanthaceae	Therophyte
61	*Lantana camara*	Verbinacaee	Phanerophyte
62	*Leucas aspera*	Labiatae	Therophyte
63	*Loranthus sp*	Loranthaceae	Epiphyte
64	*Ocimum canum*	Labiatae	Therophyte
65	*Ocimum sanctum*	Labiatae	Therophyte
66	*Oldenlandia corymbosa*	Rubiaceae	Therophyte
67	*Opuntia elator*	Cacataceae	Therophyteq
68	*Oxalis corniculata*	Oxalidaceae	Therophyte
69	*Parkinsonia aculata*	Mimosaceae	Phanerophyte
70	*Parthenium hysterophorus*	Compositae	Therophyte

Sr. No.	Technical Name	Family	Life Form
71	*Phoenix aculis*	Palmae	Phanerophyte
72	*Pithocolobium dulce*	Mimosaceae	Phanerophyte
73	*Portulaca oleracea*	Portulaccaceae	Therophyte
74	*Prosopis spicegera*	Mimosaceae	Phanerophyte
75	*Sida cordifolia*	Malvaceae	Phanerophyte
76	*Solanum nigrum*	Solanaceae	Therophyte
77	*Solanum xanthocarpum*	Solanaceae	Therophyte
78	*Tamarindus indica*	Caesalpinaceae	Phanerophyte
79	*Triumferta pilosa*	Tiliaceae	Therophyte
80	*Vernonia cinera*	Compositae	Therophyte
81	*Vitex negungo*	Verbinaceae	Therophyte
82	*Xanthium strumariumk*	Compositae	Therophyte
83	*Zizyphus jujube*	Rhamnaceae	Phanerophyte
84	*Zizyphus nummalaris*	Rhamnaceae	Phanerophyte
V. Grasslands			
85	*Apluda mutica*	Poaceae	Hemicryptophyte
86	*Aristida adscensionsis*	Poaceae	Hemicryptophyte
87	*Cenchrus ciliaris*	Poaceae	Therophyte
88	*Cyperus triceps*	Cyperaceae	Therophyte
89	*Eragrostis biferia*	Poaceae	Therophyte
	Endemic species	**No endemic species recorded/reported as per BSI records**	

During the present study, all the plants observed in the field are recorded but there could be many other plants which have remained unrecorded due to limitation of time. Detail list of plant species recorded during study period are presented in **Table 1** of **Annexure-VIII**.

- ***Cryptogamic Vegetation***

The area shows many algae, fungi, bryophytes and ferns. Algae are present in aquatic bodies or in marshy places. Fungi, particularly from ascomycetes and basidiomycetes are located on ground or epiphytically. Lichens of crustose, foliose and fruticose types are present on different substrates (Lichens, Ascomycetes and Basidiomycetes could be observed near old house walls and agricultural waste dump areas. Bryophytes occur in wet areas and occasionally on barks of trees and old walls of houses. The commonly observed in this are *Funaria sp* and *Polypodium* sp.

- ***Life Form Spectrum***

Raunkiaer defined life forms as the sum of adaptations of plants to climate. Braun-Blanquet (1951), whose system is adapted in this study, modified the Raunkiaer's system. Following five of the ten classes created by Braun-Blanquet is present in the study area.

Phanerophytes	:	Shrubs and trees
Therophytes	:	Annuals including ferns
Hydrophytes	:	Water plants except plankton
Hemicryptophytes	:	Plants with perennial shoots and buds close to surface
Geophytes	:	Plants with parenting parts buried in substratum

251 plant species (except algae, fungi and bryophytes) were recorded from the study area. Their analysis is presented in **Table-3.9.3**.

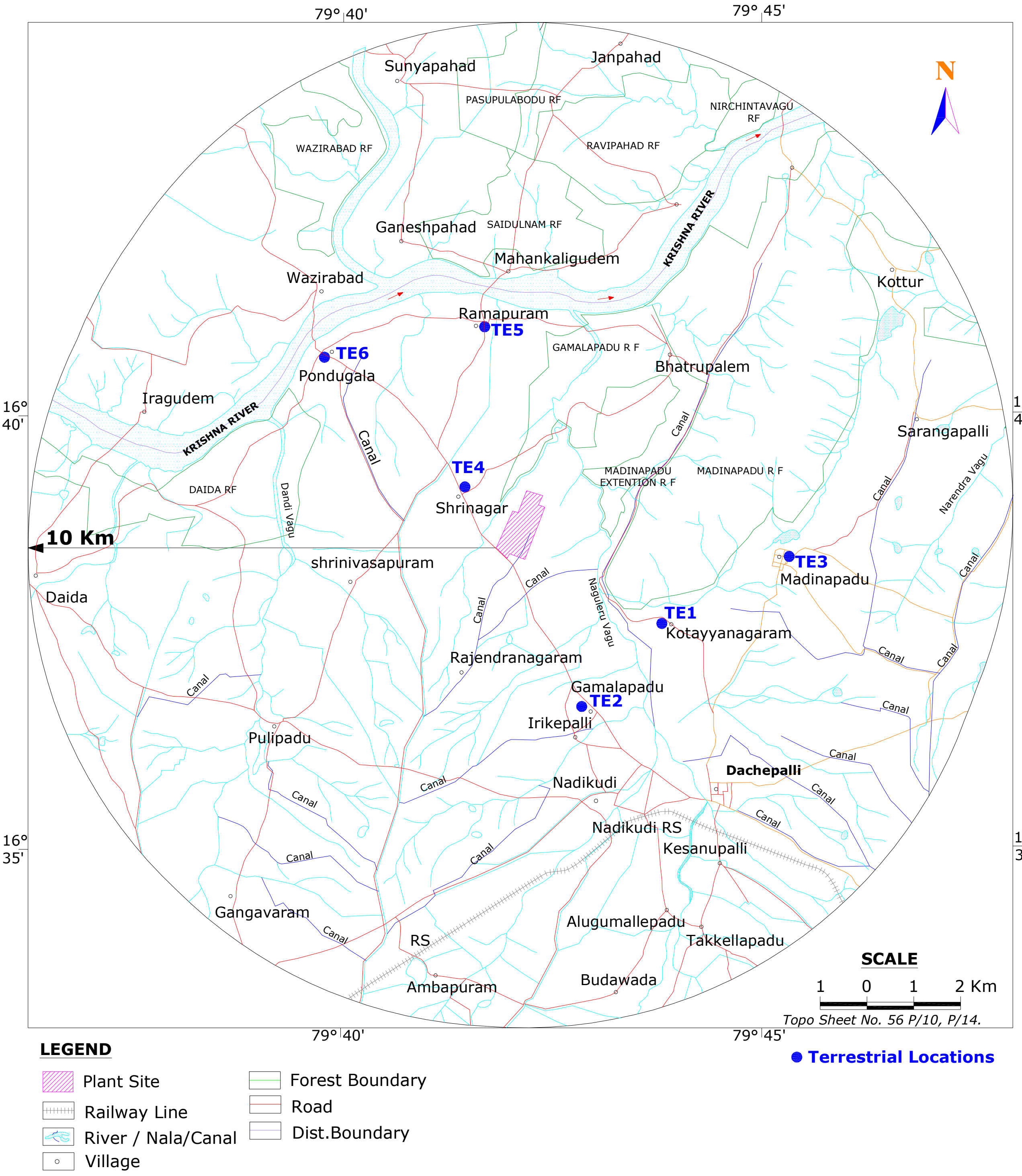


FIGURE-3.9.1
TERRESTRIAL ECOLOGICAL LOCATIONS

TABLE-3.9.3
CLASS WISE DISTRIBUTION OF PLANT SPECIES IN THE STUDY AREA

Type of Species	Number	% of Total
Phanerophytes (P)	112	44.62
Therophytes (T)	108	43.03
Hemicryptophytes (He)	22	8.77
Geophytes (G)	09	3.58
Total	**251**	**100.00**

- ***Comments on the Life Form Spectrum***

Life form spectrum is a reflection of plant community. A plant community is governed by several factors like climatic, edaphic, topographic and biotic. Even local variations in environment affect components of plant community. Among all these factors, life form spectrum of an area, which reflects climatic conditions prevailing.

In the study area, maximum number of species are phanerophytes (44.62%) followed by therophytes (43.03%). These classes are followed by hemicryptophytes (8.77%) and geophytes(3.58%).

Presence of large number of phanerophytes (shrubs and trees) and therophytes (Annuals or herbaceous vegetation) indicates tropical and mixed decidious vegetation structure. The area shows a rich gene pool of perennial shrubs and trees. This indicates a potentially good area for their growth.

Hemicryptophytes (predominantly grasses and sedges) were found to be significant in the area. These indicate fertile and wet soil in upper layer of soil profile. Hydrophytes were present in both the seasonal or perennial water bodies.

3.9.2.1Identification of Local Protected Species

A detailed enumeration of flora species from 10 km radius from buffer zone are presented in **Table-1 of Annexure-VIII.** As per Botanical Survey of India records and available published literature pertaining to the study area and current detailed study of project site, no threatened, endangered and rare plant species were observed from the study area.

3.9.2.2Details of Forest Areas

The details of forest blocks are presented in **Table-3.9.4.**

TABLE-3.9.4
DETAILS OF FORESTS IN STUDY AREA

Sr. No.	Details Forests	Distance from mine (km)	Direction Bearing w.r.t mine	Distance from cement plant (km)	Direction Bearing w.r.t cement plant
1	Tangeda RF	Adjacent	NNW	3.1	NW
2	Regulagadda RF	Adjacent	NE	1.0	NE
3	Vemavaram RF	1.1	S	2.1	S
4	Sultanpur RF	2.8	NNW	5.9	NNW
5	Govindapuram RF	3.0	ESE	2.8	ESE
6	Pittalsarikota RF	3.5	NE	5.0	NE

Sr. No.	Details Forests	Distance from mine (km)	Direction Bearing w.r.t mine	Distance from cement plant (km)	Direction Bearing w.r.t cement plant
7	Madinapadu RF	2.8	NW	4.6	NW
8	Chintalpalem RF	4.5	NE	6.0	NE
9	Uranam RF	4.5	E	4.9	E
10	Gurrambodu RF	6.8	NW	9.5	NW
11	Kamepalle RF	8.3	SE	8.1	ESE

3.9.2.3Wildlife Studies

- **Fauna recorded from core zone**

The recorded list of faunal species in core zone are presented in **Table-3.9.5.**

TABLE-3.9.5
FAUNA IN THE CORE ZONE

Technical Name	English Name/ Local Name	Conservation status as per Wild Life Protection Act 1972
Mammals		
Lapus nigricollis	Indian Hare	Sch-IV
Funumbuls palmarum	Squirrel	Sch-IV
Hystrix indica	Porcupine	Sch-IV
Birds		
Milyus migrans	Common Kite	Sch-IV
Corvus corvus	Jungle crow	Sch-IV
Corvus splendens	House crow	Sch-V
Aegithina tiphia	Iora	Sch-IV
Pycnonotus cafer	Red vented bulbul	Sch-IV
Columbus livibus	Rock Pigeon	Sch-IV
Lalage sykesi	Black headed cochoo Shrike	Sch-IV
Dicrurus macrocerus	Black Drongo	Sch-IV
Oriolus oriolus	Indian Oriole	Sch-IV
Acridotheres tristicus	Common myna	Sch-IV
Ploceus philippines	Weaver bird	Sch-IV
Uroloncha striata	Spotted munia	Sch-IV
Passer domisticus	House Sparrow	Sch-IV
Megalaima merulinus	Indian Cuckoo	Sch-IV
Eudynamis scolopaceus	Koel	Sch-V
Psittacula Krammeri	Rose ringed parakeet	Sch-IV
Alcedo atthis	Common Kingfisher	Sch-IV
Tylo alba	Barn Owl	Sch-IV
Astur badius	Shikra	Sch-IV
Lobvanella indicus	Redwattled Lapwing	Sch-IV
Bubulcus ibis	Cattle Egret	Sch-IV
Gallinula chlorpus	Moore hen	Sch-IV
Reptiles		
Chameleon zeylanicus	Lizard	Sch-IV
Ptyas mucosus	Rat snake	Sch-III
Naja naja	Cobra	Sch-IV
Bungarus candidus	Krait	Sch-IV
Vipera russeli	Viper	Part-II of Sch-II
Butterflies		Sch-IV
Euploca cora	-	Sch-IV
Euploca crassa	-	Sch-IV
0euploca dicciotianua	-	Sch-IV
Graphium agamemnos	Tailed jay	Sch-IV
Papilo polymnstor	Blue mormon	Sch-IV
Junonia atlites	Grey pansey	Sch-IV

Technical Name	English Name/ Local Name	Conservation status as per Wild Life Protection Act 1972
Juninia almana	Peacock pansey	Sch-IV
Pelopides assemensis	-	Sch-IV
Polytrema discreta	-	Sch-IV

Extensive field studies were conducted in Pre monsoon season to know the present status of fauna of the study area. Apart from that, secondary data was collected by mode of interaction of local elderly people and Forest Working Plans of Guntur district. The major wildlife present in buffer zone are presented in **Table-2** of **Annexure-VIII**.

3.10 Demography and Socio-Economics

In this section, the prevailing socio-economic aspects of people in the study area, which would form the basis for making planning efforts for the socio-economic development of people of the study area, have been described.

3.10.1 Methodology Adopted for the Study

The methodology adopted for the study mainly includes review of secondary data (District Census Statistical Handbooks-2001 and Primary Census Abstract of Census-2001) with respect to population, occupational structure and infrastructure facilities available for 10-km radius study area.

3.10.2 Review of Demographic and Socio-Economic Profile-2001

The village wise demographic data for the census year 2001 is given in **Annexure-IX**. The salient features of the demographic and socio-economic details are described in the following sections.

3.10.3 Demography

Almost all villages in the study area are experiencing a rapid growth of population, which may be due to the process of industrialization.

- ***Distribution of Population***

As per 2001 census the study area consisted of 102547 souls inhabited in study area. The distribution of population in the study area is shown in **Table-3.10.1**.

TABLE-3.10.1
DISTRIBUTION OF POPULATION

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
No. of Households	1770	10603	4890	17263
Male Population	5175	32927	14182	52284
Female Population	5020	31465	13778	50263
Total Population	10195	64392	27960	102547
Male Population (0-6 years)	779	5371	2482	8632
Female Population (0-6 years)	761	4882	2303	7946
Total Population (0-6 years)	1540	10253	4785	16578
Average Household Size	5.8	6.1	5.7	5.9
% of males to the total population	50.8	51.1	50.7	51.0
% of females to the total population	49.2	48.9	49.3	49.0
Sex Ratio (no of females per 1000 males)	970.0	955.6	971.5	961.3

Source: District Census Hand Book –2001

The males and females constitute to about 51.0% and 49.0% of the study area population respectively during 2001.

- ***Average Household Size***

The study area has a family size of 5.9 as per 2001 census.

- ***Population Density***

The density of population reveals that the study area has an overall density of 309 persons per km^2 (PP km^2) as per 2001 census reports.

- ***Sex Ratio***

The configuration of male and female indicates that the males constitute to about 51.0 % and females to 49.0% of the total population as per 2001 census records. The sex ratio i.e. the number of females per 1000 males indirectly reveals certain sociological aspects in relation with female births, infant mortality among female children and single person family structure, a resultant of migration of industrial workers. The study area on an average has 961.3 females per 1000 males as per 2001 census reports.

3.10.4 Social Structure

In the study area, as per 2001 census, 29.1 % of the population belongs to Scheduled Castes (SC) and 0.6% to Scheduled Tribes (ST). The distribution of population by social structure is shown in **Table-3.10.2.**

TABLE-3.10.2
DISTRIBUTION OF POPULATION BY SOCIAL STRUCTURE

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Schedule caste	2846	20288	7802	30936
% To the total population	27.9	31.5	27.9	29.1
Schedule Tribes	39	551	74	664
% To the total population	0.4	0.9	0.3	0.6
Total SC and ST population	2885	20839	7876	31600
% To total population	28.3	32.4	28.2	30.8
Total population	10195	64392	27960	102547

Source: District Census Hand Book –2001

3.10.5 Literacy Levels

The study area experiences a literacy rate of 47.7 % (2001). The distribution of literate and literacy rate in the study area is given in **Table-3.10.3.**

TABLE-3.10.3
DISTRIBUTION OF LITERATE AND LITERACY RATES

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Male Population	5175	32927	14182	52284
Female Population	5020	31465	13778	50263
Total Population	10195	64392	27960	102547
Male Population (0-6 years)	779	5371	2482	8632
Female Population (0-6 years)	761	4882	2303	7946
Total Population (0-6 years)	1540	10253	4785	16578

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Male literates	3166	20304	6425	29895
Female literates	2005	13450	3589	19044
Total literates	5171	33754	10014	48939
Male literacy rate (%)	61.2	60.2	64.2	61.1
Female literacy rate (%)	38.8	39.8	35.8	38.9
Average Male Literacy to the total population (%)	31.1	31.5	23.0	29.2
Average female Literacy to the total population (%)	19.7	20.9	12.8	18.6
Total Literacy rate (%)	50.7	52.4	35.8	47.7

Source: District Census Hand Book –2001

The male literacy i.e. the percentage of literate males to the total males of the study area works out to be 61.1%. The female literacy rate, which is an important indicator for social change, is observed to be 38.9 % in the study area as per 2001 census records.

3.10.6 Occupational Structure

The occupational structure of residents in the study area is studied with reference to main workers, marginal workers and non-workers. The main workers include 10 categories of workers defined by the Census Department consisting of cultivators, agricultural laborers, those engaged in live-stock, forestry, fishing, mining and quarrying; manufacturing, processing and repairs in household industry; and other than household industry, construction, trade and commerce, transport and communication and other services.

The marginal workers are those workers engaged in some work for a period of less than six months during the reference year prior to the census survey. The non-workers include those engaged in unpaid household duties, students, retired persons, dependents, beggars, vagrants etc.; institutional inmates or all other non-workers who do not fall under the above categories.

As per 2001 census records altogether the main workers works out to be 26.0% of the total population. The marginal workers and non-workers constitute to 7.4% and 66.6 % of the total population respectively. The distribution of workers by occupation indicates that the non-workers are the predominant population. The occupational structure of the study area is shown in **Table-3.10.4.**

TABLE-3.10.4
OCCUPATIONAL STRUCTURE

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Total Population	10195	64392	27960	102547
Total workers	2928	19056	12242	34226
Work participation rate (%)	28.7	29.6	43.8	33.4
Total main workers	2051	15819	8760	26630
% of main workers to total population	20.1	24.6	31.3	26.0
Marginal workers	877	3237	3482	7596
% of marginal workers to total population	8.6	5.0	12.5	7.4
Non-workers	7267	45336	15718	68321
% of non-workers to total population	71.3	70.4	56.2	66.6

Source: District Census Hand Book-2001

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Identification of Impacts

This chapter presents identification and appraisal of various impacts of the proposed coal based captive power plant of 30 MW.

Generally, the environmental impacts can be categorized as either primary or secondary. Primary impacts are those, which are attributed directly by the project, secondary impacts are those, which are indirectly induced and typically include the associated investment and changed pattern of social and economic activities by the existing activities.

The impacts have been prepared for the proposed power plant assuming that the pollution due to the existing activities such as rural domestic activities has already been covered under baseline environmental monitoring and continue to remain same during the operation of the project. The project is likely to create impact on the environment in two distinct phases:

- During the construction phase which may be regarded as temporary or short term; and
- During the operation phase which would have long-term effects.

The construction and operation of the proposed project comprises of various activities each of which will have an impact on some or other environmental parameters. Various impacts during the operation phase on the environment parameters have been studied to estimate the impact on the environment and are discussed briefly below and elaborated in the subsequent sections.

4.2 Impacts during Construction Phase

The proposed project includes the following activities such as leveling of site, construction of main plant and other related structures, erection of plant equipment like boilers, turbines and other related equipment.

4.2.1 Impact on Land Use

DCW requires 3.0-ha of land for construction of power plant. The proposed project site is located within the cement plant premises.

A full-fledged township, comprising of guest house, school, shopping centre, club, etc. is already in place.

The development in the study area will definitely bring changes in the land use pattern due to the proposed plant. Shift in occupation or sectoral changes would require more land for non-primary activities. However, the land identified for the construction is under industrial use. Hence, the impact on land usages is insignificant.

Also the development of greenbelt in 33% of plant area will help in attracting minor fauna and birds. This will have a positive impact on the land use pattern.

4.2.2 Impact on Climate

- ***Temperature***

The average, monthly minimum and maximum temperatures have been monitored at the proposed plant site and also analyzed based on the data from nearest IMD station at Rentachintala. The trend of temperature shows a regular cyclic pattern. The temperature pattern indicates a regional behavior and construction of the power plant will not have any bearing on the temperature patterns.

- ***Rainfall***

The average annual rainfall in the region is 439.9 mm as per IMD data of Rentachintala. Any changes in the pattern of rainfall will be on regional scale because of cumulative reasons. The operation of plant is not expected to have any adverse effect on the rainfall pattern of the area.

- ***Wind Speed***

The wind speeds of any area depend on the existence of elevations and depressions in the region. The proposed plant operation will have minor change in topography and creation of structures in project area and its immediate vicinity. Due to change in the topography of the project area minor variations are envisaged at local level.

- ***Humidity***

The relative humidity in the area is not likely to change because of the construction operations, as it will not cause any changes in the prevailing temperatures and rainfall of the region.

- ***Impact on Drainage***

There are no rivers, seasonal nallah or streams that pass through the proposed project site. Hence, construction activity of the plant will not have any impact on local drainage pattern or drainage system.

4.2.3 Impact on Soil

Vegetation on topsoil is to be removed prior to commencement of bulk earthwork. Sub-surface conditions of soil consist of hard rock strata of 3 to 4 m followed by soft strata.

The construction activities will result in minimum loss of vegetation and topsoil in the plant area. Vegetation is very scanty in the site to be developed and will be disturbed only in the bare minimum area required for construction. Apart from localized constructional impacts at the proposed plant site, no significant adverse impact on the soil in the surrounding area is anticipated.

4.2.4 Impact on Air Quality

During construction phase, dust generation will be the main pollutant, which would generate from the site development activities and vehicular movement on the road. However, concentration of NOx and CO may also be slightly increased due to increased vehicular traffic movement. To mitigate these impacts, regular sprinkling of water will be done at the construction site. The approach roads will be black carpeted and vehicles will be kept in good order to minimize automobile exhaust.

However, the impact of such activities would be temporary and restricted to the construction phase and will be confined to the project boundary and is expected to be negligible outside the plant boundaries. Proper upkeep and maintenance of vehicles, sprinkling of water on roads, providing sufficient vegetation etc are some of the measures that would greatly reduce the negative impacts during the construction phase.

4.2.5 Impact on Water Quality

Impact on water quality during construction phase may be due to non-point discharges of solids from soil loss and sewage generated from the construction work force stationed at the site. However, as the construction will be carried out on the flat area, the soil losses will be negligible. Further, the construction will be more related to mechanical fabrication, assembly and erection; hence the water requirements would be meager. Temporary sanitation facilities (septic tanks and soak pits) will be set-up for disposal of sanitary sewage generated by the work force through contractors. The overall impact on water environment during construction phase due to proposed project is likely to be short term and insignificant.

4.2.6 Impact on Noise Levels

The major sources of noise during the construction phase are vehicular traffic, construction equipment like dozers, scrapers, concrete mixers, cranes, generators, pumps, compressors, rock drills, pneumatic tools, saws, vibrators etc. The operation of this equipment will generate noise ranging between 70-85 dB (A). The noise produced during the construction will have significant impact on the existing ambient noise levels. The major work will be carried out during the daytime. The construction equipment may have high noise levels, which can affect the personnel operating the machines. Use of proper personal protective equipment will mitigate any significant impact of the noise generated by such equipment.

4.2.7 Impact on Terrestrial Ecology

The land identified for the proposed power plant is already under industrial category and cutting of trees are not required. Therefore, no major loss of biomass is envisaged during construction phase. Although the land required for the proposed plant would be put to industrial use, there may not be any significant impact on soil and agriculture in general. These impacts are, however, restricted to the early phase of construction.

The removal of herbaceous vegetation from the soil and loosening of the topsoil generally causes soil erosion during dry season. However, such impacts would be primarily confined to the project site during initial periods of the construction phase and would be minimized through adoption of mitigatory measures like paving and surface treatment, water sprinkling and appropriate plantation program. The project site and township area will be extensively landscaped with the development of green belt consisting of a variety of taxa, which would enrich the ecology of the area and add to the aesthetics.

Hence, in view of the above measures, the impact on terrestrial ecology would be bare minimum and insignificant.

4.2.8 Demography and Socio-Economics

The impact of the proposed plant would begin to be felt with the start-up of the construction activities.

The non-workers constitute about 66.6 % of the total population in 10 km radius study area. Some of them will be available for employment in the proposed plant during construction activities.

In addition to the opportunity of getting employment as construction labourers, the local population would also have employment opportunities in related service activities like petty commercial establishments, small contracts/sub-contracts and supply of construction materials for buildings and ancillary infrastructures etc. Consequently, this will lead to economic upliftment of the area.

With all the above mentioned consequences with respect to environmental attributes the impact during the construction phase will be limited and necessary measure will be taken to maintain the environmental components in limits as per NAAQS.

4.3 Impacts during Operational Phase

The power plant operations in general cause environmental degradation and if adequate control measures are not taken to prevent/mitigate the adverse environmental impacts, these operations may cause irreversible damage to the ecosystem. The environmental parameters which are most commonly affected by proposed plant activities are:

- Land Use;
- Soil;
- Topography and Climate;
- Air Quality;
- Drainage;
- Water Resources and Quality;
- Noise Levels;
- Ecology (Terrestrial and Aquatic);
- Landuse Pattern; and
- Socio-Economics.

4.3.1 Impact on Land use

No additional impact on site land use is envisaged during the operation stage of the project, other than those discussed during the construction stage.

The plant is proposed to be built within cement plant premises located in Guntur district which was owned by DCW. Hence there will be minimal change in the land use.

4.3.2 Impact on Soil vis-à-vis Generation of Solid Waste

There will be minimum impact on the soil due to the generation of solid waste. Ash produced will be 100% utilized in cement plant.

Further, the proposed greenbelt program with native and diversified species not only increases the biomass, soil fertility, productivity but also works as pollution sink and control of soil erosion. Hence, the likely impact on the soil characteristics will be insignificant.

4.3.3 Impact of Solid Waste

- **Plant Operations**

Ash is the major solid waste generated from the proposed coal based power plant. Coal consumption of 0.21 MTPA in power plant i.e., 0.0945 MTPA was considered for estimation of ash generation. Ash will be generated in both forms viz. bottom ash and flyash. About 80% of the total ash generations will be flyash and remaining 20% is bottom ash. The details of the solid waste generation are given in **Table-4.1**.

TABLE-4.1
EXPECTED SOLID WASTE FROM POWER PLANT

Plant	Quantity of Generation	Mode of Disposal
Ash Fly ash Bottom ash	0.0945 MTPA 0.0756 MTPA 0.0189 MTPA	• Fly ash will be 100% utilized for pozzolona cement making by the cement plant • Bottom ash will be used in back filling

- ***Ash Utilization***

Fly ash utilization will be as per MoEF flyash utilization notification. Flyash will be 100% utilized for production of pozzolona cement making by the cement plant.

Solid waste in the form of sludge is generated from the STP. The sludge will be used for maintaining the MLSS in the activated sludge process of STP and the balance sludge will be dried and used as manure for greenbelt development.

4.3.4 Topography and Climate

The proposed plant site will be located on a flat area. Minimum leveling is required to be carried out during the construction of the plant. This will not cause any significant topographical changes in the area.

Similarly, micro or macro climatic changes including thermal imbalances are not envisaged since the maximum flue gas temperature will be about 140°C. It can be concluded that the project as a whole is not likely to have any adverse impacts on the topography and climate during its operation.

4.3.5 Impact on Air Quality

The fugitive dust emissions expected are from coal storage yards, coal conveyor belt area, transportation of fuel and solid waste.

In the proposed project coal handling plant will be properly operated with EMP suggested in this report, no major fugitive dust emissions are envisaged. The fuel will be received through rail line and the solid waste will be sent to cement plant by pneumatic conveyors. Hence, no dust emissions from transportation are envisaged. However, internal roads are to be asphalted to further reduce fugitive dust emissions.

The dust emissions, if any, from the above areas will be fugitive in nature and maximum during summer season (when the wind velocities are likely to be high) and almost nil during the monsoon season. The dust emissions are likely to be confined to the place of generation only. The quantification of these fugitive emissions from the area sources is difficult as it depends on lot of factors such as dust particle size, specific gravity of dust particles, wind velocity, moisture content of the material and ambient temperatures etc. Also, there is a high level of variability in these factors. Hence, these are not amenable for mathematical dispersion modelling. However, by proper usage of dust suppression and dust extraction measures, dust generation and dispersions will be reduced.

- **Fugitive Emissions**

Fugitive dust emissions from the proposed plant would be significant as there will be air pollution due to activities like transport of coal, coal handling and generally due to the movement of vehicles on the roads. Hence, the impact due to fugitive emissions would be insignificant. All the internal roads within the plant will be metalloid; hence dust arising from the internal roads will be in significant. The proposed greenbelt and periodic water sprinkling will help reduction in fugitive emissions.

4.3.5.1 Model Data

- **ISC ST3**

- *Emission and Stack Details*

The main pollutants from the proposed project will be Particulate Matter, Sulphur dioxide (SO_2) and Oxides of Nitrogen (NOx) from the proposed power plant. The pollutants are dispersed adequately by providing suitable stack heights. The particulate matter emissions in power plant will be restricted below 50 mg/Nm^3.

The details of expected stack emissions from the proposed plant are given in **Table-4.2**. The emission calculations are given in **Annexure-X**.

- *Meteorological Data*

The hourly meteorological data recorded at site is converted to the mean hourly meteorological data as specified by CPCB and the same has been used in the model. Hourly mixing heights are taken from the "Atlas of hourly mixing height and Assimilative capacity Atmosphere in India" by Indian meteorological department 2008 New Delhi has been used. The meteorological data of the Pre monsoon season is used for modifying.

- *Presentation of Results*

Model simulations have been carried out for pre monsoon season. For the short-term simulations, the concentrations were estimated around 1200 receptor points chosen to obtain an optimum description of variations in concentrations over the site in 10-km radius covering 16 directions.

The predicted incremental ground levels concentrations for PM, SO_2 and NOx are given in **Table-4.3.** Emission calculations are enclosed as **Annexure-X**. The predicted ground level concentration isopleths for PM, SO_2 and NOx during normal operations are given in **Figure-4.1, Figure-4.2** and **Figure-4.3**.

TABLE-4.2
EMISSIONS FROM PROPOSED STACKS

Sr.No	Stack Dimensions	CPP	Coal Crusher	Raw Mill-I&II	Cooler	Coal mill-I	Coal Mill-II	Cement Mill-I	Cement Mill-II	Cement Mill-III
1	Stack height (m)	77	40	70	30	30	30	32	31	35
2	Diameter (m)	2.0	1	3.5	3	1	1	1.25	1	1.25
3	Velocity (m/s)	15.96	12	10	10	14	14	12	12	12
4	Temperature (deg C)	140	70	120	220	80	80	80	80	80
5	Flow rate (Nm^3/sec)	36.15	8.2	72.9	42.7	9.3	9.3	12.4	8.0	12.4
6	Particulate Matter (g/s) (50 mg/Nm^3)	1.80	0.41	3.65	2.14	0.46	0.46	0.62	0.40	0.62
7	Sulphurdioxide (g/s) 0.5 % S	66.6	-	13.13	-	-	-	-	-	-
8	Oxides of Nitrogen (g/s) 260 ng/kjoules	23.2	-	6.09	-	-	-	-	-	-

TABLE-4.3
SHORT TERM INCREMENTAL MODELING RESULTS –CAPTIVE POWER PLANT

Pollutant	Incremental Levels (µg/m^3)	Distance (km)	Direction
Captive Power Plant			
PM_{10}	0.17	1.0	NW
SO_2	6.4	1.0	NW
NOx	2.24	1.0	NW
Captive Power Plant + Cement Plant			
PM_{10}	2.8	1.4	NW
SO_2	7.1	1.4	NW
NOx	2.5	1.4	NW

A perusal of the results reveals that the maximum short term 24 hourly incremental ground level concentrations for PM, SO_2 and NOx during normal operations of the power plant are likely to be 0.17 $\mu g/m^3$, 6.4 $\mu g/m^3$ and 2.24 $\mu g/m^3$ respectively occurring at a distance of 1.0-km, NW during Pre-monsoon Season.

- ***Resultant Concentrations after Implementation of Proposed Plant***

Cumulative impact on baseline ambient air quality, after the implementation of the proposed plant has been arrived by superimposing the present baseline maximum air quality levels of each pollutant. The resultant ambient air quality after implementation of the proposed plant during normal working operations is given in **Table-4.4**.

TABLE-4.4
RESULTANT BASELINE CONCENTRATIONS AFTER COMMISSIONING (DURING NORMAL WORKING OPERATIONS)

All values are given in $\mu g/m^3$

Pollutant	Baseline Concentrations	Incremental Concentrations		Resultant AAQ Concentrations		NAAQS 2009
		CPP	Combined	CPP	Combine	
PM_{10}	56.8	0.17	2.8	56.97	59.6	100
SO_2	11.6	6.4	7.1	18	18.7	80
NOx	14.2	2.24	2.5	16.44	16.7	80

The resultant concentration after implementing, the GLCs as the baseline concentrations will be within the limits as per the notification by MoEF dated 14/11/09.

Hence, the impact on the surrounding ambient air quality due to the proposed plant is likely to be insignificant after implementation of the project.

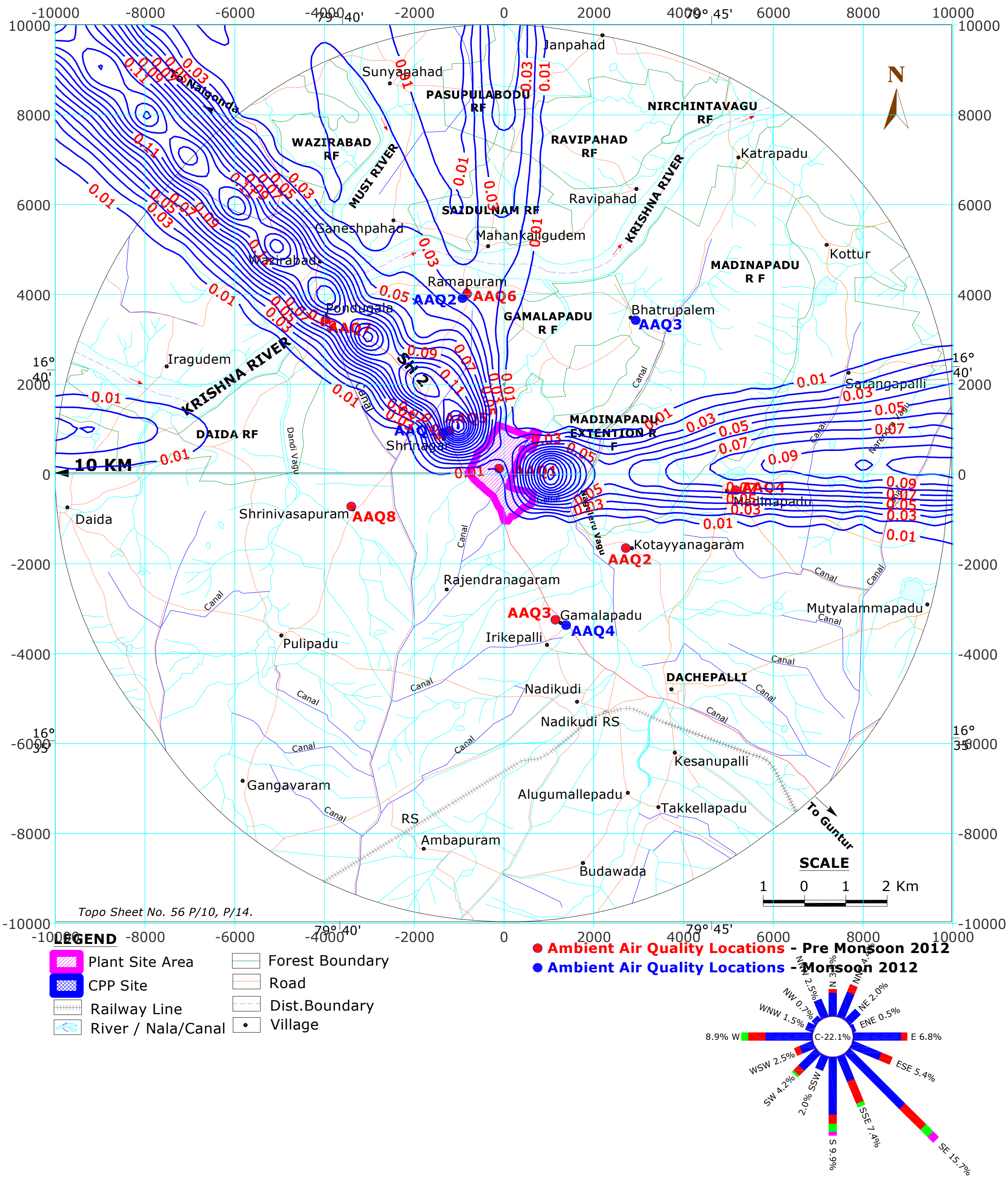


FIGURE-4.1
SHORT TERM GLC CONCENTRATION OF PM_{10}

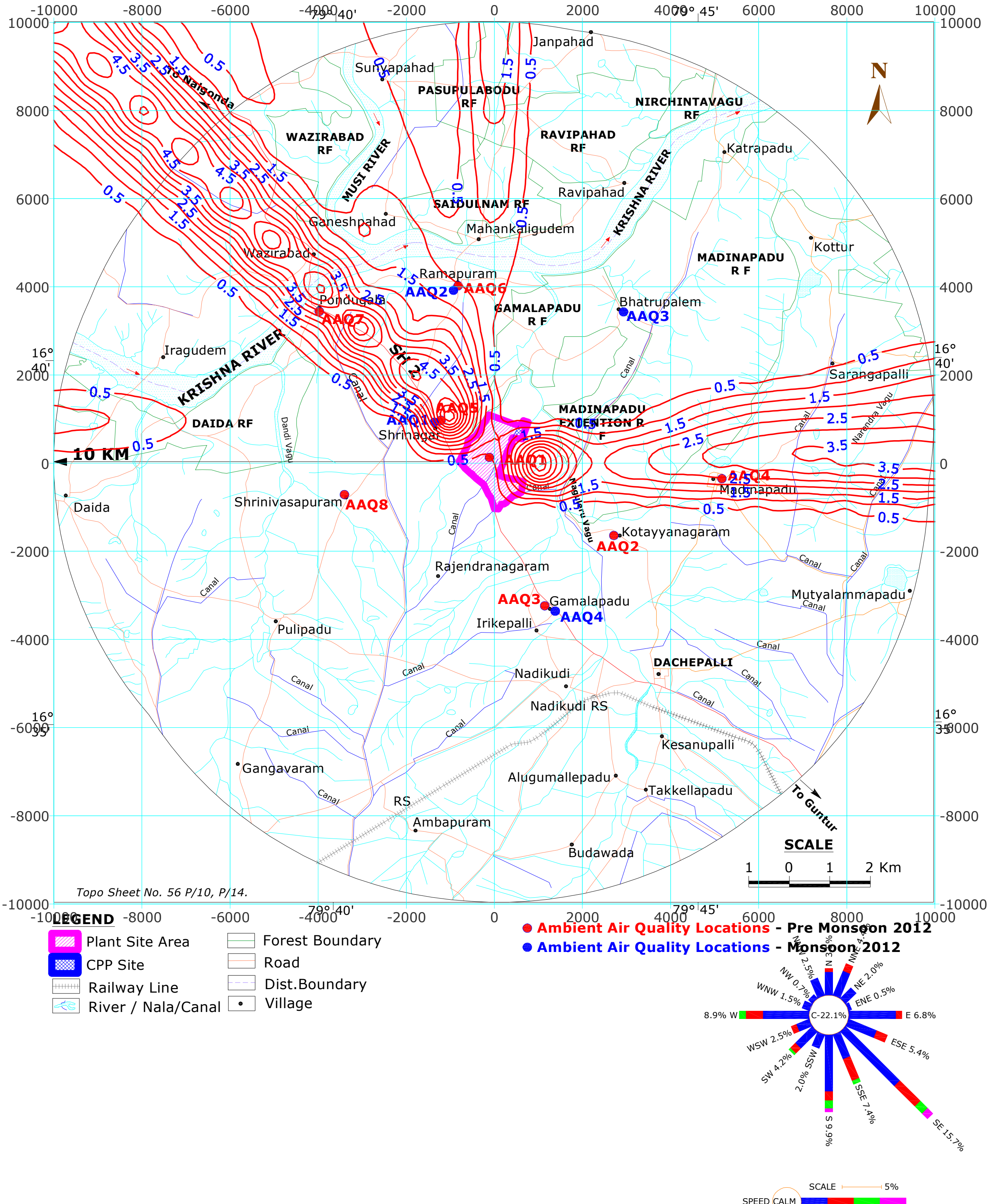


FIGURE-4.2
SHORT TERM GLC CONCENTRATION OF SO_2

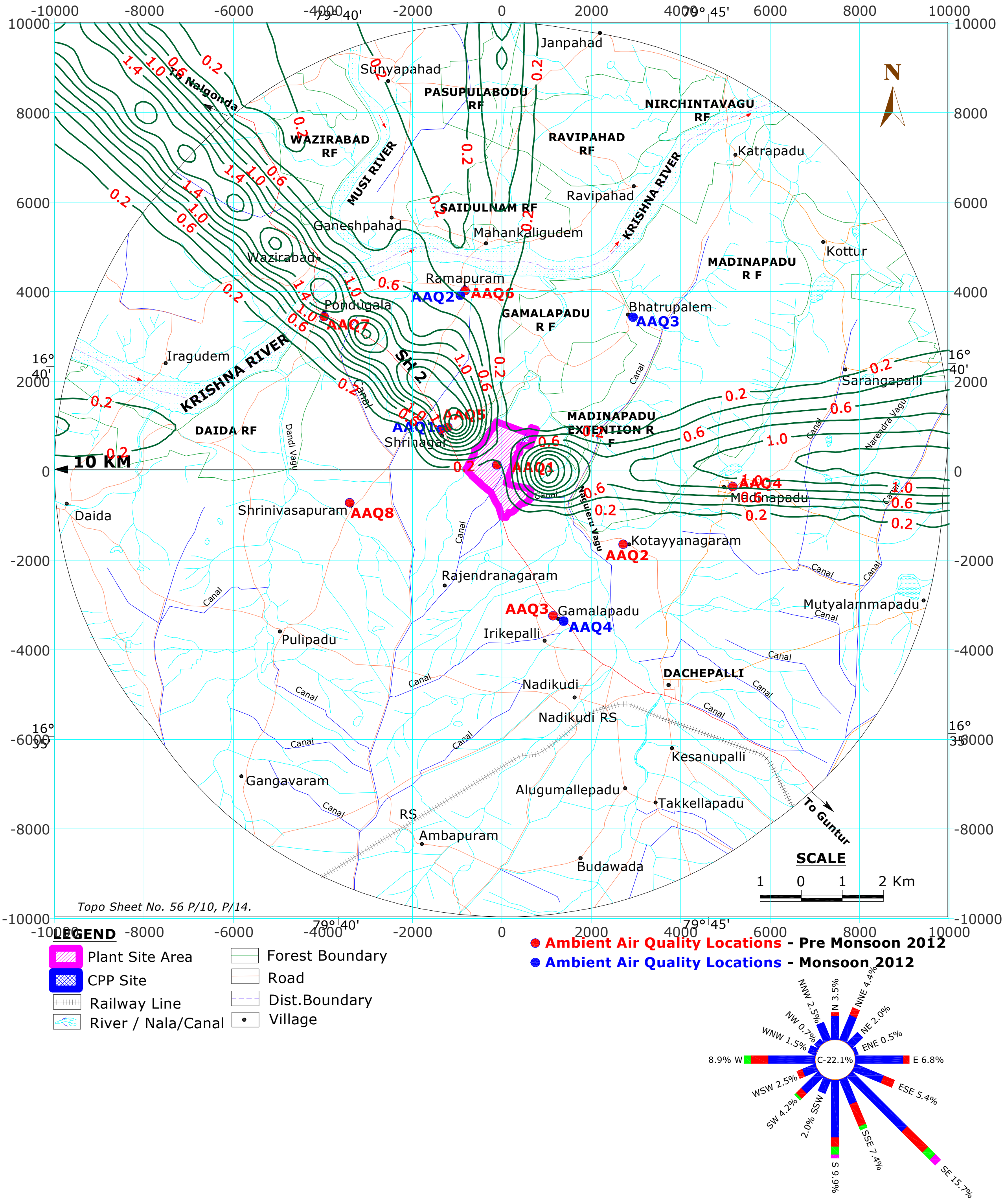


FIGURE-4.3

SHORT TERM GLC CONCENTRATION OF NO_X

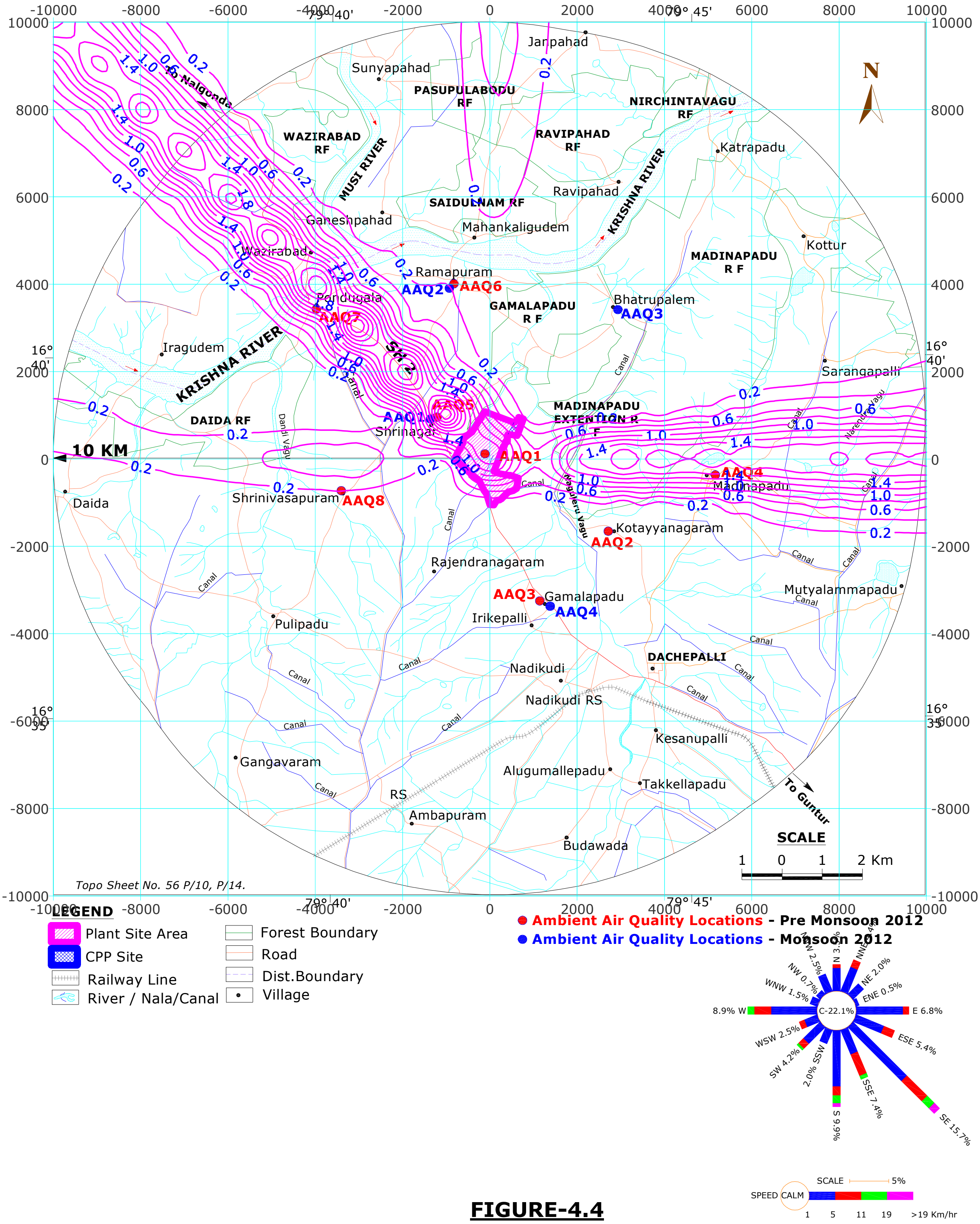


FIGURE-4.4
CUMULATIVE GLC CONCENTRATION OF PM

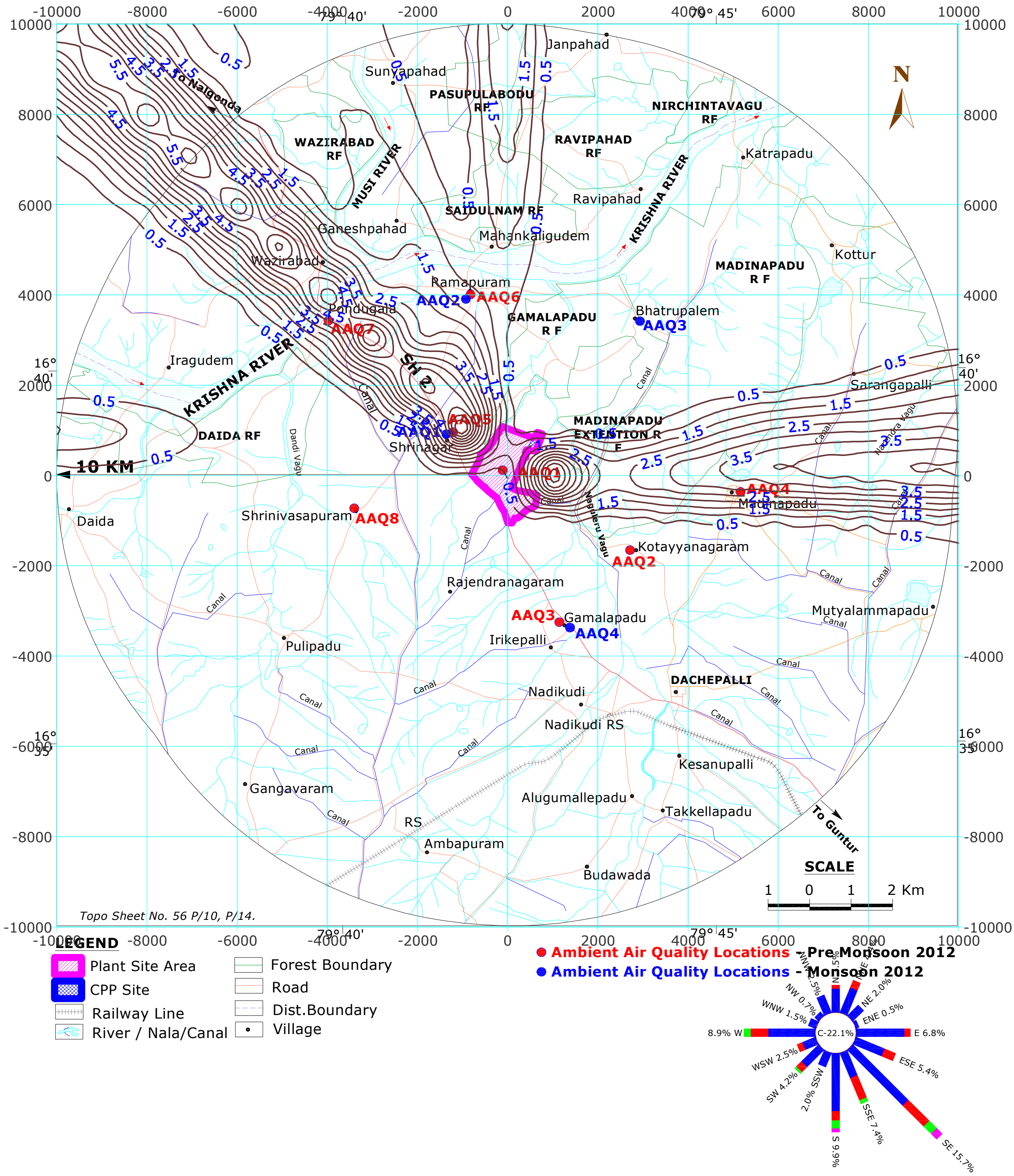
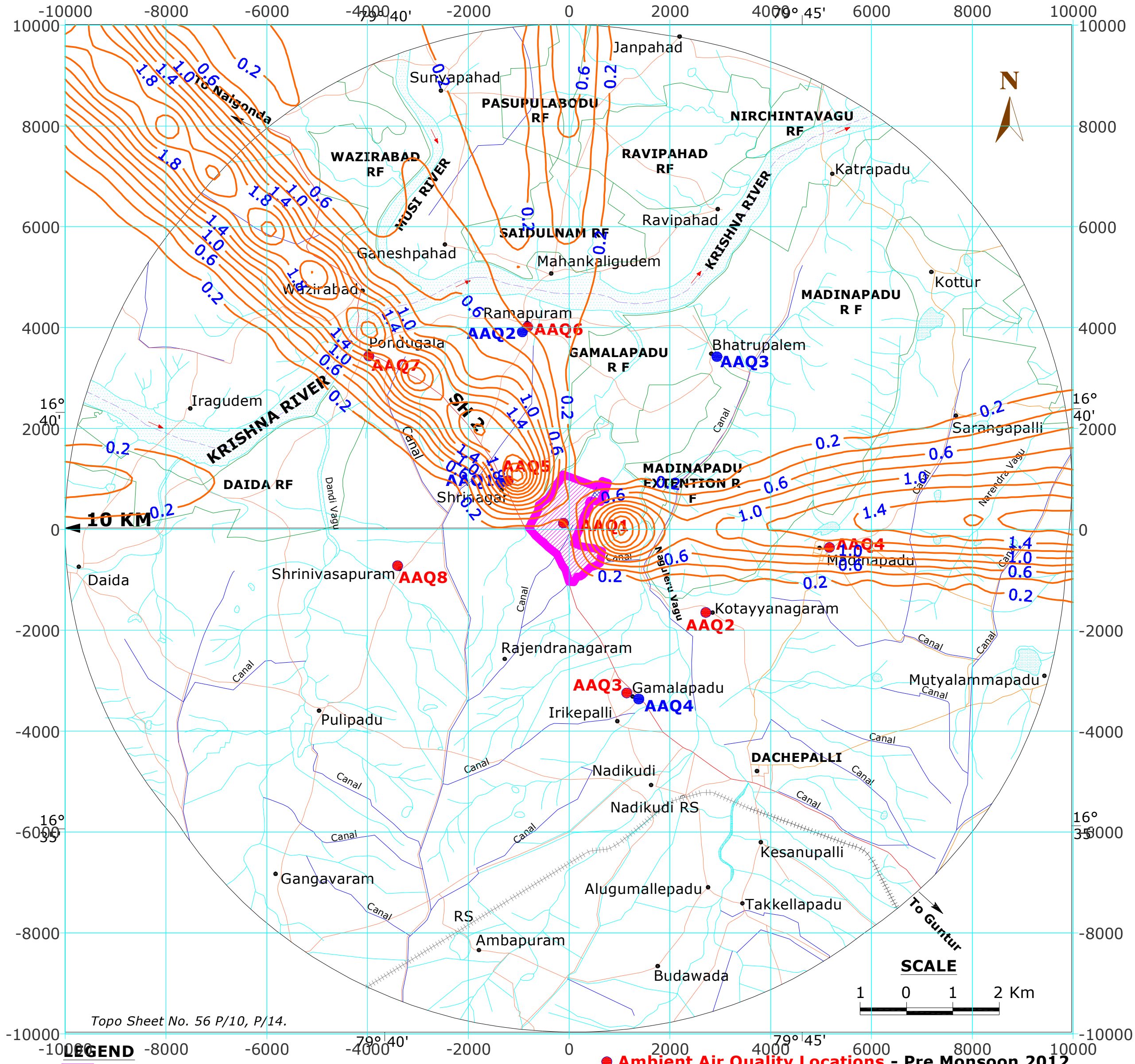


FIGURE-4.5
CUMULATIVE GLC CONCENTRATION OF SO2



LEGEND

- Plant Site Area
- CPP Site
- Railway Line
- River / Nala/Canal
- Forest Boundary
- Road
- Dist.Boundary
- Village

● Ambient Air Quality Locations - Pre Monsoon 2012
● Ambient Air Quality Locations - Monsoon 2012

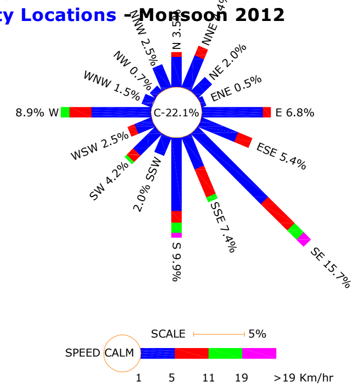


FIGURE-4.6
CUMULATIVE GLC CONCENTRATION OF NO_X

4.3.6 Impact on Air Quality - Fugitive Emissions

The fugitive dust emissions expected are from coal storage yards, coal conveyor belt area, transportation of fuel and solid waste.

In the proposed project coal handling plant will be properly operated with EMP suggested in this report, no major fugitive dust emissions are envisaged and hence, no dust emissions are envisaged from ash dump areas. The fuel will be received through rail network and the ash generated will be completely utilised in cement plant. Hence, no dust emissions from transportation are envisaged. However, internal roads are to be asphalted to further reduce fugitive dust emissions.

The dust emissions, if any, from the above areas will be fugitive in nature and maximum during summer season (when the wind velocities are likely to be high) and almost nil during the monsoon season. The dust emissions are likely to be confined to the place of generation only. The quantification of these fugitive emissions from the area sources is difficult as it depends on lot of factors such as dust particle size, specific gravity of dust particles, wind velocity, moisture content of the material and ambient temperatures etc. Also, there is a high level of variability in these factors. Hence, these are not amenable for mathematical dispersion modelling. However, by proper usage of dust suppression and dust extraction measures, dust generation and dispersions will be reduced.

- **Impact of off-Site Traffic on Air Quality**

In the proposed the coal will be transported by Rail/road. The fly ash will be transported by pneumatic conveyors to the cement plant. The vehicular movement details are given assuming that if the mode of transportation is by road. The details of the same are given in **Table-4.5**.

TABLE-4.5
TRAFFIC DETAILS

Material	Proposed Quantity	Truck Capacity	No. of vehicles
	MTPA	(tons)	Trucks/day
Coal	0.21	30	19

In order to estimate the impacts dispersion modeling has been carried out by using the air quality model CALINE4 line source model, developed by California Department of Transportation. The model is based on Gaussian diffusion equation and uses a mixing zone concept to characterize pollutant dispersion over the roadway. The model has been extensively tested for its predictive capability for traffic related air quality impacts. Given the source strength, meteorology, site geometry and site characteristics, the model can reliably predict pollutant concentrations for receptors located within 300 meters of the roadway, the most important region for estimating the impacts due to the low elevation emissions. A longer time horizon has not been considered because of uncertainty in ascertaining the emission factors for various categories of vehicles in future due to the probable change in technology and fuel use.

The averaging time for model predictions is restricted to 60 minutes. The averaging time is so selected because the primary meteorological factors that influence the air quality predictions i.e. wind speeds and directions do not remain steady for longer time periods. Also, during the peak traffic hours, the traffic volumes typically show significant variations over periods longer than one hour.

Due to averaging time of 60 minutes, the project impacts on air quality are essentially assessed based on one hourly standard for CO. Hourly standards for NOx are not available. The standards for Hydrocarbons (HC) are not specified by CPCB. The comparison of the predicted concentration of HC in absence of the standards could not be possible.

- ***Vehicular Emissions***

The standards for emissions of Carbon monoxide, Hydrocarbons, Oxides of Nitrogen and Particulate Matter for diesel driven vehicles prescribed by Bharat Stage Emission Standards applicable for trucks are used since the major traffic will be of heavy trucks.

- ***Emission Rate***

The emission rate of the different type of vehicles is calculated with speed of 40 kmph and presented in **Table-4.6.**

TABLE-4.6
VEHICULAR EMISSIONS RATES FOR TRUCKS

(All values are given in gm/KWh)

Pollutants	Emissions (g/Kwh)	Emissions (g/truck)	Total emissions/hour
CO	2.1	229	1584
HC	0.66	72	485
NOx	5.0	545	3600
PM	0.16	17	21.2

- ***Meteorological Conditions***

The air quality scenarios were developed for all stability classes. The average wind speeds and the mixing heights for the particular stability class considered for the modelling studies are given in **Table-4.7.**

TABLE-4.7
METEOROLOGICAL DATA CONSIDERED FOR MODELLING

Stability Class	Wind Speed (m/sec)	Mixing Heights (m)
A	1.2	1000
B	1.8	1000
C	2.2	800
D	2.8	500
E	1.8	300
F	1.0	100

- ***Observations***

Caline-4 model is used for predicting the concentrations of CO, and NOx. The model was run for all the stability class. The concentrations of the pollutants are predicted at a 10 m to 200 m distance from the edge of the road. The model results are presented in **Table-4.8.**

TABLE-4.8
HOURLY PREDICTED RESULTS FOR CO, HC AND NOX

Distance (m)	Concentration (µg/m^3)	
	CO	NOx
10	13.7	32.1
40	11.3	26.3
60	9.9	23.2
80	7.4	17.1
100	5.8	15.6
150	6.7	13.5
200	5.2	12.2

It is observed from the predicted maximum concentrations occur under A stability class at 10 m distance from the edge of the road.

Conclusions on Impact on air quality due to Traffic

- ***CO Levels***

The predicted maximum hourly CO concentration is 13.7 µg/m^3. On comparison with the hourly standard for CO, which is specified as 4000 µg/m^3 by CPCB, it is seen that no infringement of CO standard are expected due to the proposed project. The CO levels in fact will remain well below the standards. The project therefore has insignificant impact, if any, on ambient air quality in terms of CO.

- **NOx Levels**

The maximum predicted hourly NOx concentration is 32.1 µg/m^3. The hourly standards for NOx are not specified by CPCB, hence the hourly NOx standard of 400 µg/m^3 specified by World Health Organisation (WHO) is considered for comparison. It is observed that no infringement of this standard will occur due to traffic on the roads in the post project scenario. Hence, impact on air quality due to traffic will be well within the permissible limits.

- **Impact on Adequacy of Existing Highway**

The transportation of fuel will involve generation of additional traffic of about 19 trucks per day.

The traffic contribution from the proposed plant will be due to the transportation of coal. As worst case 100% transportation by road has been considered for these materials. Compared to the existing traffic on highway, the incremental traffic density due to the proposed plant (19 trucks per hour) will be negligible. Hence, insignificant impact on the adequacy of the highway is envisaged.

- **Impact of Fugitive Emissions on Flora & Fauna**

- *Flora*

There is no forest area in the core zone, whereas in buffer zone there are nine reserved forests. The vegetation in the buffer zone is mainly of the shrub variety. As the project activity is to the core zone no impact on the flora of the buffer zone due to the proposed project is anticipated.

Therefore, the impact of these emissions on the surrounding agro-ecosystem will be insignificant.

- *Fauna*

The impact on the fauna of the buffer zone due to the project activity will be marginal. The proposed progressive plantation over a period of time will create conditions favorable for fauna.

4.3.7 Impact on Drainage

No stream crossing the plant site. Some seasonal nallas, which flow in rainy season, are observed in the buffer zone and no diversion of these nallas around the working areas is foreseen. No impact on surface water drainage is envisaged.

4.3.7.1 Impact on Water Resources

The total water requirement for the proposed plant will be about 550 m^3/day, which will be sourced from mine pit.

However, DCW is proposing to develop rain water harvesting structures, roof top harvesting structures in the area to recharge ground water in the region.

4.3.7.2 Impact on Water

Wastewater Generation

The total wastewater generated from various units of the CPP is about 243.1 m^3/day and about 64 m^3/day is the domestic waste water which will be treated in the Sewage treatment plant. Therefore the total wastewater for handling at the power plant is about 307 m^3/day.

Wastewater from filtration unit, softener and DM plant will be neutralized before disposal to guard pond. Wastewater from plant drains (service water) and cooling water) along with wastewater from neutralization tank will be let into the guard pond.

The wastewater generation from the proposed power plant is presented below in **Table-4.9**.

TABLE-4.9
DETAILS OF WATER CONSUMPTION AND WASTEWATER GENERATION FROM THE PROPOSED PLANT

Expressed in m^3/day

Sr. No.	Units	Requirement	Losses /use	Wastewater Generation	Remarks
1	Boiler feed water make up considering DM plant process requirement	459.3	216.0	243.1	Guard pond after neutralization
2	Ventilation System	6.1	4.9	1.5	Sent to Guard Pond
3	Potable water in Plant	17.6	3.4	14.1	For greenbelt after treatment in STP
4	Washing & Sanitation	20.9	4.1	16.9	Treated in STP and sent to Guard Pond
5	Gardening and landscaping	14.3	14.1	-	-
6	Water Treatment Losses	31.9	-	22.1	Sent to Guard Pond
	Clarifier Sludge	-	-	9.8	Low lying area
	Total	**550**	**243**	**307**	120- Dust suppression 9.8- Landfill 14.1-Greenbelt 120- IBD quenching

Water balance diagram is shown in **Figure-4.7**.

Wastewater – Sanitary

The sanitary wastewater generation is mainly from CPP and township areas generated due to domestic uses. The sanitary wastewater is treated in the Sewage Treatment Plant and treated effluent is utilized for greenbelt development.

Treated Effluent Characteristics

The expected ETP and STP effluent characteristics are given in **Table-4.10.**

TABLE-4.10
WASTEWATER CHARACTERISTICS

Sr. No.	Parameters	Treated ETP Wastewater	Treated Water	Limits as per GSR 422(E) (On Land for Irrigation)
1	pH	6.5-7.0	7.0-7.5	5.5-9.0
2	Appearance	Clear	Clear	-
3	Total Suspended Solids (mg/l)	<100	<100	200
4	Bio-Chemical Oxygen Demand (3 days at 27°C)	<10	<30	100
5	Oil and Grease	<10.0	<10.0	10.0

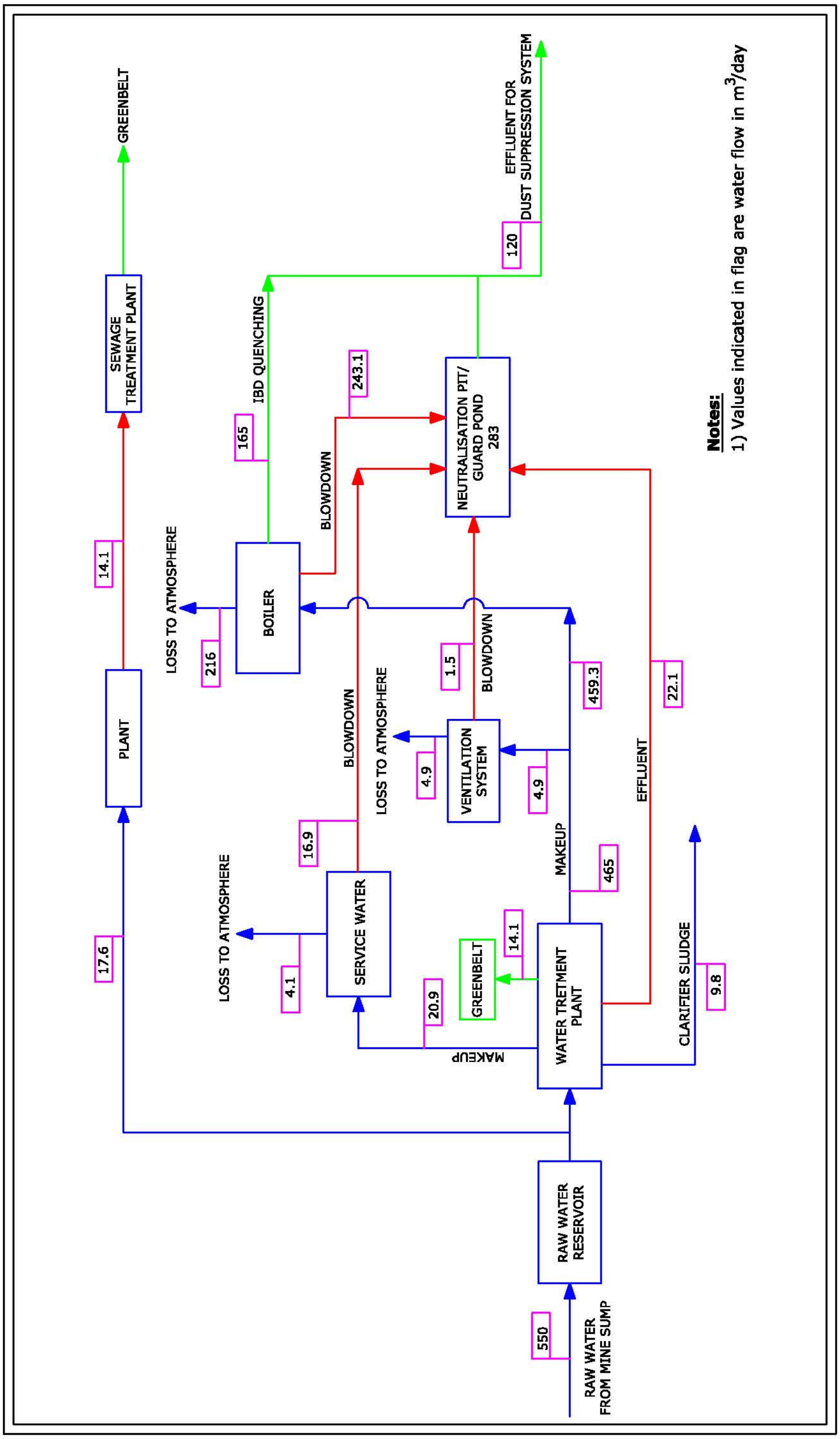


FIGURE-4.7

WATER BALANCE DIAGRAM

4.3.8 Impact of Noise Levels

The proposed power plant contains a number of items of heavy equipment – such as Turbines, engines, and generators. There will be associated road or rail traffic, including truck movement and loading equipment. For computing the noise levels at various distances with respect to the plant site, noise levels are predicted using a user friendly model.

4.3.8.1 Impact due to Plant Operations

- **Input for the Model- Plant Operations**

The prediction of incremental noise levels due to the operation of the proposed power plant has been carried out using mathematical model. Noise levels are mainly generated from turbine and cooling tower. All the equipment are designed to comply with the Factories Rules and Stipulations and will not exceed 90 dB (A) at 1 m distance. The range of noise levels of machinery in cement plant are given in **Table-4.11.**

TABLE-4.11
EXPECTED NOISE LEVELS AT THE POWER PLANT

Sr. No.	Location	Noise Levels dB(A)	Distance from Source
1	Compressors	82-85	2 m from the source
2	Boilers	80-85	2 m from the source
3	Steam turbines	80-85	2 m from the source
4	Generators	80-85	2 m from the source
5	Pump house area	75-85	2 m from the source

- **Presentation of Results-Plant operations**

The model results are discussed below and the predicted model results at plant boundary are tabulated in **Table-4.12.** The predicted noise contours are given in **Figure-4.8.**

TABLE-4.12
PREDICTED NOISE LEVELS AT PLANT BOUNDARY

Sr. No.	Plant Boundary	Noise Level, dB(A)
1	N	50.0
2	NE	45.5
3	E	47.4
4	SE	45.0
5	S	52.5
6	SW	46.0
7	W	54.2
8	NW	50.1

- **Work Zone Noise Levels**

The damage criteria as enforced by OSHA (Occupational Safety and Health Administration) to reduce hearing loss, stipulates that noise level upto 90 dB (A) are acceptable for 8 hour working shift per day. It was observed from the modeling results that, high noise levels ranging between 60 to 90 dB (A) are limited to work zone only. At the corners of the plant boundary, noise levels are found to be <55 dB (A), which is well within the prescribed norms.

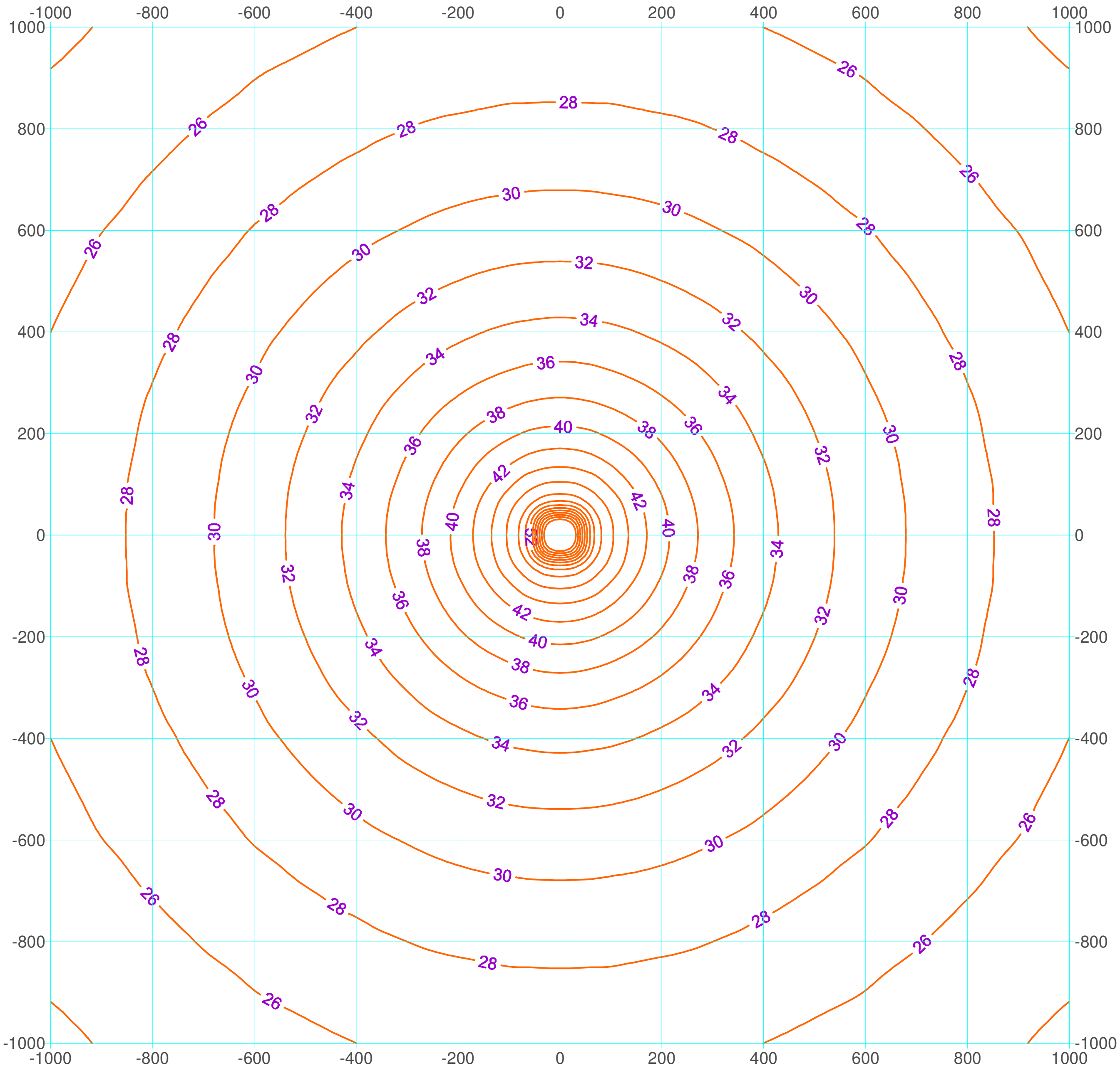


FIGURE-4.8
PREDICTED NOISE LEVELS AROUND THE PLANT

Adequate protective measures in the form of ear muffs/ear plugs will be provided to the workers working in high noise areas. All the necessary noise protective equipment will be supplied to workmen in the plant complex. In addition, reduction in noise levels in the high noise machinery areas could be achieved by adoption of suitable preventive measures as described in EMP.

- **Community Noise Levels**

Day and night sound pressure levels L_{dn} is often used to describe the community noise exposure, which includes 10 dB (A) night time penalty. The predicted noise levels at a distance of 0.3 km and above from plant boundary would be less than <45 dB (A). Most of the human settlements are beyond 0.3 km from the plant boundary. Hence, impact on general population would be insignificant.

4.3.9 Impact on Ecology

4.3.9.1 Impact on Terrestrial Ecology

The impact on terrestrial ecology may occur due to emission of gaseous pollutants like SO_2, PM and NOx.

The pollutants from the proposed plant include Sulphur dioxide, Particulate Matter and NOx. The impact of air pollutants on vegetation due to the proposed CPP are identified and quantified by using air dispersion modeling. The simulations have been done to evaluate PM, SO_2 and NOx likely to be contributed by the proposed project activities, the resultant concentrations for study period are within the limits as per National Ambient Air Quality Standards.

4.3.9.2 Impact on Aquatic Ecology

Since the unit will be operating on zero discharge process, no adverse impact on aquatic ecology is envisaged. The plant drainage system will be suitably designed such that the storm water does not carry any pollutants.

4.3.9.3 Impact on Migratory Paths for Wild life

As per the Forest Working Plans, there are no identified migratory paths for major and minor wild life in the project site and the study area. The identified avi-fauna, which are observed in the project site and in the study area, are local migrants only. Therefore, the proposed project operations are not likely to have any adverse impact on the paths for avifauna.

Since very tall stack is proposed for the CPP and adequate control measures are planned the pollutants like particulate matter, SO_2 and NO_x will be minimum and well dispersed into the atmosphere and will not have a significant impact on the surrounding residential and rural areas and also will not cause any significant impact or damage to the existing vegetation and forest present near the plant.

4.3.10 Prediction of Impacts on Socio-Economics

The project will definitely help in improvement of the socio-economic status of the society in the region by generating direct or indirect employment opportunities. The project will also induce the development of ancillary and related small-scale industries in the adjoining areas. It is obvious to assume that the activities of the proposed project operations will produce some improvements in the socio-economic levels in the study area.

The project will contribute additional revenue to the State and Central exchequer in the form of royalty, cess and other taxes etc. The anticipated impact of this project on various aspects is described in the following sections.

- *Impacts on Employment Generation*

The project will require about 50 personnel during operation of plant. In addition to the above, about 300 personnel during construction phase excluding contract labour.

This project will also create many job opportunities for the local people. Local people will be given preference if found suitable for the jobs in the plant. The employment of people will be both on permanent as well as on contract basis.

- *Impact on Literacy and Educational Facilities*

The literacy rate of the study area is poor. The literacy level of the project area is likely to increase as there will be influx of many educated people taking up jobs in the CPP, which is likely to result in establishment of better educational facilities. Better literacy rates are possible due to assumed better economic conditions of the people. Better literacy means better social status and will improve the life style in the region. This will be a positive impact due to the proposed project.

- *Impacts on Infrastructure Development*

The availability of social infrastructure depends to a large extent on the industrialization of the area. The establishment of the power plant would aid in the overall social and economic development of the region.

Apart from jobs, the DCW will provide medical and educational facilities to the employees, which can also be availed by the people around the plant. There will be significant growth in the infrastructure of the area. The company is also dedicated towards community development by organizing immunization programs and medical camps, mobile dispensary etc.

- *Economic Multiplier Effect of the Project*

The proposed project would act as a nucleus to trigger an era of industrialization in the area by way of:

❖ The industrial activity of the proposed plant coupled with its ancillary industries would contribute to overall regional development;

- The realization of the project will result into direct revenue accruals to both state and central exchequer in terms of power tariff, taxes, duties, royalties as also direct and indirect employment besides increased industrial activities in and around the region;

- *Impacts on Human Health*

  The impact from the air emissions of PM is not expected to be significant since the stack design and the atmospheric conditions are such that the ambient air quality at present as well as in future after the implementation of the project will be well within the prescribed ambient air quality limits set forth by SPCB/CPCB. The proponents of this facility will adopt effective control systems at all the identified sources of dust generation.

4.4 Indirect Impacts

4.4.1 Impacts on Public Health and Safety

The discharge of waste materials (stack emission, wastewater and solid wastes) from process operations can have potential impact on public safety and health. The impact from the discharge of waste products is not expected to be significant since, the adverse impacts on ambient air, water and soil quality are predicted to be low.

It is predicted that the impacts on public safety will be very low, due to the effective safety system and safety management available in the plant. Overall, the impact on public safety and health from the proposed project activities are likely to be insignificant.

4.4.2 Impacts on Cultural Resources

There are no historical monuments or ancient temples within the study area. Even otherwise also the future concentration levels in ambient air will be too low to cause any adverse effect.

4.5 Impact on Other Sensitive Locations

Nagamma temple is the only historical monument located at a distance of 4.0-km from the project boundary. Air quality predictions have been done and the incremental concentrations are limited only up to 1.0-km. Hence the impact will be insignificant with respect to the observations done during the study period.

4.6 Measures for Minimizing Adverse Impacts

The Environment Management Plan (EMP) is required to ensure sustainable development in the study area (10-km) of the plant, hence it needs to be an all encompassing plan for which the plant authorities, Government, Regulating agencies like Pollution Control Board etc working in the region and more importantly the affected population of the study area need to extend their cooperation and contribution.

The Management Action Plan aims at controlling pollution at the source level to the extent possible, with the available technology, followed by treatment measures before they are discharged.

Sound Environment Management Plan by the plant authorities is required to mitigate the impacts of the proposed power plant with its surrounding environment. The main objectives of the EMP are to:

- Keep the environment free from uncomfortable or unpleasant pollutants;
- Substantial saving of raw material thus helping in resource conservation; and
- Improvement in the quality of life resulting in indirect improvement in the productivity as a whole.

The potential environmental impacts from the proposed project are identified and the magnitude of these impacts also predicted. The potential environmental impacts to be regulated from the proposed plant are summarized below:

- Air pollution due to the emission of particulate matter and gaseous pollutants;
- Noise pollution due to various noise generating equipment;
- Wastewater generation from CPP as well as from domestic activities; and
- Solid waste disposal.

In order to minimize these adverse impacts and to ensure that the environment in and around the project site as well as the neighbouring population is well protected; an effective Environment Management Plan is developed for construction phase as well as operational phase.

5.0 ENVIRONMENT MANAGEMENT PLAN

5.1 Introduction

The Environment Management Plan (EMP) is necessary to ensure sustainable development in the area of the proposed plant complex. Hence, it needs to be an all encompassive plan for which the proposed industry, Government and Regulating agencies like Pollution Control Board working in the region and more importantly the affected population of the study area need to extend their cooperation and contribution. The identification and quantification of impacts based on scientific and mathematical modelling has been presented. The Management Action Plan aims at controlling pollution at the source to the extent possible, with the available technology, followed by treatment measures before they are discharged.

Sound Environment Management Plan by the plant authorities is required to mitigate the impacts of the proposed with its surrounding environment. Specifically, the EMP lays stress on key environmental aspects and issues of the project during operation phase by:

- Identifying potential environmental impacts;
- Recommending mitigation measures for the negative impacts;
- Identifying opportunities for enhancement measures;
- Providing an organizational framework for operating Environment Management System and other functions of the project by assigning roles and responsibilities for environmental monitoring and management;
- Formulating Environmental Action Plans (EAPs) which specify mitigation, periodic and annual monitoring activities during project implementation and operation.

The potential environmental impacts from the proposed project are identified and the magnitude of these impacts also predicted. The potential environmental impacts to be regulated from the proposed plant are summarized below:

- Air pollution due to the emission of particulate matter and sulphur dioxide and fugitive emissions;
- Noise pollution due to various noise generating equipment;
- Wastewater generation from TPP as well as from domestic activities; and
- Solid waste (STP sludge + Flyash) disposal.

In order to minimize these adverse impacts and to ensure that the environment in and around the project site as well as the neighbouring population is well protected, an effective Environment Management Plan is developed for construction phase as well as operational phase.

5.2 Environment Management during Construction Phase

The construction activities of the proposed plant will have some adverse impact on the environment. The activities during the construction phase of proposed plant include site preparation, transportation of construction materials and equipment and construction of the infrastructure facilities. During this phase, it is imminent that workers/labourers would be staying on site till the completion of the construction work. However, this is not considered as a long-term impact. The project proponents, in order to minimize these impacts, would undertake adequate preventive and remedial measures as outlined below:

5.2.1 Air Pollution Management

No major leveling and cutting operations are required, due to the availability of plain land. Hence, no major excavation of the area except for the purpose of foundation is envisaged. However, during dry weather conditions, dust is likely to be generated from excavation and transportation activities. Hence, it is necessary to control the dust generated by excavation and transportation activities. Dust control will be carried out by water sprinkling. Ambient air levels of SO_2 and NOx are likely to increase due to the operation. However, most of the construction equipments are mobile. Hence, there will not be concentration of emissions at any single point. The emissions from diesel vehicles in use will be checked on monthly basis and brought to the required levels of emission standards. It will also be ensured that both gasoline and diesel powered construction vehicles are properly maintained to minimize smoke in the exhaust emissions.

5.2.2 Noise Environment

Noise generation during construction phase is due to the operation of heavy equipment and vehicular traffic in the area. However, these impacts are short term, intermittent and temporary in nature. The effect of noise on the nearest inhabitants during the construction activity will be negligible as the noise will be diffused by the natural obstructions and with distance. However, it is advisable that on-site workers working with high noise generating equipment will have protection devices like earmuffs. Noise prone activities have to be restricted to the extent possible to day time only particularly to be avoided during 10 pm to 6 am in order to have minimum impact on community.

5.2.3 Water Environment

The water environment is likely to affect to certain extent due to the construction activities because of the generation of effluents from sanitary facilities for the construction workers, washing of vehicles and spillage of fuels. The water resources are likely to be affected quantitatively because of water utilization by the workers for domestic purposes. However, these are of temporary in nature and the impact will be minimum, limited to constructional phase only.

The vehicle maintenance area will be located in such a manner to prevent contamination of surface and ground water sources by accidental spillage of oil. Unauthorized dumping of waste oil will be prohibited.

5.2.4 Sanitation

The construction site will be provided with sufficient and suitable toilet facilities for workers to meet the proper standards of hygiene. Septic tanks followed by soak pits may be utilized to treat the domestic wastewater generated during constructional activity.

5.2.5 Land Environment

As soon as construction is over, the surplus earth will be utilized to fill up low-lying areas, the rubbish will be cleared and all unbuilt surfaces reinstated. The site does not involve any cutting of trees. Development of greenbelt will be taken up along with construction works.

5.2.6 Socio-Economics and Demography

Normally, the construction activity will benefit the local populace in a number of ways such as supply of construction labourers-skilled, semi-skilled and un-skilled, secondary sector employment and provision of goods and services for daily needs including transport.

5.2.7 Storage of Hazardous Material

The hazardous materials anticipated to be stored at the site during construction include petrol and diesel, gas for welding/cutting purpose, paints and solvents. These materials will be stored as per the international safety norms in ventilated enclosures. Site will to be identified for the storage of diesel away from the construction site.

5.3 Environment Management during Operation Phase

5.3.1 Air Quality Management

Coal based thermal power plants emit fly ash as the major pollutant besides varying degrees of other pollutants namely: coal dust, sulphur dioxide and oxides of nitrogen etc. Therefore it is recommended to monitor the concentration of PM, SO2 and NOX in the ambient air at regular intervals at predetermined locations. The control measures to combat air pollution due to proposed power plant have been formulated under two categories, i.e. for individual units as well as for the whole power plant in general. These are delineated hereunder:

- ***Coal Handling System***

Dust emission is mostly of fugitive type and necessities installation of close conveyor system along with suitable dust trapping/control facility at various transfer points. At coal yard, to prevent dust emission due to wind, frequent spraying of water is recommended. This also helps in preventing spot fires.

- ***Coal Crusher and Bunkers***

For the fine dust control, bag filters have been successfully tried in such operations. Better efficiency dry collection system will prove to be long term cost effective because of possibility of coal recovery in the process.

- ***Flue Gas***

For high efficiency collection of fly ash in flue gas from the boiler, a high efficiency ESP is proposed to be installed in this plant and that would be designed to limit the emission of the particulate matter for permissible level. Sprinkling of water will be applied at the dust generating areas. As far as gaseous pollutants namely NOX and SO2 are concerned, control measures will be taken by provision of 77 m stack as per regulations in the EPA, 1986.

Fugitive and stack emissions from the power plant will contribute to increase in concentrations of PM, SO_2 and NOx pollutants. The mitigative measures recommended in the plant are:

- Installation of ESP of efficiency more than 99.9% to limit the PM concentrations below 50 mg/Nm^3 with an extra standby field;
- Provision of bi-flue stack of 77-m height for wider dispersion of gaseous emissions;
- Furnaces and boilers will be operated with minimum excess air so that fuel consumption is reduced and NOX emissions are minimized. Low NOx burners will be installed for further reduction in NOX emission.
- The stack will have sufficient capacity to take care of emergency release conditions, for additional load of flue gas under boiler start up and shutdown periods.
- All the internal roads will be asphalted to reduce dust emission due to vehicular movement.
- The combustion units will be maintained properly for obtaining optimum efficiency and to ensure that the emission rates remain within estimated levels.
- The fugitive emissions of coal dust from storage facilities, from crushers and at coal transfer points will be reduced by adopting appropriate measures like cyclones/bag filters/ water sprinklers/ fog system.
- Developing of Greenbelt (100-m wide towards village areas and river course, 50 to 100-m wide towards other area) around the plant to arrest the fugitive emissions;
- Design of control equipment to meet the standards stipulated by CREP;
- Online flue gas monitors as well as flue gas flow rates and temperature measurement will be provided for all stacks; and

5.3.2 Noise Level Management

Manufacturers and suppliers of noise generating devices/machines like steam turbine generator, compressors and other rotating equipment will be asked to provide acoustic enclosures for noise control by adopting appropriate design and state of art technology for fabricating/assembling machines.
Proper noise barriers/ shields etc., will be provided around the equipment wherever required. Noise from equipment will be adequately attenuated by providing soundproof enclosure and insulation to minimize the noise level.

5.3.2.1 Recommendations for Noise Management

To reduce the impact of noise, shock absorbing techniques may be adopted

- Equipment will conform to noise levels prescribed by regulatory authorities (<85 dB (A));
- All opening like covers, partitions may be acoustically sealed

- The operator's cabin (control rooms) will be properly insulated with special doors and observation windows
- The operators working in the high-noise areas would be strictly instructed to use earmuffs/ ear plugs
- Noise levels will be reduced by the use of absorbing material on floors, walls and ceilings
- There will be thick vegetation in the plant premises to attenuate continuous noise.

5.3.3 Water Pollution Management

Wastewater will be generated from cooling towers, boilers in the power plant. Besides, domestic wastewater from canteen and employees wash area, township will also be generated.

- ***Demineralization (DM) Plant Effluent***

During treatment, acidic and alkaline effluent will be generated periodically. The effluents need be collected in a neutralizing pit where the acidic and alkaline effluents will be neutralized with each other. This will be pumped and mixed with other effluents in the polishing pond after filtration.

- ***Boiler Blow-down***

The boiler blow down does not require treatment to achieve the limits but relies on operating at sufficient blow down levels to prevent the build-up of contaminants. Also, by operating with proper chemistry in the condensate and feed water systems, copper and iron are not present in significant quantities in the blow downstream. The boiler blow down is also directed to the guard pond.

- ***Effluent from Oil Handling Areas***

The effluent carrying oil spillage etc. will be taken to oil/water separation. The decanted oil (containing small amount of water) will be taken to an oil separation tank for further separation. The decanted oil may be stored in a tank for reuse. The supernatant water need be sent to the polishing pond.

- ***Effluent from Ash Pond***

The drain and overflow water from the ash pond would flow from settling pond to stilling pond and from stilling pond to the clarifier where the suspended solids will be reduced by addition of alum/electrolyte. The clarified water will be pumped to the ash handling system.

- ***Domestic Waste from the Plant***

Domestic wastewater will be treated in Sewage Treatment Plant. The treated sewage from the plant will meet stream standards and would be used for plantation and secondary uses.

• *Air Pre-heater Wash Water Effluent*

Frequently, the air pre-heaters of the boilers need to be washed. The washed water would be led to the respective settling basins located near the boilers. From the settling basins, dust-laden water would be pumped at suitable intervals, to the guard pond.

• *Rain (Storm) Water Drainage*

The plant and storm water drainage will take into account the topography of the plant area, intensity of hourly rainfall and the existing area drainage pattern.

Out of the total rainfall in the plant area, a part of it will percolate into the ground, but the remaining major portion will constitute the storm water. The storm water drainage system consists of a network of open drains. Drainage from the roofs of buildings will be taken down by down comers. These down comers will discharge water into open peripheral drains. The runoff from plant areas, open areas, buildings and installations will be carried through the network of open drains running all along the road system and finally joining the main drain. The drain will be connected to water reservoir.

Interceptor drains will be constructed to collect water form surrounding areas to convey to the main drain. Open drains will be provided on one side or both sides of the road as required. For open drains, at least brick masonry lining on the sides and bottom will be provided.

Rain harvesting structures will be constructed on top of all available structures so that the rain water can be recycled for plant requirements. The rain (storm) water removed from the building roofs and yard area grade level surfaces would be directed through the open ditches and culverts to the storm drainage piping. All ditches would be concrete lined and located along the roads. All drainage ditches would be located to provide the shortest practical drainage path while providing efficient drainage for the yard. Grade level would be contoured such that storm water runoff is directed on the ground by sheet flow, to well defined drainage paths leading to the ditches.

• *Monitoring of Waste from the Plant*

All the treated effluent will be monitored regularly for the flow rate and identified parameters of quality, so that performance efficiency of treatment systems are evaluated and necessary changes recommended from time to time.

The recommended measures to minimise the impacts and conservation of fresh water are:

- Recycling of wastewater generated in cooling tower into process and ash disposal, coal handling and service water requirements;

- The plant raw water requirement will be optimised. The COC in cooling system will be maximised (such as COC=5);

- The effluent carrying oil spillage in the plant area will be sent to oil-water separator for removal of oil;
- Coal stock piles and ash ponds will be provided with garland drains and water will be treated for suspended / floating solids;
- Adequate treatment of wastewater prior to recycling/reuse to maximum extent;
- Provision of sewage treatment plant to treat domestic sewage generated from plant and township;
- Utilization of treated domestic wastewater in toilet flushing, greenbelt development and dust suppression;
- Lining of effluent pond suitably to prevent any seepage into ground to avoid any groundwater contamination;
- Provision of separate storm water system to collect and store run-off water during rainy season and utilization of the same in the process to reduce the fresh water requirement;
- Treated effluents from all streams will be stored in CMB/Effluent Pond /Guard Pond having 5 to 6 days detention time and the aquaculture may be practiced with bioassay tests on regular basis; and
- Suitable rainwater harvesting structures to be constructed.

♦ ***Wastewater Treatment***

The treatment given to the influent in the STP will be both chemical and biological treatment. The effluent will be treated adopting the following steps:

- Collection of domestic wastewater;
- Conveyance of sewage to STP;
- Screening at STP;
- Grit removal;
- Aeration for biological treatment;
- Secondary settling (biological sedimentation);
- Coagulation;
- Clariflocculation;
- Filtration; and
- Drying of chemical and biological sludge.

- ***Bar Screen Channel***

Two manually cleaned screens will be provided. One screen is operated at a time and the other will be standby.

- ***Grit Channel***

Two manually cleaned grit channels will be provided for removal of grit from the effluent. One channel will be operated at a time.

- ***Aeration***

Sewage after screening and de-gritting waste will be fed into the aeration tank. In addition to this, return sludge from the clarifier will be admitted to the inlet of the aeration tank. Here the effluent will be aerated to oxidize the organic matter. Microorganisms present in the return sludge oxidize the organic matter and use it as food and form their own cell mass. Thus, microorganism cell mass concentration continues to rise. The cell mass when removed in subsequent stage of settling, reduces the oxygen demand considerably.

The aerators provided on the platform maintain the contents in aerobic conditions by maintaining adequate oxygen transfer rates. They also provide adequate mixing of the contents and thereby contents do not settle on the floor of the tank. The flow from the outlet launder goes to the secondary clarifier.

- ***Secondary Sedimentation***

When liquid-containing solids in suspension is placed in a relatively quiescent state, those solids having a higher specific gravity than the liquid will tend to settle, and those with a lower specific gravity will tend to rise. These principles are used in the design of sedimentation tanks for treatment of wastewater. The objective of treatment by sedimentation is to remove, readily settable solids and floating material and thus to reduce the suspended solids content.

The mixed liquor from aeration tank will be carried to the center of the tank in a pipe encased in concrete beneath the tank floor. At the center of the tank, the wastewater enters a circular well, designed to distribute the flow equally in all directions. The sludge removal mechanism revolves slowly and has arms equipped with scrapers. The hopper collects the sludge, which is sent to the sludge drying beds. The sludge produced is known as biological sludge. The layout of the effluent treatment plant is given in **Figure-5.1.**

- ***Clariflocculator***

The working is similar to that of secondary clarifier described above, except that additional flocculator compartment is provided for formation of flocs with the help of coagulant viz. alum.

- ***Pressure Filter***

The effluent from the clariflocculator will be subjected to tertiary treatment, in order to further reduce the suspended solids in the effluent. One filtration unit will be provided to remove colloidal flocs and turbidity carried over from clariflocculator. The filtration unit consists of filter feed pumps, dual media pressure filter, frontal piping and air blower for air scouring.

- ***Drying of Chemical and Biological Sludge***

Sludge drying beds will be provided to de-water the sludge containing about 95-99% water. The dewatered sludge, in the form of dried cake, will be disposed off. Sludge is spread on the media containing gravel and sand. Simple physical straining of solid takes place. Water is partially evaporated at ambient temperature. At the bottom of the media, a collection system comprising of open jointed pipes will be provided to collect the filtrate. The entire system is enclosed by brick masonry. Filtrate is carried to influent sump.

- ***Utilization of STP***

The sewage water reclamation plant will cater to the load envisaged from the proposed plant. The layout and section of the sewage treatment plant is given in **Figure-5.2**.

- ***Wastewater Treatment - Effluent Treatment Plant at CPP***

The effluents from the respective neutralization pits in the CPP (DM plant, blow down from steam generator) will be routed to an Effluent Treatment Plant (ETP). The ETP consists of neutralizer, clarriflocculator, pressure filters and softener. The sludge from the clarriflocculator is routed to sludge drying beds. The effluent will be subjected to tertiary treatment for 100% re-utilization.

➢ ***Effluent Disposal***

The treated wastewater quality will confirm to the GSR-422 (E) standards for on land irrigation. The treated water will be re-cycled back to the water reservoir for use in the CPP make-up and dust suppression. Due to the above treatment process and 100% re-utilization of the treated wastewater there will not be any adverse impact on the water quality as no effluent will be discharged outside the plant premises. The wastewater from various units of the plant will be appropriately treated and disposed and the details are provided in **Table- 5.1.**

TABLE-5.1
WASTE WATER AND TREATMENT

Type of Wastewater	Treatment Proposed
Cooling tower blow down	Used in CHP, AHP
Boiler blow down	Sent to raw water reservoir after treatment for oil and grease
DM water treatment plant regeneration water	Neutralization pit and sent to guard pond
Service water	Sent to CMB
Effluents from fuel storage areas, floor washings, runoff from Oil handling area	Passed through Oil water separator and sent to guard pond
Sewage from township and plant	Treated in STP

Effluent zero discharge concept will be adopted for the proposed plant. The liquid effluents will be collected and treated/recycled:

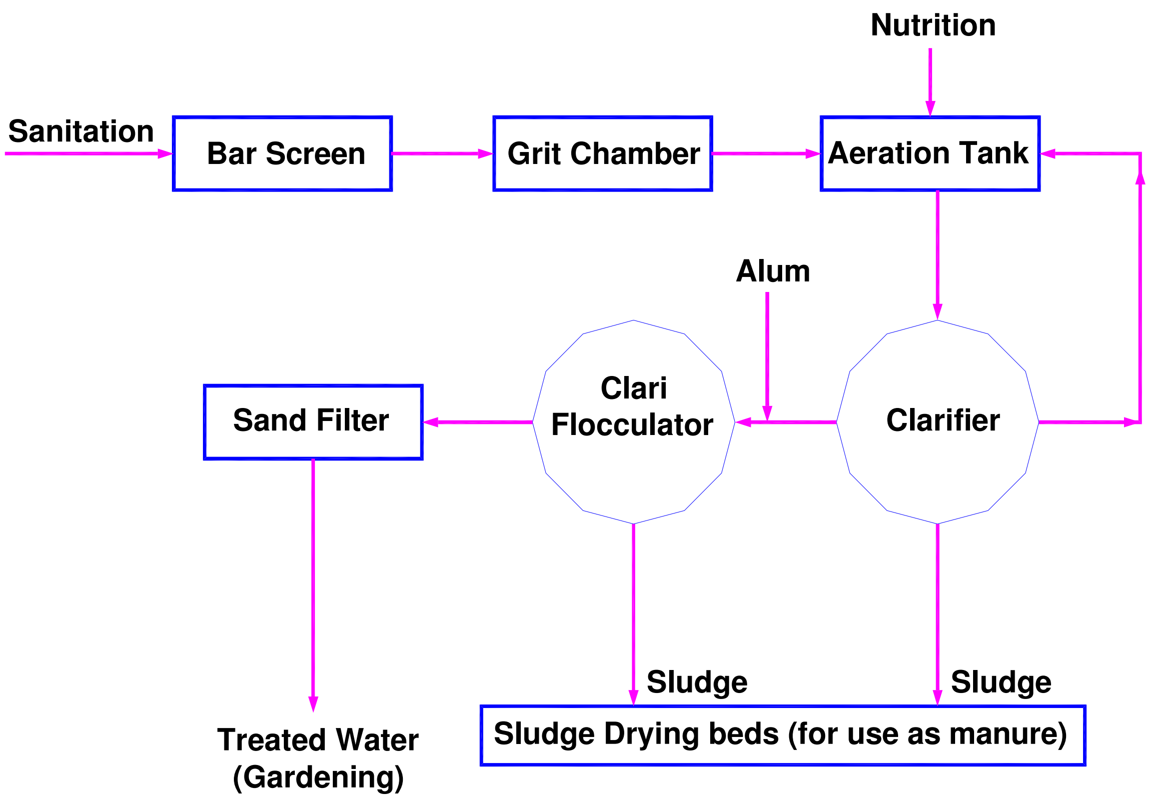


FIGURE-5.1
SCHEMATIC DIAGRAM OF SEWAGE TREATMENT PLANT

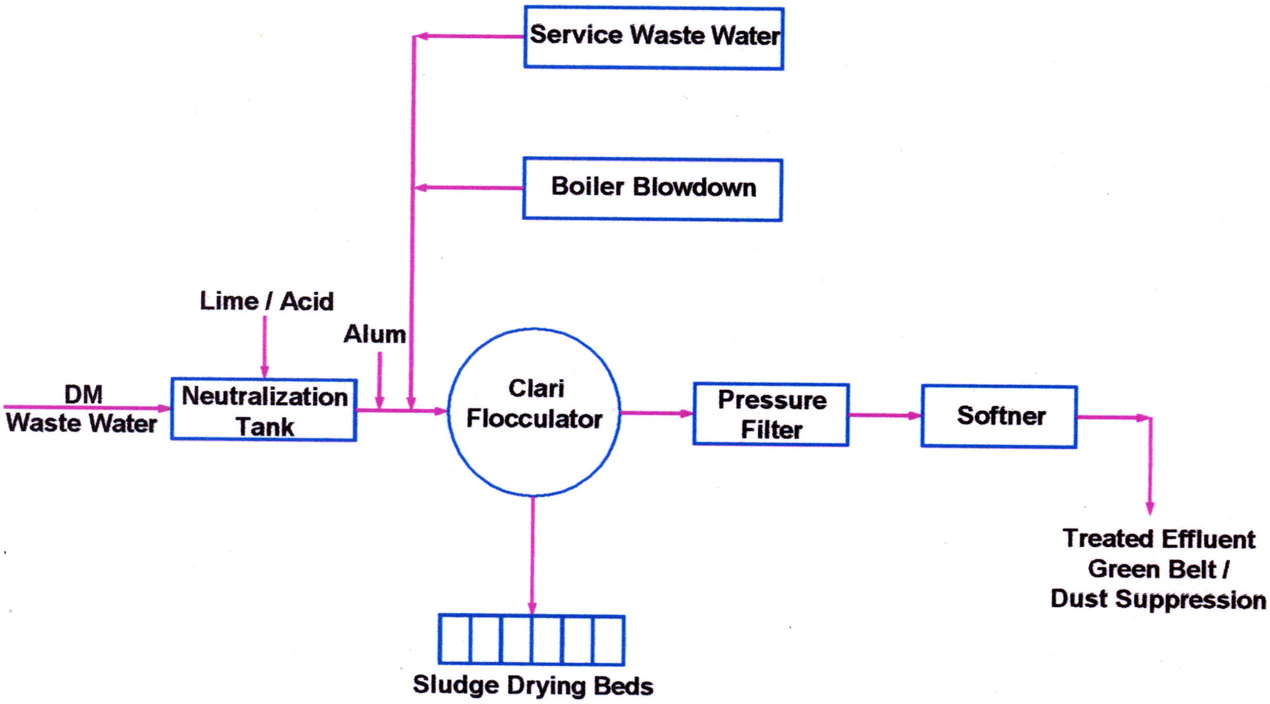


FIGURE-5.2
SCHEMATIC DIAGRAM OF EFFLUENT TREATMENT PLANT

The sludge from the clarifiers will be dewatered in the sludge thickener and solids will be disposed of the plant. Clear water will be led to clarified water reservoir for reuse. The waste water from the DM plant and pressure filter will be collected in neutralising pit and neutralised before pumping it to the guard pond. The plant & building drains will also be collected in the guard pond. The boiler blow down will be led to clarifier for reuse. The oily waste water from the plant will be treated using oil water separator and the oil separated water will be led to the guard pond. Complete CW blow down will be led to guard pond.

All the effluent collected in the guard pond (of existing plant) will be mixed and settled. This water will be used for coal handling plant dust suppression and in ash handling plant. The remaining water will be used for gardening purposes.

➢ **Rain Water Harvesting**

- *Roof Top Rain Water Utilization Program for Industrial Area*

❖ Administrative Block

There will be an administrative building in the industrial area having flat roof top area. This building will be provided with four PVC drain pipes in the front and four PVC drain pipes in the back. Entire roof top rain water is collected through these drain pipes and brought to a cemented drain which is 0.5 m in width and 0.6 m deep and will be constructed in front and back of the building.

It is proposed that cemented drain may be used as recharge trench by deepening it up to depth of 1 m. The excavated part of the drain will remain unlined and naked and will be filled with filter media.

❖ Work shop

There will be a mechanical and electrical workshop in the plant area having sloping roof and roof top area. This building will be provided with galvanized semi-circular trough for collecting rain water which comes down through drain pipes. There will be PVC drain pipes in the front and in the back of the workshop shed. Entire roof top rain water will be collected through these drain pipes and brought to a cemented drain which will be 0.5 m in width and 0.6 m deep and will be constructed in front and back of shed and goes to nearby open area.

It is proposed that cemented drain may be used as recharge trench by deepening it up to total depth of 1 m. The excavated part of the drain will remain unlined and naked and will be filled with filter media.

❖ Surface Runoff Utilization from Paved Roads

Industrial area will have few main asphaltic roads which are meant for approaching different buildings as mentioned above. These roads will be 8 and 6 m wide having slopes on either sides.

It is proposed that entire runoff from the roads be utilized for ground water recharge by constructing a recharge trench along the road on either sides. Proper slopes may be provided so that entire rain water joins the trench. The trench will be 0.40 m wide for 8 m wide roads and 0.30 m wide for 6 m wide roads with one metre depth and the same section of filter media as suggested earlier. The trenches will be unlined with top layer of pebbles so that underlying coarse sand does not get disturbed and also the trenches are visible while walking.

The rain water harvesting measures are also proposed to be carried out in colony area through three recharge pits and three recharge trenches, ground water storage will be augmented during a normal rainfall year.

With all the rain water harvesting measures proposed to be carried out in the plant area through recharge trenches and percolation ponds, ground water storage will be augmented during a normal rainfall year. This is in addition to the increment in the ground water storage due to normal rainfall by natural recharge.

- **Groundwater Recharge with Rain Water Harvesting**

There is generation of surface run-off from the plant facility during monsoon season. The run-off will be of two types, i.e., run-off from the pervious area of the facility site and run-off from the built-up area of the facility.

- **Run-off from the Built-up Areas**

The run-off from the paved surfaces of the proposed facility will be routed through a carefully designed storm water drainage network and collected in storm water collection sump and excess rainwater will be discharged to bore wells constructed on these internal drains.

- **Run-off from the Pervious Area**

The run-off from the pervious area will be routed directly to the rainwater harvesting structures constructed at suitable locations as per the contours. For augmenting the ground water resources in the plant premises, number of rainwater harvesting pits will be constructed and the internal drains where excess rain water is flowing in drain will be diverted to these pits. These structures will facilitate percolation of water into the ground thus augmenting the groundwater sources. The roof top water will be routed to the storm drains. This will result in increase in groundwater tables and to some extent in the improvement of ground water quality. The size and the locations of rainwater harvesting pits will be decided during detailed engineering of the project. Run off from the proposed project site is calculated using rational formula:

Average run-off from the proposed project facility is calculated using rational formula:

$Q = C \times I \times A$
Q = Run-off in m^3/annum
A = Catchment Area (sq.m)
C = Coefficient of Run-off
I = Intensity of Rainfall in m/annum =0.752 m/annum

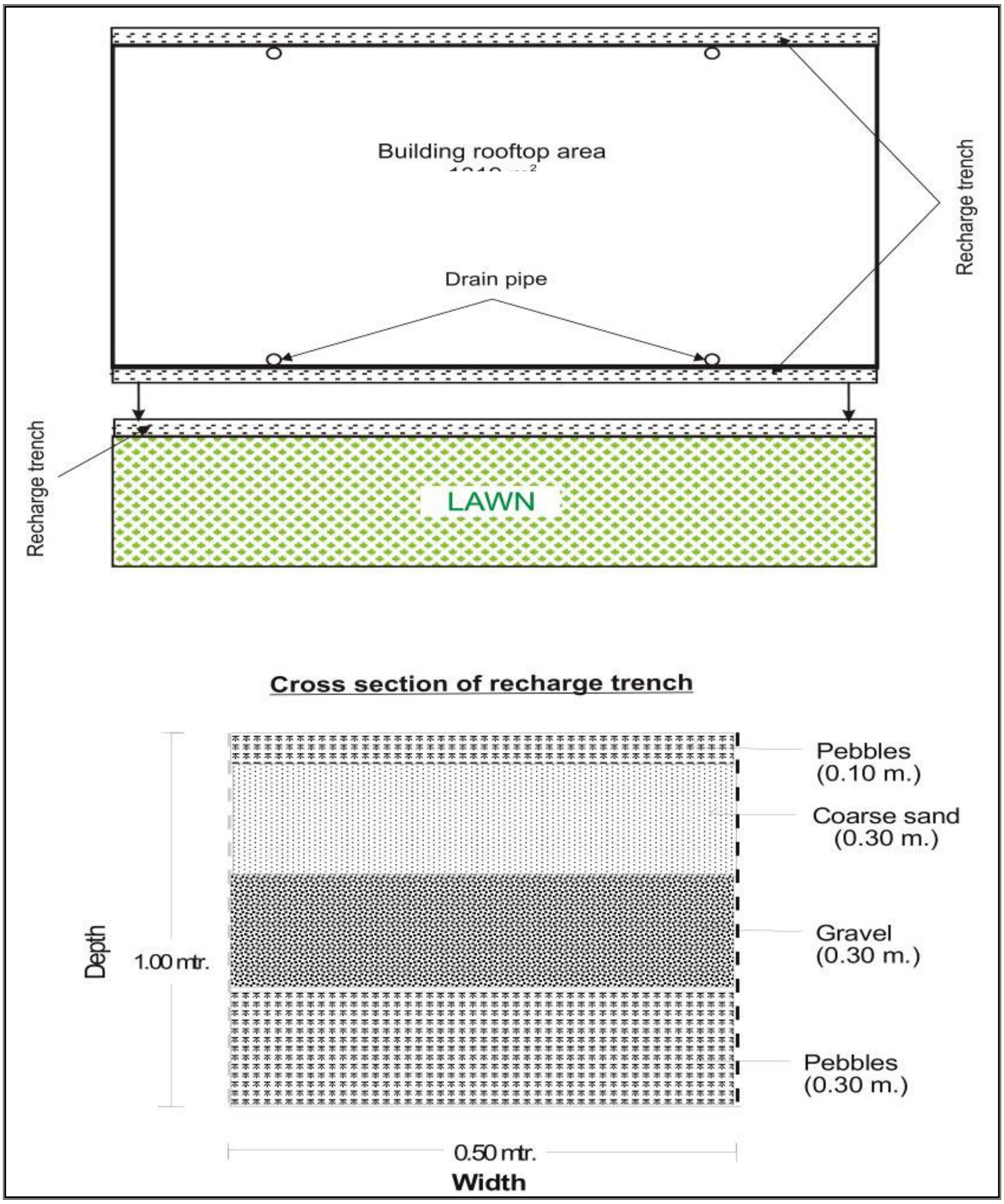


FIGURE-5.3
RAIN WATER HARVESTING STRUCTURE

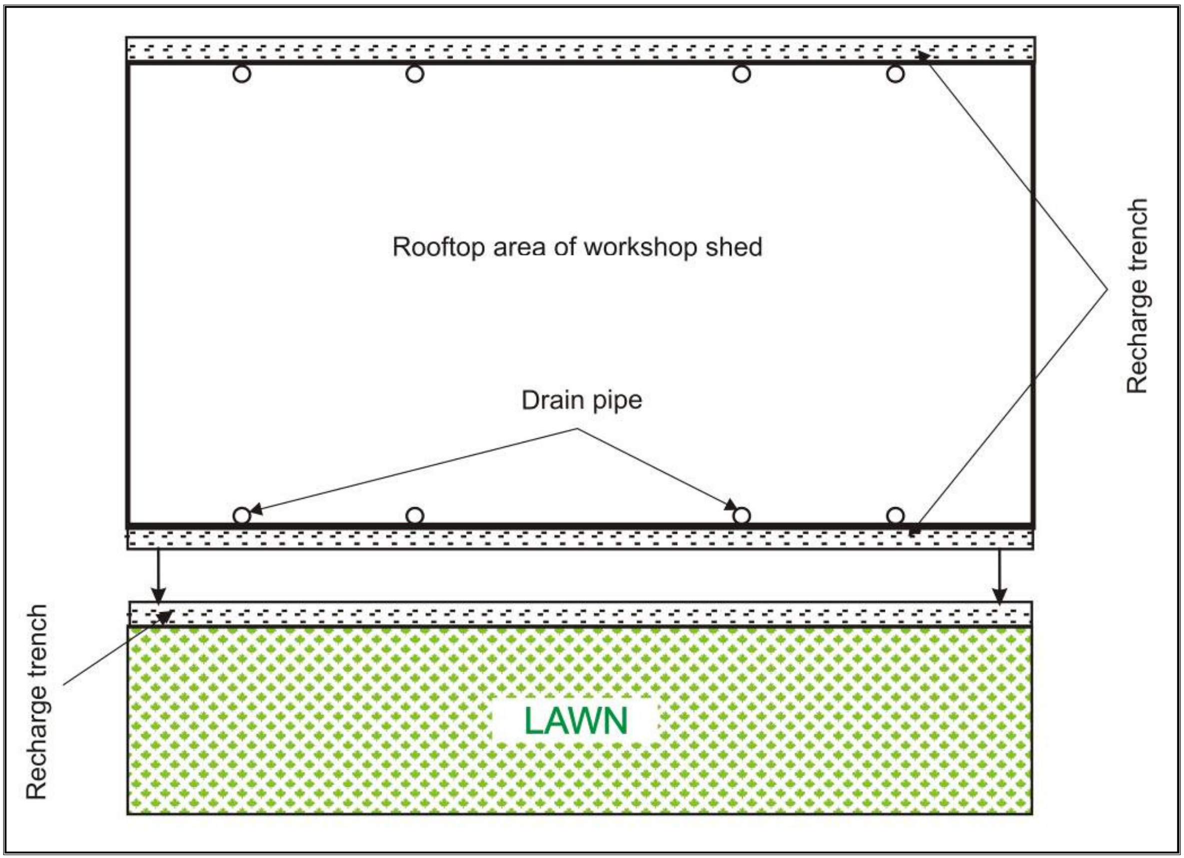


FIGURE-5.4
RECHARGE SYSTEM FOR WORKSHOP

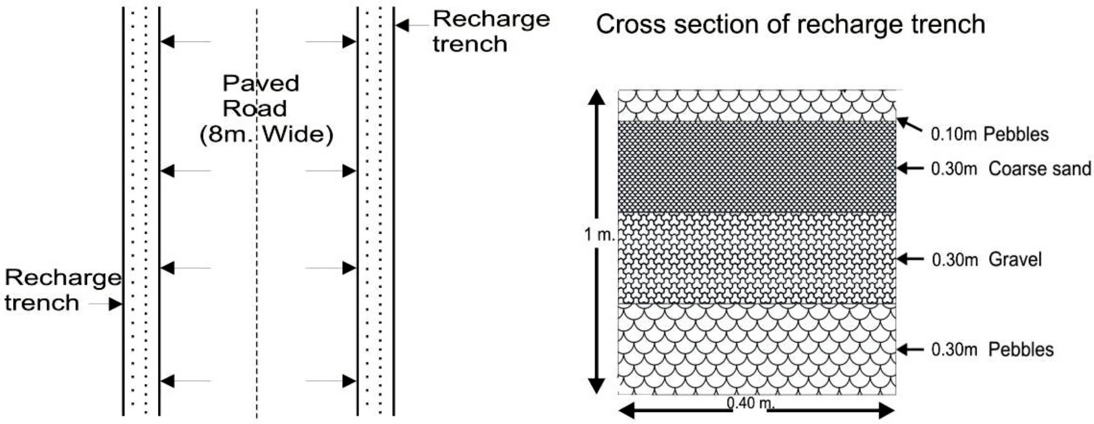


FIGURE-5.5
RECHARGE SYSTEM FOR PAVED ROAD THROUGH RECHARGE TRENCH

5.3.4 Solid Waste Management

The ash generated in CPP will be 100% utilized for cement manufacturing.

Waste Minimisation

The proposed waste minimisation, recycle, reuse& recovery techniques will be implemented in various processes during the operational phase of the project. The list of waste minimisation techniques in various processes of captive power plant is given in **Table-5.2.**

TABLE-5.2
WASTE MINIMISATION APPROACH IN VARIOUS PROCESSES OF CAPTIVE POWER PLANT

Sr. No	Process Area	Activity	Environmental Benefits
1	Coal handling & processing	Reduce handling losses during unloading/ loading and conveyance by ensuring appropriate moisture content and dust collection/suppression systems	1. Conservation of natural resources 2. Low PM in work environment
		Efficient operation of dust collectors during coal crushing and feeding to paste plant	
		Periodic calibration of weigh scales and their cross verification at various points	
2	Steam generation	Ensure complete coal combustion with minimum un-burnt carbon and excess air in boiler exhaust	1. Efficient use of natural resources 2. Efficient application or 3R principles
		Maximize waste heat recovery through recuperators and economizers	
		Maintain boiler condition so as to maximize the heat transfer through predictive/preventive maintenance	
		Avoid steam leakages during transfer to ST	
		Ensure calibration of steam flow meters and conduct periodic cross verification with coal consumption and power generation	
3	Power generation	Ensure periodic maintenance of ST and its maximum loading	Efficient use of natural resources
		Monitor and maintain specific steam/power consumption ratio as per suppliers specifications	
4	Ash Management	Strive to generate minimum ash by achieving highest boiler and turbine efficiencies	Minimum high volume waste generation
		Maximize ash use in cement industries, applications, including mine backfilling so that its storage, handling/re-handling is reduced	1. Minimum land use for waste storage 2. Reclamation of abandoned mines
5	Auxiliary power Consumption	Carryout periodic energy audit to identify opportunities for reduction in electricity consumption and ascertain that auxiliary power consumption is below or as per theoretical values	Conservation of non-renewable natural resource
6	Water Conservation	Recycling of all the boiler blow-down and part of the cooling tower blow down for reuse in the process	1. Reduced water demand 2. Efficient use of

Sr. No	Process Area	Activity	Environmental Benefits
		Increases the COC in Cooling towers and to recycle the water.	waste water streams
		Conduct water audit after plant stabilization to identify the areas for further conservation	

5.3.5 Greenbelt Development

- **Objectives of Greenbelt**

Implementation of afforestation program is of paramount importance for any industrial development. In addition to augmenting present vegetation, it will also check soil erosion, make the ecosystem more complex and functionally more stable, make the climate more conductive and restore water balance. It can also be employed to bring areas with special problems under vegetal cover and prevent further land deterioration. The total plant area covering cement plant and proposed power plant is about 141.57-ha out of which total 33% ie 46.7-ha will be converted into greenbelt development area. Plantation scheme is given in **Table-5.3**.

TABLE-5.3
PLANTATION SCHEME

Year	Area (ha)	No. of trees / ha	Total saplings
I	9.34	2500	23350
II	9.34	2500	23350
III	9.34	2500	24300
IV	9.34	2500	23350
V	9.34	2500	24300
Total	**46.7**	**2500**	**116750**

About 33% of plant area will be allotted for green belt development. Nearly 116750 samplings will be developed in an area of 46.7 ha (2500 trees/ha). Environment management plan is shown in **Figure-5.6**.

The detailed program for green belt is given below:

- **Criteria for Selection of Species**

Species to be selected will fulfill the following specific requirements of the areas:

- Availability of seed material;
- Tolerance to specific conditions or alternatively wide adaptability to eco-physiological conditions;
- Rapid growth;
- Capacity to endure water stress and climatic extremes after initial establishment;
- Differences in height, growth habits and bole shapes;
- Pleasing appearance;
- Capacity to selectively concentrate some materials from the surroundings;
- Providing shades;
- Large bio-mass and leaves number to provide fodder and fuel;
- Ability of fixing atmospheric Nitrogen; and
- Improving waste lands.

- **Raising Seedlings in Nursery**

Seedlings will be raised in nurseries. Adequate number of surplus seedlings will be available considering 10% mortality in seedlings. Healthy seedlings will be ready for transfer to permanent location before rainy season.

- **Preparation of pits and preparing them for transfer of seedlings**

- Standard pit size will be 1 m x 1 m x 1 m;
- The distance between pits will vary depending on their location;
- The pits will be filled using good soil from nearby agricultural fields (3 parts) and Farm yard manure (1 part);
- Rhizobium commercial preparation (1 kg/1000 kg);
- BHC powder, if the soil inhabits white ants (Amount variable); and
- The pits will be watered prior to plantation of seedlings.

- **Recommended Species for Plantation**

Based on climate and soil characteristics of the study area, some species are recommended for plantation. The climate of the region is extreme where there is heavy rainfall as well as extreme heat and soil temperature is very high in summer. Hence in order to have a ground cover, some fast growing species which do not require watering have been recommended for mass plantation. The species are as presented below:

- *Albizia lebeck* (Kala siris)
- *Leucena latisiliqua* (Sabubal)

The above mentioned species not only resist water stress but also covers the ground quickly and also have wider soil adaptability.

For protecting the environment from dust, temperature, chemicals, emissions the following species have been recommended.

Plant species for plant area and its Boundary

- *Azadirachta indica* (Neem)
- *Butea monosperma* (Palas)
- *Bauhinia purpuriai* (Papeli)
- *Syzygium cummini* (Jamun)
- *Ponqamia pinnata* (Honge)
- *Mangifera indica* (Aam)
- *Ficusbenghalensis* (Ala)
- *Bambusa multiplex* (Bas)
- *Tamarindus indica* (Imli)
- *Acaciachundra* (Mungli)
- *Acacia lebbeck* (siris)
- *Acacia Leucophloe (Sarkar Tumma)*

Plant species for vacant spaces:

- *Syzygium cumminii* (Jamun)
- *Eucalyptus hybrid* (Nilgiri)
- *Azadirachta indica* (Neem)
- *Pongamia glabra* (Ganuga)
- *Terminalia arjun* (Arjun)
- *Ficus reliosa* (Pipal)
- *Casia fistula* (Amaltas)
- *Bambuea multiplex* (bas)
- *Tamarindus indica* (Imli)
- *Polyalthia longifolirai* (Asoka)
- *Butea monosperma* (Palas)

5.3.6 Socio-Economic Development

The development activities needs to be taken up, based on the requirement of the people in the area. The basic requirement of the community needs to be strengthened by extending health care, educational facilities developed in the township to the community, providing drinking water to the villages affected, building/strengthening of existing roads in the area.

The preference will be given to the local population for direct and in-direct employment. The proposed project may create opportunities for indirect employment in the field of vehicle hiring, labours, trading of construction material, carpenters etc. This will help in improving the socio economic status of the region.

The company will participate in social development activities in all the villages surrounding the proposed plant area. Social welfare activities will be taken up on a large scale. These activities will have the following focus areas:

- Health Care
- Social well being
- Education
- Sustainable Livelihood
- Infrastructure Building
- Afforestation;
- Rural water supply; and
- Assistance in utilizing government programs.

➢ **Health Care**

The following activities have been identified will be implemented through CSR action plan:

- Mobile Health Clinic
- Medical camps for communities and cattle
- Preventive medical care
- More focus on women and child health care
- Awareness on sanitation and hygiene
- Segregation and disposal of domestic wastes

- **Education**

- Infrastructure support to Schools and Educational Institutes
- Scholarships and skill development opportunities
- Computer training
- Personality development training
- Promotion of sports & cultural activities
- Celebration of important national festivals
- Support for organizing natural resource conservation activities

- **Employment and Livelihood**

- Direct / Indirect employment
- Opportunities to work with business associate of the company
- Training program for entrepreneurship development
- Support for women Self Help Group (SHG)
- Guidance and support and for Horticulture, Dairy and Poultry
- Organize training program for better agro productivity its marketing

- **Financial literacy**

- Tie up with banks to promote saving and financial planning

- **Infrastructure**

- Construction of road and building of common interest
- Development of drinking water facilities

- **Natural resource conservation**

- Encourage roof rain water harvesting for safe drinking water
- Construction of check dams
- Implementation of various measure for ground water recharge
- Training program on judicious use of water
- Plantation with the support of local traditional wisdom

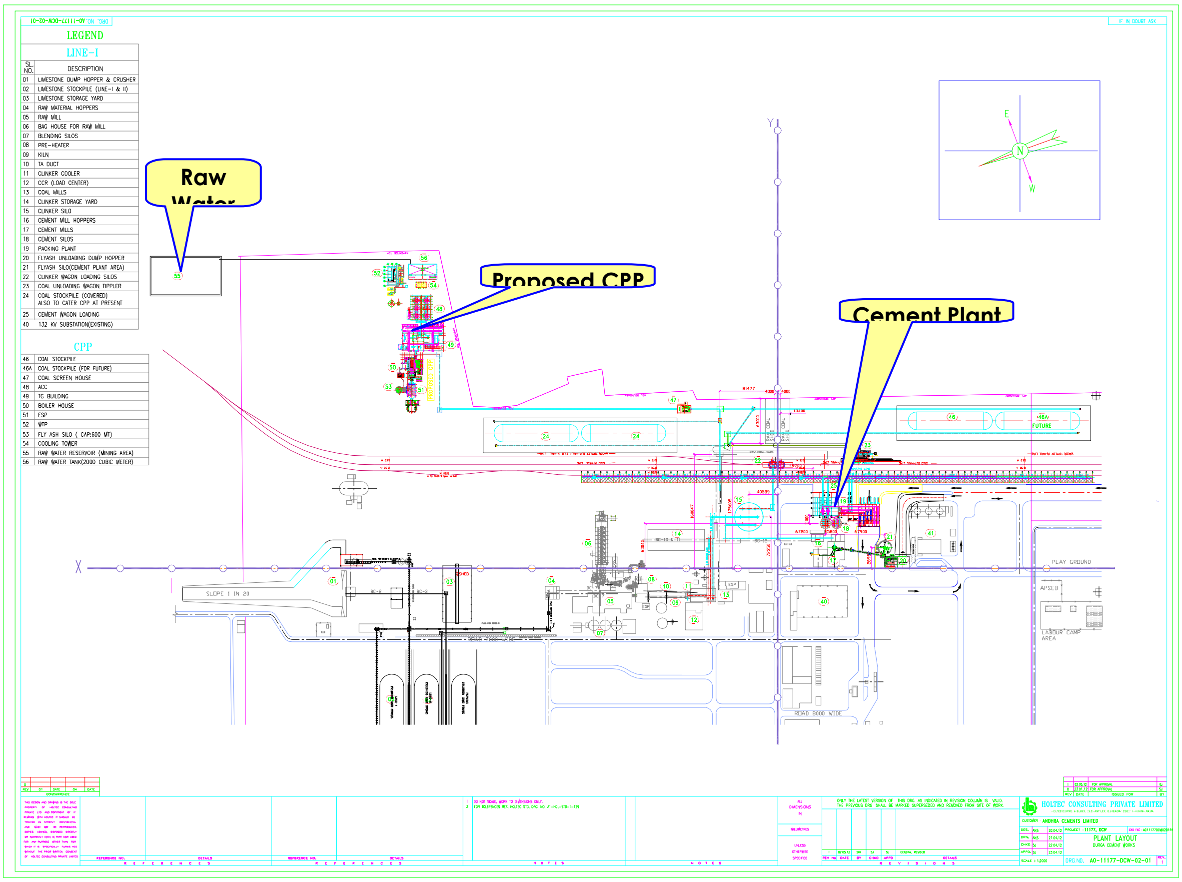


FIGURE-5.6
GREEN BELT DEVELOPMENT PLAN

5.4 Compliance with Corporate Responsibility for Environmental Protection Guidelines

The compliance status of the proposed power plant with CREP guidelines is given below in **Table-5.4**.

TABLE-5.4
COMPLIANCE WITH CREP GUIDELINES

Sr. No.	CREP Guideline	Compliance Status
1	Implementation of Environmental Standards (emission & effluent) in non- compliant ➢ Submission of action plan ➢ Placement of order for Pollution of control equipment	Will be complied with SPCB/CPCB standards
2	For existing thermal power plants, a feasibility study will be carried out by Central Electricity Authority (CEA) to examine possibility to reduce the particulate matter emissions to 100 mg/Nm^3. The studies shall also suggest the road map to meet 100 mg/Nm^3. The studies shall also suggest the road map to meet 100 mg/Nm^3 wherever found feasible.	It is a new proposal. The PM emission calculations will be based on 50 mg /NM3. As per the predicted observations done by the modelling the emissions will be within the limit of NAAQS 2009.
3	New / expansion power projects to be accorded environmental clearance on or after1.4.1.2003 shall meet the limit of 100 mg/Nm^3 for particulate matter.	Not applicable
4	Development of SO2 & NOx emission standards for coal based plants. ➢ New/ expansion power projects shall meet the limit of SO2 & NOx. ➢ Existing power plants shall meet the limit of SO2 & NOX.	CPCB standards will be considered and implemented.
5	Install/activate opacity meters/ continuous monitoring system in all the units with proper calibration system.	CEMs will be planned during operating phase
6	Development of guidelines/ standards for mercury and other toxic heavy metals emissions.	Implemented during operation phase
7	Review of stack height requirement and guidelines for power plants based on micro meteorological data.	Stack of 77m height is proposed for the 30 MW power plant
8	Implementation of use of beneficiated coal as per GOI Notification: Power plants will sign fuel supply agreement (FSA) to meet the requirement as per the matrix prepared by CEA for compliance of the notification as short term measure.	Various options will be explored

Sr. No.	CREP Guideline	Compliance Status
	Options/mechanism for setting up of coal washeries as a long term measure ➢ Coal India will up its own washery ➢ Sate Electricity Board to set up its own washery ➢ Coal India to ask private entrepreneurs to set up washeries for CIL and taking washing charges ➢ SEBs to select a private entrepreneur to set up a washery near pit- head installation of coal beneficiation plant	
9	Power plants will indicate their requirement of abandoned coal mines for ash disposal & Coal India/ MOC shall provide the list of abandoned mines to CEA.	Not applicable
10	Power plants will provide dry ash to the users outside the premises or uninterrupted access to the users within six months.	100% flyash utilisation in cement plant in the same complex.
11	Power Plants should provide dry flyash free of cost to the users.	100% flyash utilisation in adjacent cement plant
12	State P.W.Ds/ construction & development agencies shall also adhere to the specifications/Schedules of CPWD for ash based products utilization MoEF will take up the matter with State Governments.	100% utilization in Cement plant in the same complex.
13	(i) New plants to be accorded environmental clearance shall adopt dry flyash extraction or dry disposal system or Medium (35-40%) ash concentration slurry disposal system or Lean phase with hundred percent ash water re-circulation system depending upon site specific environmental situation. (ii) Existing plants shall adopt any of the systems mentioned in 13 (i).	Taken into consideration.
14	Flyash Mission shall prepare guidelines/manuals for flyash utilization.	Will be implemented during the operational phase
15	New plants shall promote adoption of clean coal and clean power generation technologies	The technology adopted is sub-critical

5.5 Summary of Anticipated Environmental Impacts and Mitigation Measures

The summary of anticipated adverse environmental impacts and the mitigation measures during operational phase are given in the **Table-5.5.**

TABLE-5.5
SUMMARY OF ANTICIPATED IMPACTS DURING OPERATION PHASE

Discipline	Potential Negative Impacts	Probable Source	Mitigative Measures	Remarks
Constructional Impact				
Water Quality	Increase in suspended solids due to soil run-off during heavy precipitation	Loose soil at construction site	During monsoon season run off from construction site will be routed to a temporary sedimentation tank for settlement of suspended solids.	_
Air Quality	Increase in dust and NOx concentration	Levelling activity and heavy vehicular movement	Sprinkling of water in the construction area and unpaved roads will be done. Proper maintenance of vehicles will be done.	The impact will be low, as the main approach road will be tarred.
Noise	Increase in noise level	Construction equipment	Equipment will be kept in good condition to keep the noise level within 90 dB(A). Workers, who are working in the high noisy areas, will be provided with protective equipment. Construction activity will be restricted to day time only.	Workers will be provided necessary protective equipment *e.g.* ear plugs, earmuffs.
Terrestrial Ecology	Clearing of vegetation including cutting of forest areas	Land acquisition and soil enabling activities	Compensatory afforestation will be done. Landscaping and extensive green belt development and plantation in the open area will be carried out. Transplantation of the existing matured trees will be undertaken and transplanted in the area earmarked for greenbelt development.	Extensive plantation in the surrounding areas including plant site will be done. The greenbelt will be developed in plant area, ash pond area, township.
Operational Impact				
Water Quality	Deterioration of surface water quality	Discharge from various plant units and other auxiliary units	Adequate treatment facilities will be provided so that the treated effluents conform to the regulatory standards. All the treated wastewater will be routed to raw water reservoir for reuse. No water will be discharged to surface water body except in rainy season, when runoff water having F<2 will be released to outside the	The reuse of treated wastewater will help in conserving the fresh water resources.

Discipline	Potential Negative Impacts	Probable Source	Mitigative Measures	Remarks
			plant area. The guard pond will be properly lined to prevent any seepages into ground and avoid ground water contamination.	
Air Quality	Increase in PM, SO_2 and NOx levels in ambient air.	Stack emissions and fugitive emissions from coal stockyards and CHP.	ESPs having >99.99 % efficiency will be provided to control Particulates Matter emission to less than 50 mg/Nm^3. Stacks of 77 m height will be provided for the proper dispersion of gaseous pollutants. Low NOx burners will be installed to control NOx emissions. Motorable roads in the plant area will be paved to reduce dust emission. Afforestation programs will be undertaken around the plant area. Dust suppression measures will be implemented in the coal handling plant and stock yards.	The resultant air quality will conform to the stipulated standards.
Solid Waste	Fly ash and bottom ash	From the ESPs	100% ash utilisation in cement plant	Dust generation in ash pond will be controlled by water sprinkling. There will not be any water discharge from the pond and impact on water quality is not envisaged. All endeavors will be made towards 100% fly ash utilization.
Noise Levels	Increase in noise levels in the plant area.	Equipment in main plant and auxiliaries.	Equipment will be designed to conform to noise levels prescribed by regulatory agencies. Provision of green belt and plantation would further help in attenuating noise.	Employees working in high noise areas would be provided earplugs/ earmuffs as protective device.
Demography and Socio-Economics	Strain on existing amenities like housing, water	Influx of people of proposed	Locals will be given preference in employment and especially displaced	Overall socio-economic status of the area is

Discipline	Potential Negative Impacts	Probable Source	Mitigative Measures	Remarks
	sources and sanitation, medical and infrastructure facilities.	power plant employees as well as contractor's employees/ labourers.	persons on priority. No significant impact is envisaged as sufficient additional facilities are proposed by the project proponents.	expected to improve considerably.
Storm Water Control	Impact on water resources	Rain water	Treat storm water discharges from site. Separate storm drains will be provided.	Separate storm water drains will ensure discharge of uncontaminated run-off water during rainy season. The collected run-off water from the drains will be used for rainwater harvesting within the plant premises.
Fire & Safety	Accidents and disasters related to fire & safety	Chemical and fuel storages	Disaster Management Plan (DMP) has been prepared	On-site and Off-site Emergency plan will be implemented during any disaster.

5.6 Environment Management System

Environment policy at industry level is yet to be defined formally. Standards are stipulated by various regulatory agencies to limit the emission of pollutants in air and water. Similarly, a mandatory practice is recommended for preparing an Environment statement each year in order to encourage the industries to allow efficient use of resources in their production processes and reduce the quantities of waste per unit of product. This in itself is not sufficient since this does not provide an assurance that its environment performance not only meets, will continue to meet, legislative and policy requirements.

Hence, Environment Management Systems (EMS) is suggested at the industry level for ensuring that the activities, products and services of the region conform to the carrying capacity (supportive and assimilative capacity) of the environment. Since this is more in line with the quality systems, it is proposed to develop one as outlined in the following sub sections. The EMS - its set-up, role and responsibilities is given below.

5.6.1 Formation of an Environment Management System

The environment management system for the power plant will enable it to maximize its beneficial effects and minimize its adverse effects with emphasis on prevention. It will:

- Identify and evaluate the environment effects arising from the plant's activities;
- Identify and evaluate the environment effects arising from incidents, accidents and potential emergency situations;

- Identify the relevant legislative and regulatory requirements;
- Enable priorities to be identified and pertinent environment objectives and targets to be set;
- Facilitate planning, control, monitoring, auditing and review of activities to ensure that the policy is complied with; and
- Allow periodic evaluation to suit changing circumstances so that it remains relevant.

5.6.2 Implementation of an Environment Management System

The top management of the power plant is committed to development of its activities in an environmentally sound manner and supports all efforts in achieving this objective. In pursuance of this, formal environment management system shall be established during the operating phase of the plant which shall carry out periodic environment review, covering the following four areas:

* Legislative and regulatory requirements;
* Evaluation and registration of significant parameters and their environment impacts;
* Review of environment management practices and procedures being proposed; and
* Assessment of feedback from investigation of previous environment incidents and noncompliance with legislation, regulations or existing policies and procedures.

The environment review shall address the following:

* The nature and extent of problems and deficiencies;
* The priorities to be accorded to rectify them; and
* An improvement program designed to ensure that the personnel and material resources required are identified and made available.

- ***Environment Management Records***

The power plant shall establish and maintain a system of records to demonstrate compliance with the environment management systems and the extent of achievement of the environment objectives and targets. In addition to the other records (legislative, audit and review reports), management records shall address the following:

* Details of failure in compliance and corrective action;
* Details of complaints and follow up action;
* Appropriate contractor and supplier information;
* Inspection and maintenance reports;
* Monitoring data; and
* Environment training records.

- ***Environment Management Reviews***

The senior management shall periodically review the Environment Management System (EMS) to ensure its suitability and effectiveness. The need for possible changes in the environment policy and objectives for continuous improvement shall be ascertained and revisions made accordingly.

5.6.3 Implementation Schedule of Mitigation Measures

The mitigation measures suggested in Chapter-4 shall be implemented so as to reduce the impact on environment due to the operations of the proposed project. In order to facilitate easy implementation of mitigation measures, the phased priority of implementation is given in **Table-5.6**.

TABLE-5.6
IMPLEMENTATION SCHEDULE

Sr. No.	Recommendations	Time Requirement	Schedule
1	Air pollution control measures	Before commissioning of respective units	Immediate
2	Water pollution control measures	Before commissioning of the plant	Immediate
3	Noise control measures	Along with the commissioning of the Plant	Immediate
4	Ecological preservation and up gradation	Stage wise implementation	Immediate & Progressive

Source: Vimta Labs Limited, Hyderabad

5.7 Budgetary Allocation for Environment Protection

As environment protection will be monitored and implemented by a centralized environment management cell. The capital cost of the proposed project will be Rs. 135.38 Crores. The details of investment for procuring the equipment for efficient control and monitoring of pollution along with annual recurring cost are given in **Table-5.7.**

TABLE-5.7
COST OF ENVIRONMENTAL PROTECTION MEASURES

Sr. No	Particulars	Proposed Cost	
		Capital (Rs. Crores)	**Recurring Cost per Annum (Rs. Lakhs)**
1	Pollution monitoring and air quality equipment's	14.7	4.2
2	Water quality monitoring & management	1.0	0.8
3	Greenbelt / Plantation for entire period	0.5	2.2
4	Occupational Health	0.2	0.0
	Total	**16.3**	**7.2**

6.0 ANALYSIS OF ALTERNATIVES FOR TECHNOLOGY AND PROJECT SITE

6.1 Analysis of Alternative Technology

The selection of the proper steam generator technology is a critical step in the basic design of a power project. The fuel to be fired and the steam cycle to be adopted govern the type of steam generator needed to satisfy the requirements of the project.

6.1.1 Alternatives for Boiler Technology

The following are the general options for selection of boiler technology:

- For easy to burn fuels, such as bituminous coals - suspension firing of the pulverized fuel in horizontal, wall-mounted burners is the configuration of choice;

- For low volatile, low reactivity fuels, such as anthracite and petroleum cokes, the down-fired arch furnace is the choice adopted world-wide; and

- Another option for difficult fuels, as well as for waste fuels, which cannot be properly burned with suspension firing, is the Atmospheric fluidized bed combustion (AFBC) boiler. Also the flywheel of circulating solids in the AFBC boiler allows a wide range of fuels to be fired in the same unit.

6.1.2 Alternatives for Boiler Parameters

Sub critical parameters were examined related to power generation of thermal power plant.

The major benefit of adopting higher steam cycle is increased generation due to higher efficiency and reduction in emissions of PM, CO_2, SO_2, and NOx.

Hence, in view of the above, sub critical parameters are considered for the proposed boiler configuration.

Power Plant Technology

- Atmospheric fluidized bed combustion (AFBC) boilers are more suited for power plants usually up to 40 MW capacities;
- AFBC boilers– complete combustion is ensured;
- Condensing steam type generator along with their auxiliaries and air cooled condensers ;
- Air cooled condenser – less water requirement (about 10% of the normal water requirement)
- High efficiency & low specific coal consumption when compared to the other boilers

6.1.3 Electrostatic Precipitator and its Preference over Bag Filter / Hybrid System

High particulate matter emission in the form of fly ash from coal fired boilers is a matter greater concern for environment. Electrostatic precipitator (ESP) is being used to limit the concentration of fly ash emission (generally <50 mg/Nm3 when all the fields are in operation) within the safe allowable limit. The electrostatic precipitator consists of metal plates which are charged (discharge & collecting electrodes; potential of these plate are in the range of 40-60 KV). When the flue gas pass through the ESP, the particulate matter in the form of fly ash gets attracted on these plates and we get clean flue gas outside of ESP and from the top of the stack. Thus ESP helps in reducing the pollution of atmosphere to a great extent. Regular mechanical hammer blows on these plates cause the accumulated dust particles to fall at the bottom of the ESP where they are collected in hoppers from where the fly ash are conveyed pneumatically through pipe to Fly ash storage silo. The whole system is enclosed and there is no chance dust particles polluting the atmosphere.

On the other hand a Bag filter is cheaper and occupies less space and can achieve Dust emission <50 mg/Nm^3, but the filter bags generally can withstand temperature only upto 170^{0}C. In presence of Sox, the flue gas can form weak acid if the dew point of flue gas is low which can cause damage to filter bags. In India, the ash content be ignored. The quality of coal also varies too much as per availability of coal at a particulate time. During start-up, the flue gas temperature is low and due to presence of sulphur (which is in the range of 1-2% in case of LDO being used during start-up) weak acid is formed which affects the internals of bag filters. Also due to carry over of oil vapors there is likelihood of chokage of filter bags. The details of CPPS equipped with high efficiency ESPs, the stack emission reports of some of such plants in operation are given below in **Table-6.1**.

TABLE-6.1
DETAILS OF EMISSIONS IN CPPS EQUIPPED WITH ESPS

Month	JSCP	Dalla Cements	Chunar Cement Factory
April 2010	-	-	40.00
May 2010	-	-	40.44
June 2010	-	-	41.46
July 2010	-	-	39.86
August 2010	-	-	38.90
September 2010	-	-	38.76
October 2010	-	-	37.38
November 2010	-	-	37.47
December 2010	-	-	36.17
January 2011	-	-	36.11
February 2011	-	-	37.96
March 2011	-	-	37.37
April 2011	-	-	37.85
May 2011	-	37.00	38.28
June 2011	-	38.00	41.01
July 2011	-	25.00	Shut down
August 2011	-	33.00	43.16
September 2011	-	35.00	36.91
October 2011	-	34.00	39.91
November 2011	-	39.00	39.89
December 2011	-	38.00	37.23
January 2012	-	35.00	39.53
February 2012	-	46.00	38.44

Month	JSCP	Dalla Cements	Chunar Cement Factory
March 2012	-	39.00	38.87
April 2012	39.91	39.00	39.08
May 2012	32.78	42.00	39.03
June 2012	42.91	35.00	39.38
July 2012	38.38	48.00	36.54
August 2012	39.04	45.00	35.19
September 2012	32.80	47.00	35.19
October 2012	42.02	43.00	34.92

6.2 Analysis of Alternative Sites for Location of Power Plant

No alternative sites are proposed. The proposed 30 MW power plant will be setup within the cement plant premise which is under operation as captive source of power to cement plant.

7.0 ENVIRONMENT MONITORING PROGRAMME

7.1 Implementation Schedule of Mitigation Measures

The mitigation measures suggested in **Chapter-4** shall be implemented so as to reduce the impact on environment due to the operations of the proposed project.

7.2 Environment Monitoring

The environment monitoring for the proposed plant operations shall be conducted as follows:

- Air quality;
- Water and wastewater quality;
- Noise levels;
- Soil Quality; and
- Greenbelt Development.

A centralized environment monitoring cell will be established for power plant. Monitoring of important and crucial environment parameters is of immense importance to assess the status of environment during operation of power plant. With the knowledge of baseline conditions, the monitoring program can serve as an indicator for any deterioration in environment conditions due to operation of the cement plant and suitable mitigatory steps could be taken in time to safeguard the environment. Monitoring is as important as that of control of pollution since the efficiency of control measures can only be determined by monitoring. The following routine monitoring program will be implemented under the post-project monitoring in the proposed plant. The monitoring program for implementation is given below.

- ***Air Pollution and Meteorological Aspects***

Both ambient air quality and meteorology will be monitored. The ambient air will be monitored twice in a week in line with the guidelines of Central Pollution Control Board and SPCB.

Meteorological parameters like wind speed, wind direction, temperature, relative humidity and rainfall will be recorded continuously at CPP.

- ***Water and Wastewater Quality***

The storm water will be analyzed in the rainy season. The ground and surface water quality will be monitored in every season at selected locations. The water depths will be monitored in the wells of surrounding villages in every season.

- ***Noise Levels***

Noise levels in the work zone environment and ambient will be monitored regularly. The frequency of noise monitoring will be once in a month in the work zone. The ambient noise levels in the surrounding villages will be monitored once in six months.

- ***Soil Sampling***

Soil samples will be tested before plantation/vegetation of the area. The environment monitoring cell will co-ordinate all monitoring programs at site and data thus generated will be regularly furnished to the regulatory agencies.

The environment monitoring program to be implemented is given in **Table-7.1**.

TABLE-7.1
MONITORING SCHEDULE FOR ENVIRONMENT PARAMETERS

Sr. No.		Particulars	Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
1	**Air Pollution and Meteorology**				
	Air Quality				
	A	Ambient Air Quality Monitoring			
		Selected 4 locations in and around plant specified by SPCB	Twice in a week	24 hr continuously	PM, SO_2, NOx and CO
	B	Stack gas analysis in all major stacks	Once in a month	One time	Specified as per State pollution control Board
	C	Fugitive dust sampling at work zone as per CPCB or SPCB guidelines	Once in three months	24 hr continuously	PM
	Meteorology				
	a	Meteorological data to be monitored at CPP	Daily	Continuous Monitoring	Wind speed, direction, temperature, relative humidity and rainfall.
2	**Water and Wastewater Quality**				
	A	Industrial/Domestic			
	1	Sewage treatment plant	Daily	24 hr composite	As per CPCB/ SPCB norms
	2	Effluents (if any) during Monsoon	Once in a month	24 hr composite	As per CPCB/ SPCB norms
	B	Water quality in the study area			
	1)	Ground Water quality	Half yearly	Grab	As per the parameters specified under IS:10500
	2)	Surface Water	Half yearly	Grab	Parameters specified under IS:10500
3	**Industrial Noise Levels**				
	1)	Major noise generating sources	Every fortnight	24 hr continuous with 1 hr interval	Noise level in dB(A)
	2)	Near the turbine	Fortnight	24 hr continuous with 1 hr interval	Noise level in dB(A)
	3)	Along the road for transportation noise	Fortnight	24 hr continuous with 1 hr interval	Noise level in dB(A)
	Ambient Noise Levels				
		4 Locations around CPP	Fortnight	24 hr continuous	Noise levels in dB(A)

Sr. No.	Particulars		Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
				with one hr interval	
4.	**Soil Characteristics**				
	1.	Selected 10 locations in core and buffer zone in nearby villages	Yearly	One Grab sample	Colour, textural class, grain size, distribution, pH, Electrical Conductivity, Bulk Density, Porosity, Infiltration rate, Moisture retention capacity, Wilting Co-efficient, Organic matter Na, N, K, PO_4, SO_4, SAR, Base Exchange Capacity, Pb, Cu, Zn, Cd, Fe.

Source: Vimta Labs Limited

7.3 Monitoring Methods and Data Analysis

All environment monitoring and relevant operational data will be stored in a relational database. Regular data extracts and interpretive reports will be sent to the regulator.

7.3.1 Air Quality Monitoring and Data Analysis

The concentration of air borne pollutants in the workspace / work zone environment will be monitored periodically. If concentrations higher than threshold limit values are observed, the source of fugitive emissions will be identified and necessary measures taken. If the levels are high suitable measures as detailed in EMP shall be initiated.

The ground level concentrations of PM, SO_2, NO_X and CO in the ambient air will be monitored at regular intervals. Any abnormal rise will be investigated to identify the causes, and appropriate action will be initiated. Greenbelt shall be developed for minimising dust propagation. The ambient air quality data should be transferred and processed in a centralised computer facility equipped with required software. Trend and statistical analysis should be done.

7.3.2 Water and Wastewater Quality Monitoring and Data Analysis

Methods prescribed in "Standard Methods for Examination of Water and Wastewater" prepared and published jointly by American Public Health Association (APHA), American Water Works Association (AWWA) and Water Pollution Control Federation (WPCF); Manual on Water and Wastewater Analysis published by NEERI, Nagpur are recommended.

7.4 Monitoring Equipment and Consumables

A well-equipped laboratory with consumable items will be provided for monitoring of environment parameters. Alternatively, monitoring can be outsourced to a recognized laboratory.

a) Air Quality and Meteorology

Following equipment and consumable items will be made available with the environment cell to meet the monitoring frequency and to implement the monitoring program.

- Respirable Dust Samplers
- Personal sampler
- CO Monitor
- Weather station (automatic recording)
- Spectrophotometer (visible range)
- Single pan balance
- Relevant chemicals as per IS:5182
- Chemical/Glass ware

b) Water and Waste Water Quality

The sampling should be done in jerry cans as per the standard procedures laid down by IS: 2488. Following equipment are recommended to be available with the environment cell:

- BOD incubator;
- Refrigerator;
- Oven;
- Stop watch;
- Thermometer;
- pH meter;
- Distilled water plant;
- Spectrophotometer; and
- Relevant chemicals and Glasswares.

c) Noise Levels

The environment cell shall have sound level meter to record noise levels in different scales like A, B and C with slow and fast response options and vibration meter. Further, any recognized agency can also be engaged for carrying out the above stated monitoring works.

7.5 Occupational Health and Safety

Occupational health and safety is very closely related to productivity and good employer-employee relationship. The main factors of occupational health in plant are fugitive dust and noise. Occupational Health Survey of the employees will be carried out at regular intervals.

These include:

- Effective de-dusting system;
- Provision of rest shelters for workers with amenities like drinking water, fans, toilets etc.;
- Provision of personal protection devices to the workers;
- Rotation of workers exposed to noise premises; and
- First-aid facilities in the plant.

7.6 Environmental Management Cell

The proposed plant will be supervised and controlled by a General Manager supported by adequate team of technically and statutorily qualified personnel apart from the operating staff of skilled, semi skilled, unskilled and other categories.

Environment Management will be the responsibility of the Environment Management cell headed by the Manager (Environment) and comprising of Environmental Engineer, safety officer, chemists, etc. The Manager (Environment) will report to the Plant General Manager.

The Manager-Environment will be responsible for Environment management activities in the power plant. To facilitate effective environment management, DCW will create a department consisting of officers from various disciplines to co-ordinate the activities concerned with the management and implementation of the environmental control measures.

Basically, this department will supervise the monitoring of environmental pollution levels viz. ambient air quality, water and effluent quality, noise level either departmentally or by appointing external agencies wherever necessary.

In case the monitored results of environmental pollution found to exceed the allowable limits, the Environmental Management Cell will suggest remedial action and get these suggestions implemented through the concerned authorities.

The Environmental Management Cell will also co-ordinate all the related activities such as collection of statistics of health of workers and population of the region, afforestation and green belt development.

The organization chart is shown in **Figure-7.1**.

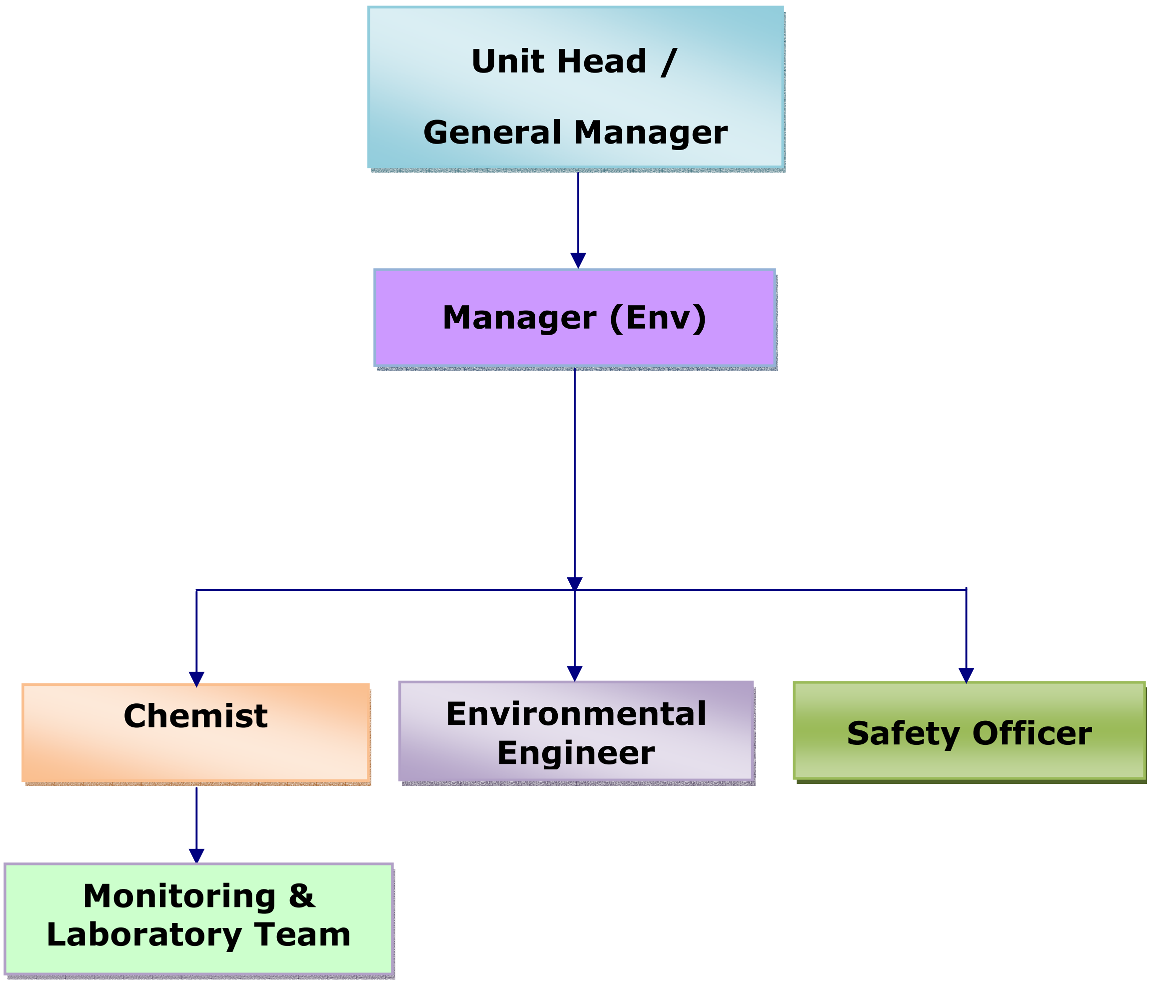


FIGURE-7.1
ORGANISATION CHART

8.0 ADDITIONAL STUDIES

8.1 Public Consultation

The public hearing for the proposed 30 MW captive power plant was conducted by Andhra Pradesh Pollution Control Board (APPCB) on 30th January, 2013 Near Durga Temple located adjacent to the plant premises at Durgapuram village, Dachepalli mandal, Guntur district.

The press notification indicating date and venue of the public hearing was issued by Member Secretary, Andhra Pradesh Pollution Control Board (APPCB), on 28.12.2012 in prominent newspapers Viz. Sakshi (Telugu local news paper) and Indian Express (regional English News Paper) with project details inviting suggestions, views, comments and objections from the public regarding establishment of proposed power project. The copies of the notification issued in newspapers for public hearing are given below in **Figure-8.1** & **Figure-8.2**.

The EIA report along with Executive Summary in English and Telugu were displayed and made available at the following places:

- Office of District Collector, Guntur;
- District Panchayat Office;
- Regional Office, APPCB;
- District Industry Centre;
- Chief Conservator of Forests;
- Regional Office, Guntur; and
- Village Sarpanch Offices of respective villages in 10-km radius.

The minutes of the public hearing is enclosed as **Annexure-XI.**

ప్రదర్శనగా వెళ్లి పత్రాన్ని అందజేశారు.

ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి

ప్రాంతీయ కార్యాలయం

ప్లాట్‌నెం.102,రాఘవ అపార్ట్‌మెంట్స్, బృందావన్ గార్డెన్స్, గుంటూరు- 522 005.

పర్యావరణ ప్రజాభిప్రాయ సేకరణ ప్రకటన

పర్యావరణ అటవీ మంత్రిత్వశాఖ, భారత ప్రభుత్వం యొక్క నోటిఫికేషన్ నెం.యస్.ఓ.1533, తేది: 14-09-2006 మరియు దానికి ఇచ్చిన మార్పులు మరియు సర్క్యులర్‌ననుసరించి ఇందు మూలముగా ప్రకటించునదేమనగా మెస్సర్స్ ఆంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్) వారు ప్రతిపాదించినటువంటి క్యాప్టివ్ విద్యుత్ ఉత్పత్తి కేంద్రము ఏర్పాటుకు సంబంధించిన ప్రజాభిప్రాయ సేకరణను ప్రతిపాదించబడినది, వివరాలు దిగువ పేర్కొనబడినవి.

1. కంపెనీపేరు, చిరునామా మరియు టెలిఫోన్ నెం	: ఆంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్‌వర్క్స్) దుర్గాపురం గ్రామం, దాచేపల్లి మండలం, గుంటూరు జిల్లా. ఫోన్:08649-257441 ఫ్యాక్స్:08649-257428. e-mail:dcw.secretarial@jalindia.co.in
2.పరిశ్రమ నిర్మాణము చేపట్టబోయే ప్రదేశం	: పరిశ్రమ నందు గల పరిసరాలలో దుర్గాపురం గ్రామం, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
3.సంప్రదించవలసిన అధీకృత వ్యక్తి, చిరునామా, టెలిఫోన్ నెం	: శ్రీ ఆర్.కె. దూడ, సీనియర్ వైస్ ప్రెసిడెంట్ (ప్రాజెక్ట్స్), ఆంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్), దుర్గాపురం గ్రామం, దాచేపల్లి మండలం, గుంటూరు జిల్లా. ఫోన్ : 08649 257440, ఫ్యాక్స్ : 08649 257428.
4.మొత్తం ప్రాజెక్టు యొక్క మూలధనము	: రూ.136కోట్లు
5.కేంద్రం యొక్క ఉత్పత్తి సామర్థ్యము	: 30 మెగా వాట్స్ (క్యాప్టివ్ పవర్ ప్లాంట్)
6. ప్యాక్టరీ యొక్క పర్యావరణ విషయ సలహాదారుడు	: విమ్టా ల్యాబ్స్ లిమిటెడ్, 142, ఐ.డి.ఎ. ఫేజ్-2, చర్లపల్లి, హైదరాబాద్-51.

7.ప్రజాభిప్రాయ సేకరణ :
తేది: ది. 30-01-2013. సమయం: ఉదయం 11గంటలకు. వేదిక: దుర్గా ఆలయము పరిసరాలలో, దుర్గాపురం గ్రామం., స్టేట్‌హైవే-2కు ఆనుకుని ఆంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్ ప్లాంట్‌కి) ప్రక్కన.

8. తలపెట్టిన ప్రాజెక్టుకు సంబంధించిన వివరములు బహిరంగంగా ఉంచబడిన ప్రదేశములు

1.శ్రీయుత కలెక్టర్ మరియు మెజిస్ట్రేట్ వారి కార్యాలయము నందు, గుంటూరు.
2. శ్రీయుత చీఫ్ ఎగ్జిక్యూటివ్ ఆఫీసర్, జిల్లా పరిషత్ వారి కార్యాలయము నందు, గుంటూరు.
3. శ్రీయుత జనరల్ మేనేజర్, జిల్లా పారిశ్రామిక కేంద్రం నందు, గుంటూరు.
4. రీజనల్ ఆఫీస్ (సదరన్ జోన్) జి.ఒ.ఐ. ఎం.ఒ.ఇ.ఎఫ్., కేంద్రీయ సదన్, 4వఅంతస్తు, ఎన్విరాన్‌మెంట్ మరియు పారెస్ట్ వింగ్స్ కోరమంగళ, బెంగళూరు.
5. ఏ.పి. పొల్యూషన్ కంట్రోల్ బోర్డు, ఆఫీస్, పర్యావరణ భవన్, ఎ-3, ఇండస్ట్రీయల్ ఎస్టేట్, సనత్‌నగర్, హైదరాబాద్-18.
6. ఏ.పి.పొల్యూషన్ కంట్రోల్ బోర్డు ఆఫీస్, ప్లాట్‌నెం.41, ఎన్.టి.టి.పి.ఎస్ ఎదురు, జోనల్ కార్యాలయం, కనకదుర్గ ఆఫీసర్స్ కాలనీ, గురునానక్ రోడ్డు, విజయవాడ
7. ఏ.పి.పొల్యూషన్ కంట్రోల్ బోర్డు ఆఫీస్, రీజనల్ ఆఫీస్ ప్లాట్ నెం.102, రాఘవ అపార్టుమెంట్స్, బృందావన్ గార్డెన్స్, గుంటూరు
8. ఏ.పి.పొల్యూషన్ కంట్రోల్ బోర్డు ఆఫీస్, రీజనల్ ఆఫీస్ హౌస్‌నెం.6-2-888/బి, 2వఫ్లోర్, లక్ష్మి కాంప్లెక్స్, క్లాక్ టవర్ దగ్గర, నల్గొండ-508001.
9. రెవిన్యూ డివిజనల్ ఆఫీసర్, నరసరావుపేట, గుంటూరు జిల్లా.
10. తాసిల్దారు వారి కార్యాలయము, దాచేపల్లి, గుంటూరు జిల్లా.
11. గ్రామ పంచాయితీ కార్యాలయం, గామాలపాడు, దాచేపల్లి, గుంటూరు జిల్లా.
12. గ్రామ పంచాయితీ కార్యాలయం, దాచేపల్లి, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
13. గ్రామ పంచాయితీ కార్యాలయం, రామాపురం, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
14. గ్రామ పంచాయితీ కార్యాలయం, నడికుడి, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
15. గ్రామ పంచాయితీ కార్యాలయం, పొందుగాల, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
16.గ్రామ పంచాయితీ కార్యాలయం, శ్రీనగర్, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
17. తాసిల్దారు వారి కార్యాలయము, దామరచర్ల మండలం, నల్గొండ జిల్లా.
18.గ్రామ పంచాయితీ కార్యాలయము, దామరచర్ల, దామరచర్ల మండలం, నల్గొండ జిల్లా.
19. గ్రామ పంచాయితీ కార్యాలయము, భట్రుపాలెం, దాచేపల్లి మండలం, గుంటూరు జిల్లా.

ప్రజల అభ్యంతరాలు ఏమైనా ఉన్నట్లయితే ఈ ప్రకటన సలహాలు, అభిప్రాయాలు, వ్యాఖ్యాలు, వివరణలు, ప్రచురించబడిన 30 రోజులలోపుగా కోరడమైనది. పైన పేర్కొనబడిన విధముగా అభ్యంతరములు ఎవరికైనా ఉన్నట్లయితే వ్రాత పూర్వకమైన సలహాలను ఈ దిగువ సంతకం చేయబడిన అధికారికి, ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి వారికి పంపవచ్చును. అట్టివారు పైన తెలుపబడిన తేది, ప్రదేశమున, బహిరంగ ప్రజాభిప్రాయ సేకరణలో పాల్గొని తమ అభిప్రాయాలు, అభ్యంతరాలు తెలుపవచ్చును.

సం/-పర్యావరణ ఇంజనీర్
ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి, ప్రాంతీయ కార్యాలయము, గుంటూరు.

ప్రదేశము : గుంటూరు
తేది :

FIGURE-8.1
PAPER ADVERTISEMENT

A.P. POLLUTION CONTROL BOARD, REGIONAL OFFICE

Flat No. 102, Raghava Apartment, Brundavan Gardens, Guntur-522 006
Phone No. 0863-2215537, e-mail . gtr.ro.ee@pcb.ap.gov.in

ENVIRONMENTAL PUBLIC HEARING NOTIFICATION

In accordance with the Notification No. 1533, Dt. 14.09.2006 of Ministry of Environment & Forests, Government of India, we hereby notify a Public Hearing for the proposed Captive Power Plant by M/s Andhra Cements Limited (Durga Cement Works). The details of activities are as follows:

1.	Name of the Company with the Phone Number and Office Address	M/s. Andhra Cements Limited (Durga Cements Works) Durgapuram (V), Dachepalli (M), Guntur district–522 426 Phone: 08649-257441; Fax: 08649-257428 Email: dcw.secretarial@jalindia.co.in
2.	Location of the Project Captive Power Plant (CPP)	Within the Plant premises of the existing unit at Durgapuram, Dachepalli (M), Guntur district.
3.	Name of the Authorised Person to be contacted with address & Phone No.	Sri R K Dooda, Sr. Vice President (Projects) M/s Andhra Cements Limited, (Durga Cement Works) Durgapuram (V), Dachepalli (M), Guntur District -522 426. Phone: 08649 257440, Fax: 08649 257428 Email: rk.dooda@jalindia.co.in
4.	Capital Cost of the Project	Rs. 136 Crores
5.	Capacity of the Power Plant	**30 MW (Captive Power Plant)**
6.	Environmental Consultant	Vimta Labs Ltd, 142, IDA, Phase-2, Cherlapally, Hyderabad-500 051.
7.	Schedule of Public Hearing Date Time Venue	 30-01-2013 11.00 AM In the premises of Durga Temple, Abutting State Highway-2, Near Andhra Cements Ltd., (Durga Cement Works), Durgapuram (V), Dachepalli (M), Guntur Dist.
8.	**Place of the availability of executive summary (Telugu & English) and Draft EIA report on proposed project which are kept open for public.**	

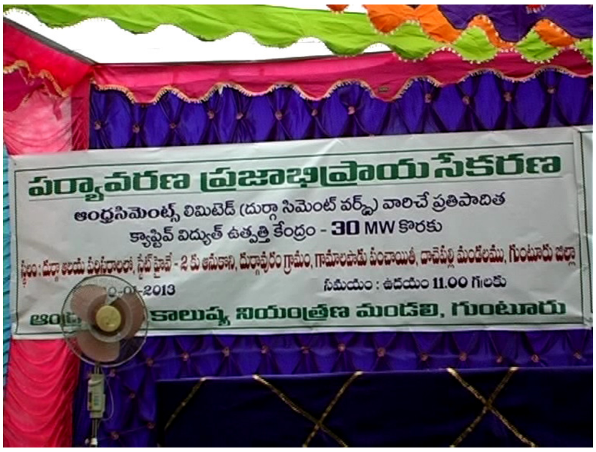
1. Office of the Collector and District Magistrate, Guntur
2. Office of the Chief Executive Officer, Zilla Parishad, Guntur.
3. Office of the General Manager, District Industries Centre, Guntur
4. Regional Office, Southern Zone, GOI, MoEF, Kendriya Sadan, IV-Floor Environment & Forest Wings, Koramangala, Bangalore-560 034.
5. A.P.Pollution Control Board, Paryavaran Bhavan, A3, Industrial Estate, Sanatnagar, Hyderabad-500 018.
6. A.P. Pollution Control Board, Plot No. 41, Opp: SBH Zonal Office, Kanakadurga Officers Colony, Gurunanak Road, Vijayawada.
7. A.P.Pollution Control Board, Regional Office, Flat No. 102, Raghava apartment, Brundavan Gardens, Guntur.
8. A.P.Pollution Control Board, Regional Office, H.No. 6-2-888/B, 2nd Floor, Lakshmi Complex, Near Clock Tower, Nalgonda – 508001.
9. Office of the Revenue Divisional Officer, Narasaraopet, Guntur Dist.
10. Office of the Tahasildhar, Dachepalli Mandal, Guntur Dist.
11. Gramapanchayat Office, Gamalapadu, Dachepalli Mandal, Guntur Dist.
12. Gramapanchayat Office, Dachepalli, Dachepalli Mandal, Guntur Dist.
13. Gramapanchayat Office, Ramapuram, Dachepalli Mandal, Guntur Dist.
14. Gramapanchayat Office, Nadikudi, Dachepalli Mandal, Guntur Dist.
15. Gramapanchayat Office, Ponugala, Dachepalli Mandal, Guntur Dist.
16. Gramapanchayat Office, Srinagar, Dachepalli Mandal, Guntur Dist.
17. Gramapanchayat Office, Damarlacharla (V&M), Nalgonda Dist.
18. Office of the Tahsildhar, Damarlacharla Mandal, Nalgonda Dist.
19. Gramapanchayat Office, Bhatrupalem, Dachepalli Mandal, Guntur Dist.

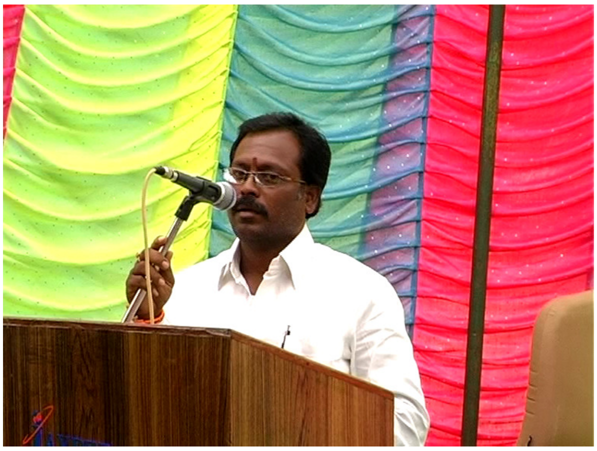
Suggestions, Views comments and objections of the Public, if any, are invited within 30 days from the date of Publication of this notification from all persons including bonafide residents. Environmental groups, others located at Project site/sites of displacement/sites likely to be affected. The interested persons can send written suggestions, comments to the under signed officer of A.P. Pollution Control Board, Regional Office, Guntur. The interested persons can participate in the Public Hearing on the date, time and venue specified above.

Sd/- Environmental Engineer,
A.P. Pollution Control Board,
Regional Office, Guntur.

Date: 27.12.2012
Place: GUNTUR

FIGURE-8.2
PAPER ADVERTISEMENT





PHOTOGRAPHS SHOWING PUBLIC HEARING

PHOTOGRAPHS SHOWING PUBLIC HEARING

8.2 Issues Discussed during Public Hearing

The entire issues rose by individuals and reply of project proponent along with action plan are given in **Annexure- XI.** The summaries of issues raised are discussed below in **Table-8.1.**

TABLE-8.1
SUMMARY OF ISSUES RAISED ARE GROUPED AND DISCUSSED

Sr.No	Issues	Proponent Reply	Action Plan
1	Shri Maasetti Venkateswarulu detailed on following issues -To take adequate pollution control measures - Priority in employment to the local people -He extended support to the project if adequate control measure are taken -Suggested for alternative technology - solar based power plant instead of using coal	The proponent assured to employ local youth fulfilling required qualifications. Preference in employment will be given to local depending on qualification and need of the company. About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist. 310 people have been employed directly/indirectly in the cement plant	**Mitigation Measures** **Air** - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm3 - **Water** Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept **Noise** - Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex. Power plant of same size (30 MW) with non-conventional sources such as solar power will require about 1 sq.km (>10-ha of land) whereas

Sr.No	Issues	Proponent Reply	Action Plan
			3.0 Ha land proposed for the coal based 30 MW CPP which may lead to additional land requirement.
2	Shri Prathipath Rosaiah, Narayanapuram village - Suggested to give priority on employment to the local people	Preference in employment will be given to locals depending on qualification and need of the company. About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist. 310 people have been employed directly/indirectly in the cement plant	-Employment will be provided for qualified persons - Industrial Training Institute (ITI) will be started by JAL to train the local youth in different industrial trade coming from villages and other areas. The persons trained in the ITI will be provided with suitable job in the company.
3	Shri Medara Daniyel, Gomalapadu village - Expressed his concerns that they are not in favor of project	The project will uplift the socio-economic conditions of the region	The project will help in development of the area. Total amount of 0.54 crore is proposed to incur on CSR activities as infrastructure development cost and Rs. 10.8 Lakhs every year as recurring expenditure for maintaining the infrastructure and other peripheral development activities
4	Shri Modugula Suresh Reddy, Shrinagar - commented on arrest of CO2 emission from the proposed project. - Suggest for opting solar or wind power technology for power generation	Necessary pollution control measures will be taken as per APPCB/CPCB norms	**Mitigation Measures** **Air** - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm3 - **Water** Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept **Noise**

Sr.No	Issues	Proponent Reply	Action Plan
			- Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex. The altitude and wind velocity around the project site donot favour windpower plants. Further 30 MW wind power requires more land than 3.0 –ha proposed for the coal based CPP
5	Shri Shankara Rao, Srinagar village - Expressed his opinion about the venue of public hearing. - He expressed his concerns on providing water supply to the villagers	The venue has been finalized by APPCB as per the EIA Notification 2006. CSR activities will be aimed at supply of water to the villages.	The break of budget allocated for CSR activities is about given below: Education-Rs.0.14 crore Health- Rs.0.18 crore incl. water supply to villages Community development– Rs.0.24 crore
6	Shri Vanga Padmavathi - expressed view on affect of proposed project on human health and live stock - Priority in employment to the local people	All the statutory guidelines will be implemented as per the stipulated norms so that proposed CPP will not impact the health of local villagers and live stock. About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist. 310 people have been employed directly/indirectly in the cement plant	- All the conditions/ norms for environmental protection that would be stipulated in EC/CFE/CFO etc will be complied Industrial Training Institute (ITI) will be started by JAL to train the local youth in different industrial trade coming from villages and other areas. The persons trained in the ITI will be provided with

Sr.No	Issues	Proponent Reply	Action Plan
			suitable job in the company.
7	Shri Ramanamma & others, Srinagar - Expressed view that they are opposing the project	More initiative will be taken for the development of schools, hospitals, infrastructure like roads, street lights etc. The proponent assured to employ local youth fulfilling required qualifications. Preference in employment will be given to locals depending on qualification and need of the company.	The proposed project will improve the socio-economic conditions of the region
8	Shri Chiluku Chandra Shekar, Advocate & AP.Civil Liberties Union - expressed his views on venue of the public hearing meeting - Preference for Local employment - Suggested for adopting solar power - Pollution measures	The venue has been finalized by APPCB as per the EIA Notification 2006. About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist. 310 people have been employed directly/indirectly in the cement plant - All the statutory guidelines will be implemented as per the stipulated norms.	**Mitigation Measures** **Air** - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm^3 - **Water** Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept **Noise** - Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex. Power plant of same size (30 MW) with non-conventional sources such as solar

Sr.No	Issues	Proponent Reply	Action Plan
			power will require huge land, of 1.0 Sq.km (>10-ha) whereas 3.0 Ha land proposed for the coal based 30 MW CPP which may lead to additional land requirement.
9	Shri Nava Jyothi, Paryavarana Parirakshana Samithi, Nadikudi village expressed his opinion stating about the damage of biodiversity due to the proposed plant and existing cement plants. - And also raise comment on ministry how it is permitting for too many cement plants at one place	All the statutory guidelines will be implemented as per the stipulated norms.	The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha

8.3 Conclusion on Public Hearing

As there is no further representation from the Public present during public hearing, Joint Collector has summed up the Proceedings of the Public hearing and declared the Public Hearing as over.

Shri BMK Sharma from JAL given the clarification of the some of the issues by stating that all employees were retained on the rolls of Andhra Cements even after takeover of the unit and also promised that the loading & unloading contract workers also will be taken as per requirement after commencement of production.

Shri TGV Krishna Reddy, MLC special invitee of the public hearing suggested management to maintain good relationship and discuss the issues. And stressed on providing employment, greenbelt development and suggested for alternative technology solar energy system.

8.4 Written Suggestions and Complaints

Comments were received by regulatory authorities in response to the Public Notice. About 205 no of written representations were received expressing their opinion on establishment of proposed project. The copies of the comments and clarifications are given in **Annexure- XI**. The written comments are given in **Table-8.2**.

TABLE-8.2
REPLY TO APPLICATIONS RECEIVED IN WRITING

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
1	Shri Surkanti Venkata Reddy, Sri Siddhartha rural development & environment safe guard society, NGO	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent
2	Shri Chhintala Sailu, Mathrubhumi Prayavarana Parirakshna Samithi Shri Venkatareddy, President, Swan Environmental Safeguard Society (NGO)	- All environmental factors shall have to be taken care and requested to grant environmental clearances -Advised for 80% of local employment - Plantation has been done by the company in existing plant and effective control measures are adopted for control of pollution.	**Mitigation Measures** **Air** - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm3 - **Water** Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept **Noise** - Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex whereas Rs. 7.2 crores will be spent every year for recurring cost.
3	Shri P.Ranjith Kumar, General secretary, Society of Media awareness service	- Adviced to take the suggestions from forest department for greenbelt development - Expressed willingness to the project	The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha. For developing green belt, advice and assistance will be obtained from Forest Dept.
5	Shri Shyamal Nagasena Reddy, President, Charumathi Child Care Centre	- Advised to improve CSR activities - Views expressed on greenbelt development and allotment of budget on environment protection measures	- Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures - Total amount of Rs.0.54 crores will be incurred on CSR activities
6	Shri P.V.Sudhakar Rao, Co-Ordinator, Disha Service Heights Voluntary Organisation	All environmental factors shall have to be taken care and requested to grant environmental clearances	We shall take care of all environmental elements - CSR activities will be

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
		- Expressed views that the coming project will improve the socio-economic conditions of nearby villages	strengthened for socio-economic development of the region
7	Shri A.Kumar, Co-ordinator, Tribal Rural Development society & G.Janardhan Reddy, President, Paryavarana Praja Parirakshana Samithi, PLN.Rao, Front Line Environment Safe Guard Society	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent
8	The people from Bodugala, Srinagar, Gamalapadu, Pondugala, Ramapuram, Katarapadu and other nearby villages	-Expressed positive concerns for the coming project and suggested to adapt effective measure for abatement of pollution and requested to grant environmental clearance	Thanks for consent
9	PDM, Guntur district	- Opposes the project stating that the levels of pollution due to the project activity will have impact on health of the people	**Mitigation Measures** **Air** - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm3 - **Water** Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface water bodies. The plant will be working on zero discharge concept **Noise** - Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex whereas Rs. 7.2 crores will be spent every year for recurring cost. All the statutory guidelines will be implemented as per the stipulated norms so that proposed CPP will not impact the health of local villagers and livestock.
10	People of Gamalapadu village	- Requested to stop the project and opinioned that it will damage agricultural land	Necessary steps will be taken for the abatement of pollution. The produced ash

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
			will be 100% utilised in cement plant
11	Public of Bhatrupalem thanda, Chips & welfare unit, Nadikudi	-Expressed concerns on dust pollution and requested to stop the project as it will be damaging the agricultural land and cause health problems to the villages nearby	All standards are being strictly followed by the company in the existing cement plants and regular inspections are done by pollution control board and other departments.
12	Shri V.Venkata reddy, Andhra Cement Company Employees Union	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent
13	The following members who attended public hearing expressed their willingness in writing: Shaik Chand, Pondugala Thanda Ibrahim Pondugala Jhakka Ramnaidu Pondugala Thanda Modhin Pondugala T.M.Kareem Pondugala Thanda Jilani Pondugala G.Masthan Pondugala K.Pichaih Pondugala Gurajala Ghani Pondugala Thanda Odesa Pondugala K. Mutaih Pondugala J.Ramakoteswarao Pondugala M.D.Kalil Pondugala B.Murali Krishna Pondugala Thanda Jilani Basha Pondugala S.K.Fayaziddun Vadapalli G.Narsaiah Vadapalli M.Nageswarao Vadapalli S.K.Salem Vadapalli Shaik Liakathali Vadapalli Maram Koteswarao Vadapalli Ramaswami Srinivas reddy Vadapalli	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Korra Nageswarao Vadapalli Shaik Dastagiri Vadapalli G.Rambabu Vadapalli Surepalli Srinivasrao Vadapalli Vattepu Kasiah Vadapalli Shaik Nazir Nadikudi B.Koteswarao Nadikudi Shaik Nazir Nadikudi K.Saidaih Nadikudi B.Krishna Nadikudi ThantiKondalu Gamalapadu Kondalu Gamalapadu D.Nageswarao Gamalapadu Pamula Parvathi Srinagar Settiprolu Srinivasa Rao Gamalapadu Jinkala Kasim Gamalapadu Bomma Suresh Gamalapadu Ch. Venkataka Kotaiah Gamalapadu Viriyala China Narasimham Gamalapadu Allari Kondaiah Gamalapadu Palle Saidaiah Gamalapadu Y. Srinivasa Rao Gamalapadu Y. Adinarayana Gamalapadu G. Suresh Babu Gamalapadu Sankarasetti Appara Rao Gamalapadu Munavathu Baghya Naik Batrupalem P. Venkateswarlu Srinagar Devadathu Parama Naik Batrupalem M Saida Naik Batrupalem R. Tikya Naik Batrupalem M. Bimla Naik		

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Batrupalem SK. Leela Srinagar Taviti Subba Rao Srinagar Mukku Madhusudan Srinagar R. Raghu Gamalapadu T. Venkateswararam Gamalapadu Y. Yedukondalu Pondugula K.V.Rao Srinagar P. Venkaiah Ramapuram Lela Srinagar Shyam Babu Nadikudi Korrapati Purnaiah Ramapuram V. Vinod Reddy Ramapuram Vemula Srinivasara Ramapuram A. Kondaiah Gamalapadu Chilaka Marthamma Nadikudi Erisi Mashaiah Nadikudi Erisi Jargi Nadikudi Velpula Santhosham Nadikudi Velpula Suryanarayana Nadikudi Mamidi GOpal Nadikudi Velpula Linkan Nadikudi Eriki Durga Rao Nadikudi Velpula Ambhedkar Nadikudi V. Ramesh Babu Ramapuram B. Yesaiah Srinagar B. Parameswara Rao Gamalapadu Karasani Nagireddi Srinagar Bidigula Nagaiah Gamalapadu R. Ravi Naik Vadapalli K. Saidaiah CHoudhary Nadikudi		

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Md. Basheer Ahmed Vadapalli Md. Jahangir Vadapalli Kothapalli Anandababu Nadikudi Patrapu Saibabu Batrupalem Sudhakar Gamalapadu Saidalu Gamalapadu Ramalinga Reddy Dachepalli B. Venkat Reddy Srinagar Mallu Madi Reddy Batrupalem Vishnu Babu Srinagar Koti Reddy Ramapuram G.P.Rao Gamalapadu P.G. Rao Srinagar K. Rama Rao Srinagar M. V.V. Reddy Ramapuram C. Ramaiah Gamalapdu P. Lakshmi Gamalapadu S. Venkateswarao Gamalapadu K. Patha Kalaiah Gamalapadu G. Anjaneyulu Gamalapadu N. Srinivas Gamalapadu A. Saidulu Gamalapadu B. Koteswara Rao Srinagar P. Kondaiah Gamalapadu M. Devasahayam Gamalapadu P. Sathanandham Srinagar M. Yesu Gamalapadu K. Saidulu Gamalapdu T. Balaji Hyderabad K. Anki Reddy Gamalapadu N. Chandra Sekhar		

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Gamalapadu Vemula Nagamani Ramapuram Todeti Punna Rao Nadikudi Kobbari Murali Nadikudu Velpula Jakkaiah Nadikudi B.V.Veswara Rao Srinagar V. Satyanarayana Dachepalli K.Srinivasa Reddy Srinagar Sk. Kasim Gamalapadu V. Satyanarayana Dachepalli K. Srinivasa Reddy Srinagar T. Sambasiva Rao Gamalapadu Koya Koteswara Rao Gamalapadu Sudhakar Kumar Srinagar B. Sekhar Durgapuram K. Sekhar Gamalapadu Rajkiran Gamalapadu M. Nagulu Gamalapadu V. Venkat Reddy Durga Puram S. Anji Reddy Gamalapadu K. Meera Reddy Gamalapadu A. Bharathi Ramapuram V. Krishnaveni Ramapuram V. Sambrajamma Gamalapadu Sk. Shahina Kousar Gamalapadu Vemula Lingamma Gamalapadu Annangi Anjamma Gamalapadu A.V. Rao Durgapuram V . Padma Ramapuram Sripathi Ananda Rao Nadikudi L.C.H. Meerabhi Ramapuram		

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Rudraiah Bodugula Ramapuram Lakshmi Srinagar C. Krisha Rao Dachepalli P. Saidulu Pondugula Jamula Naik Gamalapadu Md. Janmiya Dachepalli Mangaraithu Srinagar Tulasiraithu Srinagar Maisamma Raithu Srinagar L. Samy Goud Srinagar S. Yadaih Srinagar B. Lingaiah Srinagar Saleru Buchamma Pondugula B. Krishna Rao Ramapuram K. Jagga Rao Katarapadu V. Sankar Batrupalem Y. Sathi Reddy Irika Gudem J. Kamili Ganesh Pahad P. Damodhar Reddy Vadapalli K. Janaiah Vadapalli K. Yadi Reddi Vadapalli D. Manga Naik Vadapalli D. Peer Naik Vadapalli D. Mamatha Vadapalli K. Ramuli Dachepalli K. Ramireddi Nadikudi V. Koti rEddi Gamalapadu Sankar Naik Vadapalli D. Ravidhar Naik Vadapalli		

8.5 RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

8.5.1 Risk Assessment and Disaster Management Plan

Hazard analysis involves the identification and quantification of various hazards (unsafe conditions) that exist in the plant. On the other hand, risk analysis deals with the identification and quantification of risks, the plant equipment and personnel are exposed to, due to accidents resulting from the hazards present in the plant.

Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks the neighboring populations are exposed to as a result of hazards present. This requires a thorough knowledge of failure probability, credible accident scenario, vulnerability of populations etc. Much of this information is difficult to get or generate. Consequently, the risk analysis is often confined to maximum credible accident studies.

In the sections below, the identification of various hazards, probable risks in the plant, maximum credible accident analysis and consequence analysis are addressed which gives a broad identification of risks involved in the cement and captive power plant. Based on the risk estimation, disaster management plan has also been prepared.

8.5.2 Approach to the Study

Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas;
- Identification of representative failure cases;
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion;
- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios;
- Assess the overall suitability of the site from hazard minimization and disaster mitigation point of view;
- Furnish specific recommendations on the minimization of the worst accident possibilities; and
- Preparation of broad Disaster Management Plan (DMP), On-site and Off-site Emergency Plan, which includes Occupational Health and Safety plan.

8.5.3 Hazard Identification

Identification and quantification of hazards in plant is of primary significance in the risk analysis. Hence, all the components of a system/plant/process has been thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident. The following two methods for hazard identification have been employed in the study:

- Identification of major hazardous units based on Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 of Government of India (GOI Rules, 1989); as amended in 2000; and

- Identification of hazardous units and segments of plants and storage units based on relative ranking technique, viz. Fire-Explosion and Toxicity Index (FE&TI).

Hazardous substances may be classified into three main classes: Flammable substances, unstable substances and Toxic substances. The ratings for a large number of chemicals based on flammability, reactivity and toxicity have been given in NFPA Codes 49 and 345-M. The storages of raw materials, products of power and cement plants are given in **Table-8.3.**

Coal is the main fuel used in the Captive Power Plant and Kiln in cement plant.

Hazardous characteristics of the major flammable materials and chemicals that are employed in different processes and storages of the cement and power plant are listed in **Table-8.4.**

TABLE- 8.3
CATEGORYWISE SCHEDULE OF STORAGE TANK

Sr. No	Product	No. of Tanks	Classification	Design Capacity (KL)
1	HSD	1	B	200

A: Dangerous Petroleum B: Non- Dangerous Petroleum C: Heavy Petroleum

TABLE-8.4
PROPERTIES OF FUELS/CHEMICALS USED AT THE PLANT

Chemical	Codes/Label	TLV	FBP	MP	FP	UEL	LEL
			°C			%	
HSD	Flammable	5 mg/m^3	400	338	32-96	7.5	0.6

TLV : Threshold Limit Value
FBP : Final Boiling Point
MP : Melting Point
FP : Flash Point
UEL : Upper Explosive Limit
LEL : Lower Explosive Limit

8.5.3.1 Identification of Major Hazard Installations Based on GOI Rules, 1989 (amended in 2000)

Following accidents in industries in India over a few decades, a specific legislation covering major hazard activities has been enforced by Govt. of India in 1989 in conjunction with Environment Protection Act, 1986. This is referred here as GOI Rules 1989 (amended in 2000). For the purpose of identifying major hazard installations the rules employ certain criteria based on toxic, flammable and explosive properties of chemicals. A systematic analysis of the fuels and their quantities of storage has been carried out, to determine threshold quantities as notified by GOI Rules and the applicable rules are identified. The results are summarized in **Table-8.5.**

TABLE-8.5
APPLICABILITY OF GOI RULES TO FUEL/CHEMICAL STORAGE

Sr. No.	Fuel	Listed in Schedule	Total Quantity [KL]	Threshold Quantity (T) for Application of Rules	
				5,7-9,13-15	10-12
1	HSD	3(1)	200	25 MT	200 MT

8.6 Hazard Assessment and Evaluation

An assessment of the conceptual design is conducted for the purpose of identifying and examining hazards related to feed stock materials, major process components, utility and support systems, environmental factors, operations, facilities and safeguards.

8.6.1 Preliminary Hazard Analysis (PHA)

A preliminary hazard analysis is carried out initially to identify the major hazards associated with storages and the processes of the plant. This is followed by consequence analysis to quantify these hazards. Finally the vulnerable zones are plotted for which risk reducing measures are deduced and implemented. The potential risk areas in the plant are given in **Table-8.6 &** hazard analysis in **Table-8.7**.

TABLE-8.6
PRELIMINARY HAZARD ANALYSIS FOR PROCESS AND STORAGE AREAS

Sr. No.	Blocks/Areas	Hazards Identified
1	Coal Handling Plant	Fire and/or Dust Explosions
2	Boilers	Fire (mainly near oil burners), steam; Explosions, Fuel Explosions
3	Kiln	Fires in - a) Lube Oil systems b) Cable galleries c) Short circuits in i) Control Rooms ii) Switchgears
4	Power Transformers	Explosion and fire.
5	Switch-yard Control Room	Fire in cable galleries and Switchgear/Control Room.
6	Tank Farms Furnace Oil	Fire

TABLE-8.7
PRELIMINARY HAZARD ANALYSIS FOR THE WHOLE PLANT IN GENERAL

PHA Category	Description of Plausible Hazard	Recommendation	Provision
Environ-mental factors	If there is any leakage and eventuality of source of ignition.	--	All electrical fittings and cables are provided as per the specified standards. All motor starters are flame proof.
Environ-mental factors	Highly inflammable nature of the chemicals may cause fire hazard in the storage facility.	A well-designed fire protection including protein foam, dry powder and CO2 extinguisher shall be provided.	Fire extinguisher of small size and big size are provided at all potential fire hazard places. In addition to the above, fire hydrant network is also provided.

8.6.2 Fire Explosion and Toxicity Index (FE&TI) Approach

Fire, Explosion and Toxicity Indexing (FE & TI) is a rapid ranking method for identifying the degree of hazard. The application of FE&TI would help to make a quick assessment of the nature and quantification of the hazard in these areas. However, this does not provide precise information.

The degree of hazard potential is identified based on the numerical value of F&EI as per the criteria given below:

F&EI Range	Degree of Hazard
0-60	Light
61-96	Moderate
97-127	Intermediate
128-158	Heavy
159-up	Severe

By comparing the indices F&EI and TI, the unit in question is classified into one of the following three categories established for the purpose are presented in **Table-8.8.**

TABLE-8.8
FIRE EXPLOSION AND TOXICITY INDEX

Category	Fire and Explosion Index (F&EI)	Toxicity Index (TI)
I	F&EI < 65	TI < 6
II	65 < or = F&EI < 95	6 < or = TI < 10
III	F&EI > or = 95	TI > or = 10

Certain basic minimum preventive and protective measures are recommended for the three hazard categories.

- ***Results of FE and TI for Storage/Process Units***

Based on the GOI Rules, the hazardous fuels used in the plant were identified. Fire and Explosion are the likely hazards, which may occur due to the fuel storages. Hence, Fire and Explosion index has been calculated for in plant storage. Detailed estimates of FE&TI are given in **Table-8.9.**

TABLE-8.9
FIRE EXPLOSION AND TOXICITY INDEX FOR STORAGE FACILITIES

Sr. No.	Chemical	Total Quantity	F&EI	Category	TI	Category
1	HSD	200 KL	10.1	Light	Nil	-

Furnace oil storage falls into 'light' category of F&EI and 'nil' toxicity index.

8.6.3 Maximum Credible Accident (MCA) Analysis

Hazardous substances may be released as a result of failures or catastrophes, causing possible damage to the surrounding area. This section deals with the question of how the consequences of the release of such substances and the damage to the surrounding area can be determined by means of models. Major hazards posed by flammable storage can be identified taking recourse to MCA analysis. MCA analysis encompasses certain techniques to identify the hazards and calculate the consequent effects in terms of damage distances of heat radiation, toxic releases, vapor cloud explosion, etc. A host of probable or potential accidents of the major units in the complex arising due to use, storage and handling of the hazardous materials are examined to establish their credibility. Depending upon the effective hazardous attributes and their impact on the event, the maximum effect on the surrounding environment and the respective damage caused can be assessed.

The reason and purpose of consequence analysis are many folds like:

- Part of Risk Assessment;
- Plant Layout/Code Requirements;
- Protection of other plants;
- Protection of the public;
- Emergency Planning; and
- Design Criteria (e.g. loading on Control Room).

The results of consequence analysis are useful for getting information about all known and unknown effects that are of importance when some failure scenario occurs in the plant and also to get information as how to deal with the possible catastrophic events. It also gives the workers in the plant and people living in the vicinity of the area, an understanding of their personal situation.

8.6.3.1 Damage Criteria

The fuel storage and the supply pipelines may lead to fire and explosion hazards. The damage criteria due to an accidental release of any hydrocarbon arise from fire and explosion. Contamination of soil or water is not expected as these fuels will vaporize slowly and would not leave any residue. The vapors of these fuels are not toxic and hence no effects of toxicity are expected.

- **Fire Damage**

A flammable liquid in a pool will burn with a large turbulent diffusion flame. This releases heat based on the heat of combustion and the burning rate of the liquid. A part of the heat is radiated while the rest is convected away by rising hot air and combustion products. The radiations can heat the contents of a nearby storage or process unit to above its ignition temperature and thus result in a spread of fire. The radiations can also cause severe burns or fatalities of workers or fire fighters located within a certain distance. Hence, it will be important to know beforehand the damage potential of a flammable liquid pool likely to be created due to leakage or catastrophic failure of a storage or process vessel. This will help to decide the location of other storage/process vessels, decide the type of protective clothing the workers/fire fighters need, the duration of time for which they can be in the zone, the fire extinguishing measures needed and the protection methods needed for the nearby storage/process vessels. **Tables-8.10** and **Table-8.11** tabulated the damage effect on equipment and people due to thermal radiation intensity.

TABLE-8.10
DAMAGE DUE TO INCIDENT RADIATION INTENSITIES

Sr. No	Incident Radiation (kW/m^2)	Type of Damage Intensity	
		Damage to Equipment	**Damage to People**
1	37.5	Damage to process equipment	100% lethality in 1 min. 1% lethality in 10 sec.
2	25.0	Minimum energy required to ignite wood at indefinitely long exposure without a flame	50% Lethality in 1 min. Significant injury in 10 sec.
3	19.0	Maximum thermal radiation intensity allowed on thermally unprotected adjoining equipment	--
4	12.5	Minimum energy to ignite with a flame; melts plastic tubing	1% lethality in 1 min.
5	4.5	--	Causes pain if duration is longer than 20 sec, however blistering is un-likely (First degree burns)
6	1.6	--	Causes no discomfort on long exposures

Source: Techniques for Assessing Industrial Hazards by World Bank

TABLE-8.11
RADIATION EXPOSURE AND LETHALITY

Radiation Intensity (kW/m^2)	Exposure Time (seconds)	Lethality (%)	Degree of Burns
1.6	--	0	No Discomfort even after long exposure
4.5	20	0	1 st
4.5	50	0	1 st
8.0	20	0	1 st
8.0	50	<1	3 rd
8.0	60	<1	3 rd
12.0	20	<1	2 nd
12.0	50	8	3 rd
12.5	--	1	--
25.0	--	50	--
37.5	--	100	--

8.6.3.2 Fuel Storage

Only one storage tank is provided in the plant for Furnace Oil storage. The oil is supplied by road tankers. In case of tank or fuel released in the dyke area catching fire, a steady state fire will ensue. Failures in pipeline may occur due to corrosion and mechanical defect. Failure of pipeline due to external interference is not considered as this area is licensed area and all the work within this area is closely supervised with trained personnel.

8.6.3.3 Modeling Scenarios

Based on the storage and consumption of furnace oil, the following failure scenarios for the plant have been identified for MCA analysis and the scenarios are discussed in **Table-8.12.**

TABLE-8.12
SCENARIOS CONSIDERED FOR MCA ANALYSIS)

Sr. No.	Fuel/Chemical	Total Storage Quantity (KL)	Scenarios Considered
1	Failure of HSD Tank	200	Pool Fire

8.6.3.4 Details of Pool Fire Model

Heat Radiation program **RADN** has been used to estimate the steady state radiation effect from various storage of fuel and chemicals at different distances. The model has been developed by VIMTA based on the equations compiled from literatures by Prof.J.P.Gupta, Department of Chemical Engineering, IIT Kanpur. The equations used for computations are described below:

8.6.3.5 Properties of Fuels Considered for Modeling Scenarios (Pool fire)

The data for various fuels used for modeling is tabulated in **Table-8.13** and are compiled from various literatures.

TABLE-8.13
PROPERTIES OF FUEL CONSIDERED FOR MODELING

Sr. No.	Fuel	Molecular Weight kg/kg. mol	Boiling Point ^{0}C	Density kg/m^3
1	HSD	114.24	400.0	920.0

8.6.3.6 Results and Discussion - Pool Fire

The results of MCA analysis are tabulated indicating the distances for various damages identified by the damage criteria. Calculations are done for radiation intensities levels of 37.5, 25, 19, 12.5, 4.5 and 1.6 kW/m^2, which are presented in **Table-8.14** for different scenarios. The distances computed for various scenarios are given in meters and are from the edge of the pool fire. The radiation intensities are computed for the maximum and minimum diameter of the storage tanks. It is further assumed that all other tank diameters fall in between the maximum and minimum diameter, thereby the radiation intensities also fall in between the maximum and minimum radiation intensities.

TABLE-8.14
OCCURRENCE OF VARIOUS RADIATION INTENSITIES- POOL FIRE

Failures	Quantity KL	Radiation Intensities (kW/m^2)/Distances (m)			
		37.5	25.0	4.5	1.6
Failure of HSD tank	200	12.3	15.4	41.1	74

A perusal of modeling results tabulated in **Table-8.14** indicate that the radiation intensity of 37.5 kW/m^2 (100% lethality) and 25.0 kW/m^2 (50% lethality) are likely to occur within the radius of the pool, which is computed at 12.3 m and 15.4 m respectively.

Similarly, the radiation intensity of 4.5 kW/m^2 is likely to occur within a distance of 41.1 m from the center of fuel storage tank. First-degree burns are likely to occur within this distance. The radiation contours are shown in **Figure-8.3**.

8.6.3.7 Effect of Thermal Radiation on Population

The radiation of 1.6 kW/m^2 represents the safe radiation intensity for human population even for long exposures.

In case of pool fire of tank the safe distance i.e. distance of occurrence of 1.6 kW/m^2 is observed to be 74 m and falls within the plant boundary.

8.6.4 Risk Associated with Coal Handling Plant - Dust Explosion

Coal dust when dispersed in air and ignited would explode. Coal crusher house and conveyor systems are most susceptible to this hazard. To be explosive, the dust mixture should have:

- Particles dispersed in the air with minimum size (typical figure is 400 microns); and
- Dust concentrations must be reasonably uniform.

Failure of dust extraction and suppression systems may lead to abnormal conditions and increasing the concentration of coal dust to the explosive limits. Sources of ignition present are incandescent bulbs with the glasses of bulk head fittings missing, electric equipment and cables, friction, spontaneous combustion in accumulated dust.

Dust explosions may occur without any warnings with Maximum Explosion Pressure upto 6.4 bar. Another dangerous characteristic of dust explosions is that it sets off secondary explosions after the occurrence of the initial dust explosion. Many a times, the secondary explosions are more damaging than primary ones. The dust explosions are powerful enough to destroy structures, kill or injure people and set dangerous fires likely to damage a large portion of the Coal Handling Plant including collapse of its steel structure, which may cripple the life line of the power plant.

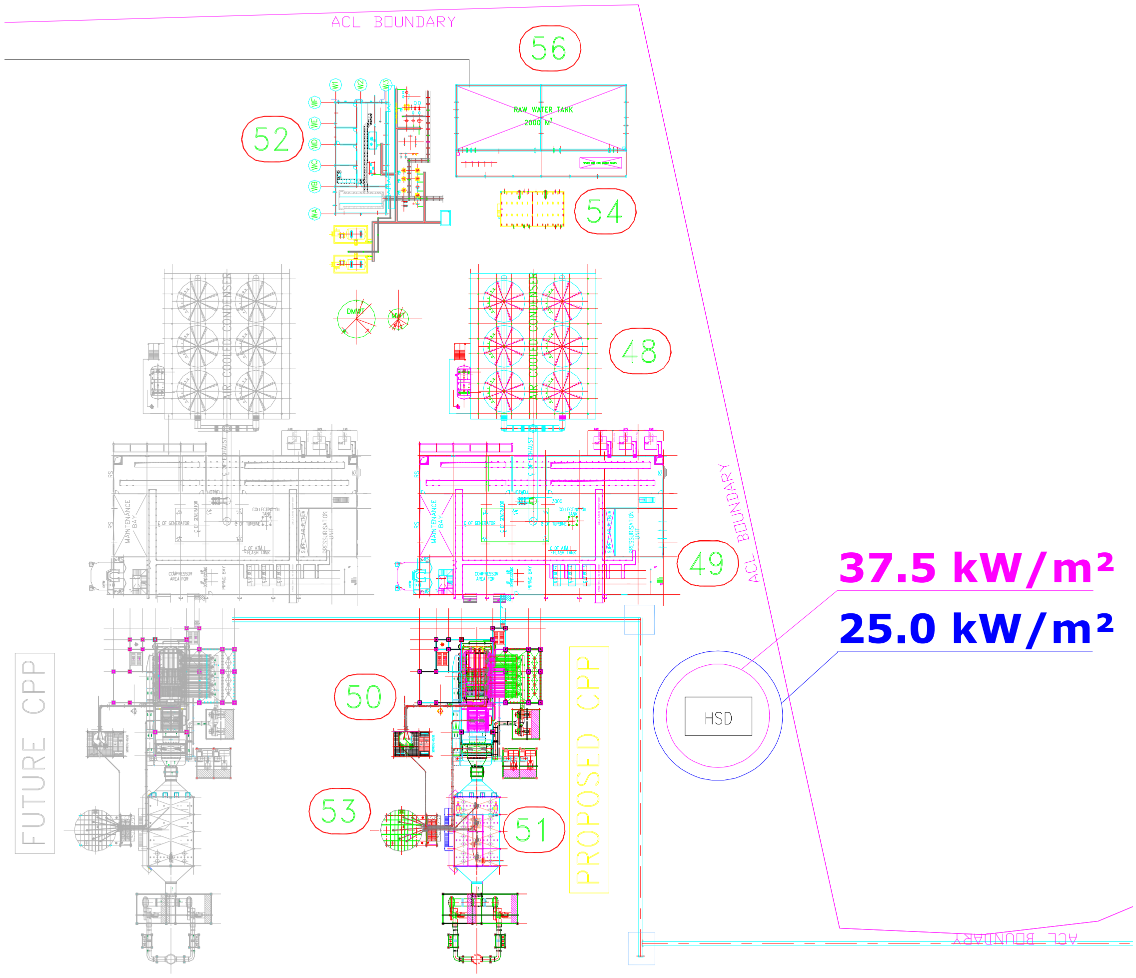


FIGURE-8.3
RADIATION CONTOURS

Stockpile areas shall be provided with automatic garden type sprinklers for dust suppression as well as to reduce spontaneous ignition of the coal stockpiles. Necessary water distribution network for drinking and service water with pumps, piping, tanks, valves etc will be provided for distributing water at all transfer points, crusher house, control rooms etc.

A centralized control room with microprocessor based control system (PLC) has been envisaged for operation of the coal handling plant. Except for locally controlled equipment like traveling tripper, dust extraction/ dust suppression / ventilation equipment, sump pumps, water distribution system etc, all other in-line equipment will be controlled from the central control room but will have provision for local control as well. All necessary interlocks, control panels, MCC's, mimic diagrams etc will be provided for safe and reliable operation of the coal handling plant.

8.3.5 Control Measures for Coal Yards

The total quantity of coal shall be stored in separate stockpiles, with proper drains around to collect washouts during monsoon season.

Water sprinkling system shall be installed on stocks of coal in required scales to prevent spontaneous combustion and consequent fire hazards. The stock geometry shall be adopted to maintain minimum exposure of stock pile areas towards predominant wind direction.

8.6.6 Identification of Hazards

The various hazards associated, with the plant process apart from fuel storage have been identified and are outlined in **Table-8.15.**

TABLE-8.15
HAZARD ANALYSIS FOR PROCESS IN POWER PLANT

Sr. No.	Blocks/Areas	Hazards Identified
1	Coal storage in open yard	Fire, Spontaneous Combustion
2	Coal Handling Plant including Bunker area	Fire and/or Dust Explosions
3	Boilers	Fire (mainly near oil burners), Steam Explosions, Fuel Explosions
4	Steam Turbine Generator Buildings	Fires in – a) Lube oil system b) Cable galleries c) Short circuits in: i)Control rooms ii) Switch-gears Explosion due to leakage of Hydrogen and fire following it.
5	Switch-yard Control Room	Fire in cable galleries and Switch-gear/Control Room
6	LDO Tank Farms HFO Tank Farm	Fire

8.6.6 Generator Buildings

Turbo-Generator buildings are exposed to risks due to similar hazards given below:

1. As per the summary of study of losses in United States for a period of 50 years, the probability of fire in Turbo-Generators is one in 185 unit years. Therefore, there is a possibility of fire/explosion in turbo-generator set once in 50 years. The probable hazardous area is lubrication system in the turbo-generator.

2. Apart from the Turbo-Generator sets, other major hazardous areas in Turbo-Generator Buildings are:

   - Cable Galleries;
   - Control Rooms;
   - Switchgears;
   - Oil drums stored at Ground Floor level; and
   - Battery Rooms.

PVC cables can be involved in fire. Such fires are known to propagate at speeds upto 20 m/min. Hence, there is a possibility of starting fresh fires in all directions wherever cable runs cross each other or bifurcate. On combustion, every kilogram of PVC compound produces 1000 M^3 of highly dense smoke, which mainly contains hydrogen chloride fumes sufficient to produce 1 liter of Hydrochloric acid, which may condense on cooler metallic parts and instruments in presence of moisture damaging them severely. Since length of PVC cables is several kilometers in Turbo-Generator Buildings, the hazard is tremendous.

Apart from PVC cables, the oil installation is a large one for Turbo-Generator sets and can burn furiously spreading fires to Cable Galleries and other places.

The rapidity of spread of fire may create problems such as safe shutdown of units not involved initially in fire and safe evacuation of personnel, particularly operators and engineers in control rooms.

Turbo-Generator building is a steel structure with no insulation, and in case of a major fire, may collapse as the strength of steel would get reduced by half at temperature of 550^{O}C (yield point of steel) and above.

There will also be serious implications for supply in power grids including its total collapse following major fires.

8.7 Disaster Management Plan

8.7.1 Introduction

Disaster Management Plan for an industrial unit is necessarily a combination of various actions which are to be taken in a very short time but in a pre-set sequence to deal effectively and efficiently with any disaster, emergency or major accident with an aim to keep the loss of men, material, plant/machinery etc., to the minimum.

Creation and establishment of a cell within the industrial unit is a pre-requisite for an effective implementation of any disaster management plan. The main functions of the Disaster Management Cell are to prepare a detailed disaster management plan, which includes:

- Identification of various types of expected disasters depending upon the type of the industrial unit;
- Identification of various groups, agencies, departments etc. necessary for dealing with a specific disaster effectively;
- Preparation - by intensive training - of relevant teams/groups within the organization to deal with a specific disaster and keep them in readiness;
- Establishment of an early detection system for the disasters;
- Development of a reliable instant information/communication system; and
- Organization and mobilization of all the concerned departments/ organizations/ groups and agencies instantly when needed.

Major disaster that can occur in this Cement Plant /CPP may be due to fire. In the existing cement plant already having a good and well-maintained

8.7.2 Emergency Planning For Disaster due to Fire

Coal storage, cable rooms, transformer unit, auxiliary transformers, oil tanks, coal bunkers including all conveyor lines etc., within the plant are the likely areas for which plan is outlined to deal with any eventuality of fire. Stores, workshop, canteen and administration building have also been included.

8.7.2.1 Classification of Fires

The various classes of fire, explanation of the classes of fire and method of fighting the different classes of fire are given in **Table-8.16**.

TABLE-8.16
CLASSES OF FIRE

Class	Explanation	Method of Fire	Fire Fighting
A	Solid – Carbonaceous inflammable material	Fire involving wood, paper, coal, cloth and other material	Water
B	Liquid	Fire involving oil, kerosene etc.	Foam or dry powder chemical extinguisher
C	Special	Electrical fire	DCP or CO_2 extinguisher

8.7.2.2 Equipment System Dealing with Coal Handling

The whole system dealing with coal handling can be summarized as follows:

- A wagon tripper for unloading transported coal from the racks/trucks;
- Coal is unloaded into ground level hopper(s) from where it is transported to pre-blending stock pile through belt conveyors;
- Coal is reclaimed for the above stock pile and is transported to the raw coal hopper for vertical mill by a set of belt conveyors;
- For collection of the pulverized fuel as well as venting the mill, a high efficiency bag filters will be provided; and
- The fine coal from the hoppers will be sent to kiln firing by a set of pumps.

Water sprinklers will be provided for the stockpile at the unloading point to prevent fire. Pull cords and emergency switches will be provided all along the conveyor belt to avoid the spreading of fire.

8.7.2.3 Need for a Fire Fighting Group

A small spark of fire may result into loss of machines and conveyors and the damage by fire may be of the order of few crores of Rupees. This type of losses can be avoided by preventing and controlling the fire instantly for which fire-fighting group shall be established.

8.7.2.4 Fire Fighting with Water

Adequate and reliable arrangement is required for fighting the fire with water such as:

- Identification of source of water and equipping with pumps;
- Arrangement of pipe lines along and around all vulnerable areas;
- Alternative water supply arrangements to divert the water from one set of pipe lines (connected to another source) or to connect to other source;
- Provisions of valves at appropriate points to enable supply of water at the required place/area or divert the same to another direction/pipe line; and
- Each source of water shall be equipped with one standby diesel driven pump to serve in case of power failure.
- ***Water Line Arrangement***

Water lines shall be provided at coal handling area along the conveyors and around the stockyards, transformers, oil tanks, coal crusher house etc. Water lines shall also be provided around other infrastructures in the plant like administration building, canteen, stores and other plant equipment. The system shall be designed in conformity with the recommendations of the NFPA of Insurance Association of India. A reserve water level shall be maintained in the sump as per NFPA requirements.

Hydrant system feed pressurized water to hydrant valves shall be located throughout the plant and also at strategic locations. The water pressure shall be maintained at 6 to 8 kg/cm^2 in these lines. By operating a few of the valves water pressure can be increased at one particular place. There are two types of valves. Non-return valves shall be provided to allow only unidirectional flow of water. Gate valves shall be provided for closing or opening the water supply. An adequate number of gate valves shall be provided at appropriate points to tap water to deal with fire if it breaks out at any point of the plant.

8.7.2.5 Fire Fighting with Fire Extinguishers

To deal with fires - other than carbonaceous fires, which can be dealt with by water - suitable fire extinguishers are required to do the job effectively. Adequate number of "Fire stations' are to be established with the following types of equipment and arrangements:

- Soda Acid Fire Extinguishers;
- CO_2 Extinguishers;
- Dry Powder Chemical Extinguishers;
- Foam Extinguishers;
- Fire buckets; and
- 50-mm spray hoses up to 150-m length.

Appropriate types of fire extinguishers shall also be provided at conveyor drive heads, crusher house, control rooms, in machines like stacker and reclaimer, electrical yard, sub-station and other infrastructure facilities within the premises.

In the transformer yard, automatic fire detecting and quenching system shall be provided for each transformer. This system comes into operation whenever the temperature of surrounding air exceeds 80°C and sprays water over the transformer to prevent spreading of fire and quenches the same. In order to avoid fire in cable galleries, all the power and control cables of FRLS type (Fire Resistant Low Smoke) shall be used. In addition, fire detecting and Fire Alarm Systems shall be installed in the cable galleries.

8.7.2.6 Inspection

- Fire alarm panel (electrical) shall cover the entire plant. Fire Extinguishers in Fire Stations and machines and other places shall be periodically inspected by the inspection group;

- The temperature of the coal stack shall be regularly measured and recorded. If the temperature exceeds 80°C, water quenching shall be carried out;

- Emergency telephone numbers shall be displayed at vital points by the groups; and

- General inspection for fire shall be regularly carried out by the group.

8.7.2.7 Procedure for Extinguishing Fire

The following steps shall be taken during a Fire Accident in the system:

- As soon as the message is received about fire, one of the spray groups in the system shall be diverted to the place of the fire accident along with a staff member;
- Simultaneously plant Fire Station shall be informed by phone, walkie-talkie for fire brigades;
- Fire stations nearby also be informed by phone to be in readiness;
- In the meanwhile, the pipe system shall be operated to obtain maximum pressure and output;
- In case cables are within the reach of fire, power supply shall be tripped and the cables shifted;
- Further, other spray groups from the system shall be diverted to the spot;
- In case of fire in the belt, belt shall be cut near the burning portion, to save the remaining parts; and
- After extinguishing the fire, the area shall be well prepared for re-use.

8.7.3 Specific Emergencies Anticipated

Fire consequences can be disastrous, since they involve huge quantities of fuel either stored or in dynamic inventory in pipe lines or in nearby areas. Toxic releases can affect persons working around. Preliminary hazard Analysis has provided a basis for consequence estimation. Estimation can be made by using various pool fires, tank fire consequence calculations. During the study of Risk Assessment, the nature of damages is worked out and probability of occurrence of such hazards is also drawn up.

8.7.4 Emergency Action Plan

The emergency action plan consists of:

- First information;
- Responsibilities of Work Incident Controller;
- Responsibilities of Chief Incident Controller;
- Responsibilities for Declaration of Emergency;
- Responsibilities for Emergency Communication Officer;
- Responsibilities of key personnel;
- Responsibilities and action to be taken by essential staff and various teams during emergency; and
- Responsibilities for All Clear Signal.

8.7.4.1 First Information

The first person who observes/identities the emergencies shall inform by shouting and by telephone to the Shift Engineer and Fire Station about the hazard. The Shift Engineer will inform to Works Incident Controller, Chief Incident Controller and also telephone operator, who shall communicate it to all key personnel.

8.7.4.2 Responsibilities of Work Incident Controller (WIC)

The Work Incident Controller on knowing about an emergency immediately will rush to the incident site and take overall charge and inform the same to Chief Incident Controller (CIC). On arrival, he will assess the extent of emergency and decide if major emergency exists and inform the communication officer accordingly.

8.7.4.3 Responsibilities of Chief Incident Controller (CIC)

The Additional General Manager, who is also the Chief Incident Controller, will assume overall responsibilities for the factory/storage site and its personnel in case of any emergency. His responsibilities are to:

1. Assess the magnitude of the situation and decide if staff needs to be evacuated from their assembly point to identified safer places. Declare onsite/offsite emergency;
2. Exercise direct operational control over areas other than those affected;
3. Undertake a continuous review of possible developments and assess in consultation with key personnel as to whether shutting down of the plant or any section of the plant and evacuation of personnel are required;
4. Laison with senior officials of Police, Fire Brigade, Medical and Factories Inspectorate and provide advice on possible effects on areas out side the factory premises;
5. Look after rehabilitation of affected persons on discontinuation of emergency; and
6. Issue authorized statements to news media, and ensures that evidence is preserved for enquiries to be conducted by the statutory authorities.

8.7.4.4 Responsibilities for Declaration of Major Emergency

It is important to make the emergencies known to every one in the plant. The major emergency will be made known to every one inside the plant by sounding the alarm. Separate alarms to warn different types of major emergencies such as fire and explosion or toxic gas escape are provided. Public address system is also available throughout the plant.

Announcement will be made by the concerned official/interpreter in local language. Similarly, announcement for termination of the emergency will also be announced.

8.7.4.5 Responsibilities of Emergency Communication Officer (ECO)

On hearing the emergency alarm he will proceed to Emergency Control Center. He will

- Report to Chief Incident Controller and Work Incident Controller and maintain contact with them;
- On information received from the WIC of the situation, recommending if necessary, evacuate the staff from the assembly points;
- Identify suitable staff to act as runners or messengers who are listed in the Essential staff, between him and the Works Incident Controller if the telephone and other system of communication fail due to any reason;
- Maintain inventory of items in the emergency control center;
- Contact local meteorological office to receive early notification of changes in weather condition in case of gas leak and prolonged action;
- Maintain a log of incidents;
- Keep in constant touch with happenings at the emergency site and with WIC;
- Liaise with neighbor fire brigade, hospital, civil and police authorities on advice from CIC.

8.7.4.6 Key Personnel

Apart from Works Incident Controller and Chief Incident Controller, other works personnel will have key role to play in providing advice and in implementing the decisions made by the Chief Incident Controller. The key personnel include:

A. Sr. Superintendents/Engineer-in-charge responsible for :

- Operation;
- Electrical Maintenance;
- Mechanical maintenance;
- C&I; and
- Chemical.

B. Head of Personnel and Officers connected with IR and Labour Welfare

C. Head (Technical Service)

8.7.4.7 Responsibilities of Key Personnel

- ***Department Heads***

The departmental heads will provide assistance as required by the WIC. They will decide which members of their departments are required at the incident site.

- ***Chief Personnel Manager***

He will have following responsibilities:

a) Report to Work Incident Controller;
b) Ensure that all non-essential workers in the affected areas are evacuated to assembly points in consultation with the Chief Incident Controller;
c) Receive reports from nominated persons from assembly points, and pass on the absence information services;
d) Keep liaison with other coordinators to meet the requirements of services such as materials, security management, transportation, medical, canteen facilities etc. as required during emergency;
e) Be in constant touch with the Chief Incident Controller and feed him correct information of the situation;
f) Give information to press, public and authorities concerned on instructions from the CIC/WIC;
g) Ensure that casualties receive adequate attention at medical center and arrange required additional help and inform relatives of the injured;
h) Arrange to inform public on Radio and TV about evacuation etc.; and
i) Arrange TV coverage on handling emergency.

- ***In-Charge (TS)***

On knowing about an emergency, he will report to CIC and assist him in all activities. He will also liaison with all teams.

- ***Medical Officer***

Medical Officer will render medical treatment to the injured and if necessary will shift the injured to nearby Hospitals. He will mobilize extra medical help from outside if necessary.

- ***Head of Safety***

On hearing the emergency alarm, he will proceed to the site. He will

a. Make sure that all safety equipment are made available to the emergency teams;
b. Participate in rescue operations;
c. Co-ordinate to transfer the injured persons to medical center and arrange for first aid; and
d. Keep in contact with ECO and the WIC and advice them on the condition of injured persons

- ***Security Officer***

On hearing the Emergency alarm, he will proceed to main entrance/main gate. He will

a. Arrange to control the traffic at the gate and the incident area;

b. Direct the security staff to the incident site to take part in emergency operations under his guidance and supervision;
c. Evacuate the persons in the plant or in the nearby areas as advised by WIC after arranging the transport through the Transport in-charge;
d. Allow only those people who are associated with handling emergency;
e. Maintain law and order in the area, if necessary seek the help of police; and
f. Maintain communication with CIC/WIC and ECO.

- ***Fire Officer***

On hearing the emergency, he will reach the fire station and arrange to sound the alarm as per the type of emergency in consultation with WIC, He will:

a. Guide the fire fighting crew i.e. firemen and trained plant personnel and shift the fire fighting facilities to the emergency site. Adequate facilities will be made available;
b. Take guidance of the WIC for fire fighting as well as assessing the requirement of outside help; and
c. Maintain communication with WIC, CIC and ECO.

- ***Transport Engineer-in-Charge***

On hearing the emergency alarm, he will immediately report to Work Incident Controller. He will:

a. Ensure availability of auto base vehicles for evacuation or other duties, when asked for; and
b. Make all arrangements regarding transportation.

8.7.5 General Responsibilities of Employees During an Emergency

During an emergency, it becomes more enhanced and pronounced when an emergency warning is raised, the workers if they are in charge of process equipment shall adopt safe and emergency shut down and attend any prescribed duty as essential employee. If no such responsibility is assigned, he shall adopt a safe course to assembly point and await instructions. He shall not resort to spread panic. On the other hand, he must assist emergency personnel towards objectives of DMP.

8.7.6 Emergency Facilities

8.7.6.1 Emergency Control Center (ECC)

For the time being Office Block is identified as Emergency Control Center. It would have external Telephone, Fax, Telex facility. All the Site Controller/ Incident Controller Officers, Senior Personnel would be located here. Also, it would be an elevated place. The following information and equipment are to be provided at the Emergency Control Center (ECC).

- Intercom, telephone;
- P and T telephone;

- Safe contained breathing apparatus;
- Fire suit/gas tight goggles/gloves/helmets;
- Hand tools, wind direction/velocities indications;
- Public address megaphone, hand bell, telephone directories;
- (internal, P and T) factory layout, site plan;
- Emergency lamp/torch light/batteries;
- Plan indicating locations of hazard inventories, plant control room, sources of safety equipment, work road plan, assembly points, rescue location vulnerable zones, escape routes;
- Hazard chart;
- Emergency shut-down procedures;
- Nominal roll of employees;
- List of key personnel, list of essential employees, list of Emergency Co-ordinators;
- Duties of key personnel;
- Address with telephone numbers and key personnel, emergency coordinator, essential employees; and
- Important address and telephone numbers including Government agencies, neighboring industries and sources of help, out side experts, chemical fact sheets population details around the factory.

8.7.6.2 Assembly Point

Number of assembly depending upon the plant location would be identified wherein employees who are not directly connected with the disaster management would be assembled for safety and rescue. Emergency breathing apparatus, minimum facilities like water etc. would be organized. In view of the size of plant, different locations are ear marked as assembly points. Depending upon the location of hazard, the assembly points are to be used.

8.7.6.3 Emergency Power Supply

Plant facilities would be connected to Emergency Power supply units and would be placed in auto mode. Thus water pumps, plants lighting and emergency control center. Administrative building and other auxiliary services are connected to emergency power supply. In all the blocks, flame proof type emergency lamps would be provided.

8.7.6.4 Fire Fighting Facilities

First Aid Fire fighting equipment suitable for emergency shall be maintained in each section in the plant. This would be as per statutory requirements as well as per NFPA Regulations. However, fire hydrant line covering major areas would be laid. It would be maintained as 6 kg/sq.cm pressure. Fire alarms would be located in the bulk storage areas. On the top of the Administration block, top of each production blocks, wind socks would be installed to indicate direction of wind for emergency escape.

8.7.6.5 Emergency Medical Facilities

Stretchers, gas masks and general first aid materials for dealing with chemical burns, fire burns etc. would be maintained in the medical center as well as in the emergency control room. Private medical practitioners help would be sought. Government hospital would be approached for emergency help. Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of near by industrial management's in this regard would taken on mutual support basis.

An ambulance with driver availability in all the shifts, emergency shift vehicle would be ensured and maintained to transport injured or affected persons. Number of persons would be trained in first aid so that, in every shift first aid personnel would be available.

8.7.7 Emergency Actions

8.7.7.1 Emergency Warning

Communication of emergency would be made familiar to the personnel inside the plant and people outside. An emergency warning system would be established.

8.7.7.2 Emergency Shutdown

There are number of facilities which can be provided to help deal with hazardous conditions, fire breaks out. Under this situation the supply of the fuel will be disconnected immediately. Whether a given method is appropriate depends on the particular case. Cessation of agitation may be the best action in some instances but not in others. Stopping of the feed may require the provision of by pass arrangements.

Methods of removing additional heat include removal through the normal cooling arrangements or use of an emergency cooling system. Cooling facilities, which use vapouring liquid, may be particularly effective, since a large increase in vaporization can be obtained by dropping pressure.

8.7.7.3 Evacuation of Personnel

There could be more number of persons in the storage area and other areas in the vicinity. The area would have adequate number of exits, stair cases. In the event of an emergency, unconnected personnel have to escape to assembly point. Operators have to take emergency shutdown procedure and escape. Time Office maintains a copy of deployment of employees in each shift, at ECC. If necessary, persons can be evacuated by rescue teams.

Also, at the end of an emergency, after discussing with Incident Controllers and Emergency Co-ordinators, the Site Controller orders an all clear signal. When it becomes essential, the Site Controller communicates to the District Emergency Authority, Police, and Fire Service personnel regarding help required or development of the situation into an Off-Site Emergency.

8.7.8 General

8.7.8.1 Employee Information

During an emergency, employees would be warned by raising siren in specific pattern. Employees would be given training of escape routes, taking shelter, protecting from toxic effects. Employees would be provided with information related to fire hazards, antidotes and first aid measures. Those who would be designated as key personnel and essential employees shall be given training to emergency response.

8.7.8.2 Public Information and Warning

The industrial disaster effects related to this plant may mostly be confined to the plant area. The detailed risk analysis has indicated that the effects would not be felt outside. However, as an abundant precaution, the information related to chemicals in use would be furnished to District Emergency Authority for necessary dissemination to general public and for any use during an off site emergency.

8.7.8.3 Co-ordination with Local Authorities

Keeping in view of the nature of emergency, two levels of coordination are proposed. In the case of an On Site Emergency, resources within the organization would be mobilized and in the event of extreme emergency local authorities help shall be sought.

In the event of an emergency developing into an off site emergency, local authority and District Emergency Authority (normally the Collector) would be appraised and under his supervision, the Off Site Disaster Management Plan would be exercised. For this purpose, the facilities that are available locally, i.e. medical, transport, personnel, rescue accommodation, voluntary organizations etc. would be mustered. Necessary rehearsals and training in the form of mock drills shall be organized.

Mutual aid in the form of technical personnel, runners, helpers, special protective equipment, transport vehicles, communication facility etc. shall be sought from the neighboring industrial management.

8.7.8.4 Mock Drills

Emergency preparedness is an important aspect in the planning of Industrial Disaster Management. Personnel would be trained suitably and prepared mentally and physically in emergency response through carefully planned, simulated procedures. Similarly, the key personnel and essential personnel shall be trained in the operations.

8.7.8.5 Important Information

Once the plant goes into stream, important information such names and addresses of key personnel, essential employees, medical personnel, out side the plant, transporters address, address of those connected with Off Site Emergency such as

Police, Local Authorities, Fire Services, District Emergency Authority shall be prepared and maintained.

8.8 Off-Site Emergency Preparedness Plan

The task of preparing the Off-Site Emergency Plan lies with the district collector, however the off-site plan will be prepared with the help of the local district authorities. The proposed plan will be based on the following guidelines.

8.8.1 Introduction

Off-site emergency plan follows the on-site emergency plan. When the consequences of an emergency situation go beyond the plant boundaries, it becomes a off-site emergency. Off-site emergency is essentially the responsibility of the public administration. However, the factory management will provide the public administration with the technical information relating to the nature, quantum and probable consequences on the neighboring population.

The off-site plan in detail will be based on those events, which are most likely to occur, but other less likely events, which have severe consequence, will also be considered. Incidents, which have very severe consequences yet have a small probability of occurrence, shall also be considered during the preparation of the plan. However, the key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan.

The roles of the various parties who will be involved in the implementation of an off-site plan are described below. Depending on local arrangements, the responsibility for the off-site plan shall be either rest with the works management or, with the local authority. Either way, the plan shall identify an emergency co-ordinating officer, who would take the overall command of the off-site activities. As with the on-site plan, an emergency control center shall be setup within which the emergency co-ordinating officer can operate.

An early decision will be required in many cases on the advice to be given to people living "within range" of the accident - in particular whether they shall be evacuated or told to go indoors. In the latter case, the decision can regularly be reviewed in the event of an escalation of the incident. Consideration of evacuation may include the following factors:

- In the case of a major fire but without explosion risk (e.g. oil storage tank), only houses close to the fire are likely to need evacuation, although a severe smoke hazard may require this to be reviewed periodically; and

- If a fire is escalating and in turn threatening a store of hazardous material, it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people shall be advised to stay indoors and shield them from the fire. This latter case particularly applies if the installation at risk could produce a fireball with vary severe thermal radiation effects.

8.8.2 Aspects Proposed to be Considered in the Off-Site Emergency Plan

The main aspects, which shall be included in the emergency plan, are:

- **Organization**

Names and appointments of incident controller, site main controller, their deputies and other key personnel.

- **Communications**

Identification of personnel involved, communication center, call signs, network, lists of telephone numbers.

- **Specialized knowledge**

Details collected of specialized bodies, firms and people upon whom it may be necessarily to call e.g. those with specialized chemical knowledge, laboratories.

- **Voluntary organizations**

Details of organizers telephone numbers, resources etc.

- **Chemical information**

Details of the hazardous substances stored or procedure on each site and a summary of the risk associated with them.

- **Meteorological information**

Arrangements are done for obtaining details of weather conditions prevailing at the time and weather forecasts.

- **Humanitarian arrangements**

Transport, evacuation centers, emergency feeding treatment of injured, first aid, ambulances, temporary mortuaries.

- **Public information**

Arrangements for:
(a) Dealing with the media press office;
(b) Informing relatives, etc.

- **Assessment of emergency plan**

Arrangements for:
(a) Collecting information on the causes of the emergency;
(b) Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

8.8.3 Role of the Emergency Co-coordinating Officer

The various emergency services shall be co-ordinated by an emergency co-coordinating officer (ECO), who will be designated by the district collector. The ECO shall liaise closely with the site main controller. Again depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control shall be passed to a senior local authority administrator or even an administrator appointed by the central or state government.

8.8.4 Role of the Local Authority

The duty to prepare the off-site plan lies with the local authorities. The emergency planning officer (EPO) appointed shall carry out his duty in preparing for a whole range of different emergencies within the local authority area. The EPO shall liaise with the works, to obtain the information to provide the basis for the plan. This liaison shall ensure that the plan is continually kept upto date.

It will be the responsibility of the EPO to ensure that all those organizations, which will be involved off site in, handling the emergency, know of their role and are able to accept it by having for example, sufficient staff and appropriate equipment to cover their particular responsibilities. Rehearsals for off-site plans should be organized by the EPO.

8.8.5 Role of Police

Formal duties of the police during an emergency include protecting life and property and controlling traffic movements. Their functions shall include controlling bystanders evacuating the public, identifying the dead and dealing with casualties, and informing relatives of death or injury.

8.8.6 Role of Fire Authorities

The control of a fire shall be normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer shall also have a similar responsibility for other events, such as explosions and toxic release. Fire authorities in the region shall be apprised about the location of all stores of flammable materials, water and foam supply points, and fire-fighting equipment. They shall be involved in on-site emergency rehearsals both as participants and, on occasion, as observers of exercises involving only site personnel.

8.8.7 Role of Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances, and so on, shall have a vital part to play following a major accident, and they shall form an integral part of the emergency plan.

For major fires, injuries shall be the result of the effects of thermal radiation to a varying degree, and the knowledge and experience to handle this in all but extreme cases may be generally available in most hospitals.

Major off-site incidents are likely to require medical equipment and facilities additional to those available locally, and a medical "mutual aid" scheme shall exist to enable the assistance of neighboring authorities to be obtained in the event of an emergency.

8.8.8 Role of Government Safety Authority

There will be the factory inspectorate available in the region. Inspectors are likely to want to satisfy themselves that the organization responsible for producing the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies. They may wish to see well documented procedures and evidence of exercise undertaken to test the plan.

In the event of an accident, local arrangements regarding the role of the factory inspector will apply. These may vary from keeping a watching brief to a close involvement in advising on operations in case involvement in advising on operations.

8.9 Occupational Health and Safety

Large industries, in general where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance, the men, materials and machines are the basic inputs. Along with the boons, the industrialization generally brings several problems like occupational health and safety.

The industrial planner, therefore, has to properly plan and take the steps to minimize the impacts of industrialization and to ensure appropriate occupational health, safety including fire plans. All these activities again may be classified under construction and erection, and operation and maintenance. The proposed safety plan is given below:

8.9.1 Occupational Health

Occupational health needs attention during operation and maintenance of the plant. However, the problem varies both in magnitude and variety in the above phases.

The hazardous area of work place in the cement plant, the projected numbers of employees to be employed in the hazardous activities and the safety measures to be adopted in the proposed cement plant are given in **Table-8.17.**

TABLE-8.17
HAZARDOUS ACTIVITIES AND SAFETY MEASURES TO BE ADOPTED

Sr. No.	Hazardous Activities	Safety Measures
1	Working in confined spaces	work permits system to be followed strictly
2	Working at height	work permits system to be followed strictly
3	Excavations/Trenching/Penetration/Digging	work permits system to be followed strictly
4	Hot work	work permits system to be followed strictly
5	Lockout/tag out	work permits system to be followed strictly
6	Scaffolding	Training , checklist and continues monitoring by safety

Sr. No.	Hazardous Activities	Safety Measures
		patrollers
7	Demolition works	Safe work procedures and under supervision and SOPs
8	Reinforcement bending & laying	Training and use of PPEs
9	Concrete formwork	use of of PPEs
10	Concreting	use of PPEs
11	Structural works	use of PPEs
12	Lifting with Cranes	Proper Taining to personnel and lifting area barricading
13	Lifting tools and tackles operation	Testing of all lifting tools and tackles with competent and training to operators
14	High pressure testing, cleaning and painting	Proper training , use of PPEs and work procedures for high pressure vessels
15	Overhead works	Use of PPEs and
16	Working in dust and noise	Use of PPEs display of sign boards
17	Storing, Transportation & handling of Materials	Proper work instructions
18	Machining operations (drilling, shaping, turning, sawing, grinding etc.)	Use of PPEs and Awareness training
19	Bending & rolling	Use PPEs
20	Hand tools operation	Use of PPEs and WI
21	Pneumatic tools operation	use of PPEs and Proper WI
22	Electrical tool operation	use of PPEs SOPs
23	Commissioning	use of PPEs SOPs
24	Working in electrical load centres EHT/HT/LT	use of PPEs SOPs

The personnel protective equipment shall be given to employees based on the work area.

- Industrial Safety Helmet
- Crash Helmets
- Face shield with replacement acrylic vision
- Zero power plain goggles with cut type filters on both ends
- Zero power goggles with cut type filters on both sides and blue color glasses
- Welders equipment for eye and face protection
- Cylindrical type earplug
- Ear muffs
- Canister Gas mask
- Self contained breathing apparatus
- Leather apron
- Aluminized fiber glass fix proximity suit with hood and gloves
- Boiler suit
- Safety belt/line man's safety belt
- Leather hand gloves
- Acid/Alkali proof rubberized hand gloves
- Canvas cum leather hand gloves with leather palm
- Electrically tested electrical resistance hand gloves
- Industrial safety shoes with steel toe
- Electrical safety shoes without steel toe and gum boots

Full fledged hospital facilities shall be made available round the clock for attending any emergency, if any. All working personnel shall be medically examined at least once in every year and at the end of his term of employment.

The problem of occupational health, in the operation and maintenance phase is due to noise and dust, which may lead to ailments related to lung and hearing losses. DCW has a well equipped hospital where, the Occupational Health Survey of the employees is carried out regularly. During occupational health survey following tests are conducted:

1. Lung Function Test;
2. Hearing Loss (audiometer)

The details of the existing Occupational System practiced are given in **Table-8.17.**

8.9.2 Safety Plan

Safety of both men and materials during construction and operation phases is of concern. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. The disaster in proposed plant is possible due to leakage of fuels, collapse of structures and fire/explosion etc.

Keeping in view the safety requirement during construction, operation and maintenance phases, the plant shall formulate safety policy with the following regulations:

- To allocate sufficient resources to maintain safe and healthy conditions of working environment;
- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment;
- To ensure that adequate safety instructions are given to all employees;
- To provide wherever necessary protective equipment, safety appliances and clothing and to ensure their proper use;
- To inform employees about materials, equipment or processes used in their work, which are known to be potentially hazardous to health or safety;
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and upto date knowledge;
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work;
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters;
- To ensure proper implementation of fire prevention methods and an appropriate fire fighting service together with training facilities for personnel involved in this service;
- To organize collection, analysis and presentation of data on accident, sickness and incident involving personal injury or injury to health with a view to taking corrective, remedial and preventive action;
- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees;
- To publish/notify regulations, instructions and notices in the common language of employees;

- To prepare separate safety rules for each types of occupation/processes involved in a project; and
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipment, work places and operations.

8.9.3 Safety Organization

- **Construction and Erection Phase**

A qualified and experienced safety officer shall be appointed. The responsibilities of the safety officers include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programs and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/ Statutory Provisions. In addition to employment of safety officer by power plant, every contractor, shall also employ one safety officer to ensure safety of the worker, in accordance with the conditions of contract.

- **Operation and Maintenance Phase**

When the construction is completed the posting of safety officers shall be in accordance with the requirement of Factories Act and their duties and responsibilities shall be as defined there of.

8.9.4 Safety Circle

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circles would be constituted in each area of work. The circle would consist of 5-6 employees from that area. The circle normally shall meet for about an hour every week.

8.9.5 Safety Training

Safety training shall be provided by the Safety Officers with the assistance of faculty members called from Corporate Center, Professional Safety Institutions and Universities. In addition to regular employees, limited contractor labors shall also be provided safety training. To create safety awareness safety films shall be shown to workers and leaflets etc. Some precautions and remedial measures proposed to be adopted to prevent fires are:

- Compartmentation of cable galleries, use of proper sealing techniques of cable passages and crevices in all directions would help in localizing and identifying the area of occurrence of fire as well as ensure effective automatic and manual fire fighting operations;
- Spread of fire in horizontal direction would be checked by providing fire stops for cable shafts;
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarms are effective protection methods for conveyor galleries.
- Housekeeping of high standard helps in eliminating the causes of fire and regular fire watching system strengthens fire prevention and fire fighting; and

- Proper fire watching by all concerned would be ensured.

8.9.6 Health and Safety Monitoring Plan

All the potential occupational hazardous work places such as fuel storage area, coal handling area shall be monitored regularly. The health of employees working in these areas shall be monitored once in a year for early detection of any ailment.

Though effective measures are taken to combat pollution in ambient conditions, occupational health hazards are not overlooked. Project will provide well organized occupational health services to all its employees by taking responsibility for establishment and maintenance of safe and healthy working environment and assessment of the physical and mental capabilities to turn out specific work loads. The industrial medical centre will have following responsibilities:

1. Surveillance of workers health in relation to work;
2. Surveillance of working environments;
3. Identification and evaluation of environmental factors which may affect the workers health;
4. Assessment of conditions of occupational workers health; and
5. Observance of safety norms and reduce/eliminate exposure to hazardous environs.

8.0 ADDITIONAL STUDIES

8.1 Public Consultation

The public hearing for the proposed 30 MW captive power plant was conducted by Andhra Pradesh Pollution Control Board (APPCB) on 30th January, 2013 Near Durga Temple located adjacent to the plant premises at Durgapuram village, Dachepalli mandal, Guntur district.

The press notification indicating date and venue of the public hearing was issued by Member Secretary, Andhra Pradesh Pollution Control Board (APPCB), on 28.12.2012 in prominent newspapers Viz. Sakshi (Telugu local news paper) and Indian Express (regional English News Paper) with project details inviting suggestions, views, comments and objections from the public regarding establishment of proposed power project. The copies of the notification issued in newspapers for public hearing are given below in **Figure-8.1** & **Figure-8.2**.

The EIA report along with Executive Summary in English and Telugu were displayed and made available at the following places:

- Office of District Collector, Guntur;
- District Panchayat Office;
- Regional Office, APPCB;
- District Industry Centre;
- Chief Conservator of Forests;
- Regional Office, Guntur; and
- Village Sarpanch Offices of respective villages in 10-km radius.

The minutes of the public hearing is enclosed as **Annexure-XI.**

ప్రదర్శనగా వెళ్లి పత్రాన్ని అందజేశారు.

ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి

ప్రాంతీయ కార్యాలయం

ప్లాట్‌నెం.102,రాఘవ అపార్ట్‌మెంట్స్, బృందావన్ గార్డెన్స్, గుంటూరు- 522 005.

పర్యావరణ ప్రజాభిప్రాయ సేకరణ ప్రకటన

పర్యావరణ అటవీ మంత్రిత్వశాఖ, భారత ప్రభుత్వం యొక్క నోటిఫికేషన్ నెం.యస్.ఓ.1533, తేది: 14-09-2006 మరియు దానికి ఇచ్చిన మార్పులు మరియు సర్క్యులర్‌ననుసరించి ఇందు మూలముగా ప్రకటించునదేమనగా మెస్సర్స్ ఆంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్) వారు ప్రతిపాదించినటువంటి క్యాప్టివ్ విద్యుత్ ఉత్పత్తి కేంద్రము ఏర్పాటుకు సంబంధించిన ప్రజాభిప్రాయ సేకరణను ప్రతిపాదించబడినది, వివరాలు దిగువ పేర్కొనబడినవి.

1.కంపెనీపేరు, చిరునామా మరియు టెలిఫోన్ నెం	: ఆంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్‌వర్క్స్) దుర్గాపురం గ్రామం, దాచేపల్లి మండలం, గుంటూరు జిల్లా. ఫోన్:08649-257441 ఫ్యాక్స్:08649-257428. e-mail:dcw.secretarial@jalindia.co.in
2.పరిశ్రమ నిర్మాణము చేపట్టబోయే ప్రదేశం	: పరిశ్రమ నందు గల వ పరిసరాలలో దుర్గాపురం గ్రామం, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
3.సంప్రదించవలసిన అధీకృత వ్యక్తి, చిరునామా, టెలిఫోన్ నెం	: శ్రీ ఆర్.కె. దూడ, సీనియర్ వైస్ ప్రెసిడెంట్ (ప్రాజెక్ట్స్), ఆంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్), దుర్గాపురం గ్రామం, దాచేపల్లి మండలం, గుంటూరు జిల్లా. ఫోన్ : 08649 257440, ఫ్యాక్స్ : 08649 257428.
4.మొత్తం ప్రాజెక్టు యొక్క మూలధనము	: రూ.136కోట్లు
5.కేంద్రం యొక్క ఉత్పత్తి సామర్థ్యము	: 30 మెగా వాట్స్ (క్యాప్టివ్ పవర్ ప్లాంట్)
6. ఫ్యాక్టరీ యొక్క పర్యావరణ విషయ సలహాదారుడు	: విమ్టా ల్యాబ్స్ లిమిటెడ్, 142, ఐ.డి.ఎ. ఫేజ్-2, చర్లపల్లి, హైదరాబాద్-51.

7.ప్రజాభిప్రాయ సేకరణ :
తేది: ది. 30-01-2013. సమయం: ఉదయం 11గంటలకు. వేదిక: దుర్గా ఆలయము పరిసరాలలో, దుర్గాపురం గ్రామం., స్టేట్‌హైవే-2కు ఆనుకుని ఆంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్ ప్లాంట్‌కి) ప్రక్కన.

8. తలపెట్టిన ప్రాజెక్టుకు సంబంధించిన వివరములు బహిరంగంగా ఉంచబడిన ప్రదేశములు

1.శ్రీయుత కలెక్టర్ మరియు మెజిస్ట్రేట్ వారి కార్యాలయము నందు, గుంటూరు.
2. శ్రీయుత చీఫ్ ఎగ్జిక్యూటివ్ ఆఫీసర్, జిల్లా పరిషత్ వారి కార్యాలయము నందు, గుంటూరు.
3. శ్రీయుత జనరల్ మేనేజర్, జిల్లా పారిశ్రామిక కేంద్రం నందు, గుంటూరు.
4. రీజనల్ ఆఫీస్ (సదరన్ జోన్) జి.ఒ.ఐ. ఎం.ఒ.ఇ.ఎఫ్. కేంద్రీయ సదన్, 4వ అంతస్తు, ఎన్విరాన్‌మెంట్ మరియు ఫారెస్ట్ వింగ్స్ కోరమంగళ, బెంగళూరు.
5. ఏ.పి. పొల్యూషన్ కంట్రోల్ బోర్డు, ఆఫీస్, పర్యావరణ భవన్, ఎ-3, ఇండస్ట్రియల్ ఎస్టేట్, సనత్‌నగర్, హైదరాబాద్-18.
6. ఏ.పి.పొల్యూషన్ కంట్రోల్ బోర్డు ఆఫీస్, ప్లాట్‌నెం.41, ఎస్.బి.హెచ్ ఎదురు, జోనల్ కార్యాలయం, కనకదుర్గ ఆఫీసర్స్ కాలనీ, గురునానక్ రోడ్డు, విజయవాడ
7. ఏ.పి. పొల్యూషన్ కంట్రోల్ బోర్డు ఆఫీస్, రీజనల్ ఆఫీస్ ప్లాట్ నెం.102, రాఘవ అపార్టుమెంట్స్, బృందావన్ గార్డెన్స్, గుంటూరు
8. ఏ.పి.పొల్యూషన్ కంట్రోల్ బోర్డు ఆఫీస్, రీజనల్ ఆఫీస్ హౌస్‌నెం.6-2-888/బి, 2వఫ్లోర్, లక్ష్మి కాంప్లెక్స్, క్లాక్ టవర్ దగ్గర, నల్గొండ-508001.
9. రెవిన్యూ డివిజనల్ ఆఫీసర్, నరసరావుపేట, గుంటూరు జిల్లా.
10. తాసిల్దారు వారి కార్యాలయము, దాచేపల్లి, గుంటూరు జిల్లా.
11. గ్రామ పంచాయితీ కార్యాలయం, గామాలపాడు, దాచేపల్లి, గుంటూరు జిల్లా.
12. గ్రామ పంచాయితీ కార్యాలయం, దాచేపల్లి, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
13. గ్రామ పంచాయితీ కార్యాలయం, రామాపురం, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
14. గ్రామ పంచాయితీ కార్యాలయం, నడికుడి, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
15. గ్రామ పంచాయితీ కార్యాలయం, పొందుగాల, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
16. గ్రామ పంచాయితీ కార్యాలయం, శ్రీనగర్, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
17. తాసిల్దారు వారి కార్యాలయము, దామరచర్ల మండలం, నల్గొండ జిల్లా.
18. గ్రామ పంచాయితీ కార్యాలయము, దామరచర్ల, దామరచర్ల మండలం, నల్గొండ జిల్లా.
19. గ్రామ పంచాయితీ కార్యాలయము, భట్రుపాలెం, దాచేపల్లి మండలం, గుంటూరు జిల్లా.

ప్రజల అభ్యంతరాలు ఏమైనా ఉన్నట్లయితే ఈ ప్రకటన సలహాలు, అభిప్రాయాలు, వ్యాఖ్యాలు, వివరణలు, పైన పేర్కొనబడిన విధముగా అభ్యంతరములు ఎవరికైనా ఉన్నట్లయితే ప్రచురించబడిన 30 రోజులలోపుగా కోరడమైనది. ఈ దిగువ సంతకం చేయబడిన అధికారికి, ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి వ్రాత పూర్వకమైన సలహాలను వారికి పంపవచ్చును. అట్టివారు పైన తెలుపబడిన తేది, ప్రదేశమున, బహిరంగ ప్రజాభిప్రాయ సేకరణలో పాల్గొని తమ అభిప్రాయాలు, అభ్యంతరాలు తెలుపవచ్చును.

సం/-పర్యావరణ ఇంజనీర్

ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి, ప్రాంతీయ కార్యాలయము, గుంటూరు.

ప్రదేశము : గుంటూరు
తేది :

FIGURE-8.1
PAPER ADVERTISEMENT

A.P. POLLUTION CONTROL BOARD, REGIONAL OFFICE

Flat No. 102, Raghava Apartment, Brundavan Gardens, Guntur-522 006

Phone No. 0863-2215537, e-mail : gtr.ro.ee@pcb.ap.gov.in

ENVIRONMENTAL PUBLIC HEARING NOTIFICATION

In accordance with the Notification No. 1533, Dt. 14.09.2006 of Ministry of Environment & Forests, Government of India, we hereby notify a Public Hearing for the proposed Captive Power Plant by M/s Andhra Cements Limited (Durga Cement Works). The details of activities are as follows:

1.	Name of the Company with the Phone Number and Office Address	: M/s. Andhra Cements Limited (Durga Cements Works) Durgapuram (V), Dachepalli (M), Guntur district–522 426 Phone: 08649-257441; Fax: 08649-257428 Email: dcw.secretarial@jalindia.co.in
2.	Location of the Project Captive Power Plant (CPP)	: Within the Plant premises of the existing unit at Durgapuram, Dachepalli (M), Guntur district.
3.	Name of the Authorised Person to be contacted with address & Phone No.	: Sri R K Dooda, Sr. Vice President (Projects) M/s Andhra Cements Limited, (Durga Cement Works) Durgapuram (V), Dachepalli (M), Guntur District -522 426. Phone: 08649 257440, Fax: 08649 257428 Email: rk.dooda@jalindia.co.in
4.	Capital Cost of the Project	: Rs. 136 Crores
5.	Capacity of the Power Plant	: **30 MW (Captive Power Plant)**
6.	Environmental Consultant	: Vimta Labs Ltd, 142, IDA, Phase-2, Cherlapally, Hyderabad-500 051.
7.	Schedule of Public Hearing Date Time Venue	 : 30-01-2013 : 11.00 AM : In the premises of Durga Temple, Abutting State Highway-2, Near Andhra Cements Ltd., (Durga Cement Works), Durgapuram (V), Dachepalli (M), Guntur Dist.
8.	Place of the availability of executive summary (Telugu & English) and Draft EIA report on proposed project which are kept open for public.	

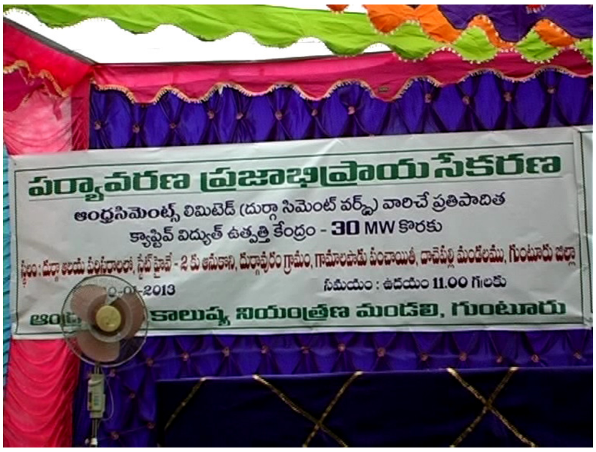
1. Office of the Collector and District Magistrate, Guntur
2. Office of the Chief Executive Officer, Zilla Parishad, Guntur.
3. Office of the General Manager, District Industries Centre, Guntur
4. Regional Office, Southern Zone, GOI, MoEF, Kendriya Sadan, IV-Floor Environment & Forest Wings, Koramangala, Bangalore-560 034.
5. A.P.Pollution Control Board, Paryavaran Bhavan, A3, Industrial Estate, Sanatnagar, Hyderabad-500 018.
6. A.P. Pollution Control Board, Plot No. 41, Opp: SBH Zonal Office, Kanakadurga Officers Colony, Gurunanak Road, Vijayawada.
7. A.P.Pollution Control Board, Regional Office, Flat No. 102, Raghava apartment, Brundavan Gardens, Guntur.
8. A.P.Pollution Control Board, Regional Office, H.No. 6-2-888/B, 2nd Floor, Lakshmi Complex, Near Clock Tower, Nalgonda – 508001.
9. Office of the Revenue Divisional Officer, Narasaraopet, Guntur Dist.
10. Office of the Tahasildhar, Dachepalli Mandal, Guntur Dist.
11. Gramapanchayat Office, Gamalapadu, Dachepalli Mandal, Guntur Dist.
12. Gramapanchayat Office, Dachepalli, Dachepalli Mandal, Guntur Dist.
13. Gramapanchayat Office, Ramapuram, Dachepalli Mandal, Guntur Dist.
14. Gramapanchayat Office, Nadikudi, Dachepalli Mandal, Guntur Dist.
15. Gramapanchayat Office, Ponugupala, Dachepalli Mandal, Guntur Dist.
16. Gramapanchayat Office, Srinagar, Dachepalli Mandal, Guntur Dist.
17. Gramapanchayat Office, Damarlacharla (V&M), Nalgonda Dist.
18. Office of the Tahsildhar, Damarlacharla Mandal, Nalgonda Dist.
19. Gramapanchayat Office, Bhatrupalem, Dachepalli Mandal, Guntur Dist.

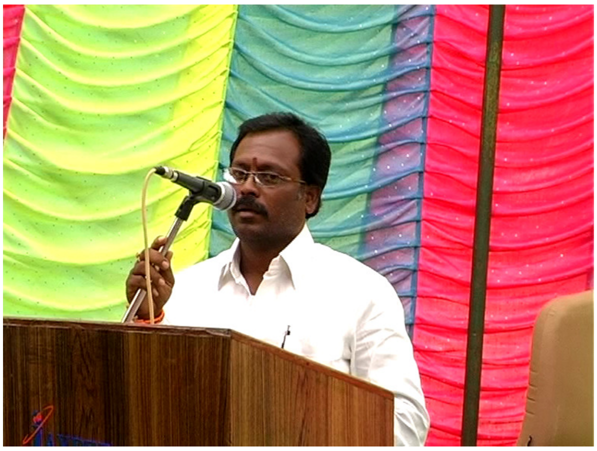
Suggestions, Views comments and objections of the Public, if any, are invited within 30 days from the date of Publication of this notification from all persons including bonafide residents. Environmental groups, others located at Project site/sites of displacement/sites likely to be affected. The interested persons can send written suggestions, comments to the under signed officer of A.P. Pollution Control Board, Regional Office, Guntur. The interested persons can participate in the Public Hearing on the date, time and venue specified above.

Sd/- Environmental Engineer,
A.P. Pollution Control Board,
Regional Office, Guntur.

Date: 27.12.2012
Place: GUNTUR

FIGURE-8.2
PAPER ADVERTISEMENT





PHOTOGRAPHS SHOWING PUBLIC HEARING

PHOTOGRAPHS SHOWING PUBLIC HEARING

8.2 Issues Discussed during Public Hearing

The entire issues rose by individuals and reply of project proponent along with action plan are given in **Annexure- XI.** The summaries of issues raised are discussed below in **Table-8.1.**

TABLE-8.1
SUMMARY OF ISSUES RAISED ARE GROUPED AND DISCUSSED

Sr.No	Issues	Proponent Reply	Action Plan
1	Shri Maasetti Venkateswarulu detailed on following issues -To take adequate pollution control measures - Priority in employment to the local people -He extended support to the project if adequate control measure are taken -Suggested for alternative technology - solar based power plant instead of using coal	The proponent assured to employ local youth fulfilling required qualifications. Preference in employment will be given to local depending on qualification and need of the company. About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist. 310 people have been employed directly/indirectly in the cement plant	**Mitigation Measures** **Air** - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm3 - **Water** Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept **Noise** - Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex. Power plant of same size (30 MW) with non-conventional sources such as solar power will require about 1 sq.km (>10-ha of land) whereas

Sr.No	Issues	Proponent Reply	Action Plan
			3.0 Ha land proposed for the coal based 30 MW CPP which may lead to additional land requirement.
2	Shri Prathipath Rosaiah, Narayanapuram village - Suggested to give priority on employment to the local people	Preference in employment will be given to locals depending on qualification and need of the company. About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist. 310 people have been employed directly/indirectly in the cement plant	-Employment will be provided for qualified persons - Industrial Training Institute (ITI) will be started by JAL to train the local youth in different industrial trade coming from villages and other areas. The persons trained in the ITI will be provided with suitable job in the company.
3	Shri Medara Daniyel, Gomalapadu village - Expressed his concerns that they are not in favor of project	The project will uplift the socio-economic conditions of the region	The project will help in development of the area. Total amount of 0.54 crore is proposed to incur on CSR activities as infrastructure development cost and Rs. 10.8 Lakhs every year as recurring expenditure for maintaining the infrastructure and other peripheral development activities
4	Shri Modugula Suresh Reddy, Shrinagar - commented on arrest of CO_2 emission from the proposed project. - Suggest for opting solar or wind power technology for power generation	Necessary pollution control measures will be taken as per APPCB/CPCB norms	**Mitigation Measures** **Air** - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm3 - **Water** Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept **Noise**

Sr.No	Issues	Proponent Reply	Action Plan
			- Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex. The altitude and wind velocity around the project site donot favour windpower plants. Further 30 MW wind power requires more land than 3.0 –ha proposed for the coal based CPP
5	Shri Shankara Rao, Srinagar village - Expressed his opinion about the venue of public hearing. - He expressed his concerns on providing water supply to the villagers	The venue has been finalized by APPCB as per the EIA Notification 2006. CSR activities will be aimed at supply of water to the villages.	The break of budget allocated for CSR activities is about given below: Education-Rs.0.14 crore Health- Rs.0.18 crore incl. water supply to villages Community development– Rs.0.24 crore
6	Shri Vanga Padmavathi - expressed view on affect of proposed project on human health and live stock - Priority in employment to the local people	All the statutory guidelines will be implemented as per the stipulated norms so that proposed CPP will not impact the health of local villagers and live stock. About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist. 310 people have been employed directly/indirectly in the cement plant	- All the conditions/ norms for environmental protection that would be stipulated in EC/CFE/CFO etc will be complied Industrial Training Institute (ITI) will be started by JAL to train the local youth in different industrial trade coming from villages and other areas. The persons trained in the ITI will be provided with

Sr.No	Issues	Proponent Reply	Action Plan
			suitable job in the company.
7	Shri Ramanamma & others, Srinagar - Expressed view that they are opposing the project	More initiative will be taken for the development of schools, hospitals, infrastructure like roads, street lights etc. The proponent assured to employ local youth fulfilling required qualifications. Preference in employment will be given to locals depending on qualification and need of the company.	The proposed project will improve the socio-economic conditions of the region
8	Shri Chiluku Chandra Shekar, Advocate & AP.Civil Liberties Union - expressed his views on venue of the public hearing meeting - Preference for Local employment - Suggested for adopting solar power - Pollution measures	The venue has been finalized by APPCB as per the EIA Notification 2006. About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist. 310 people have been employed directly/indirectly in the cement plant - All the statutory guidelines will be implemented as per the stipulated norms.	**Mitigation Measures** **Air** - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm^3 - **Water** Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept **Noise** - Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex. Power plant of same size (30 MW) with non-conventional sources such as solar

Sr.No	Issues	Proponent Reply	Action Plan
			power will require huge land, of 1.0 Sq.km (>10-ha) whereas 3.0 Ha land proposed for the coal based 30 MW CPP which may lead to additional land requirement.
9	Shri Nava Jyothi, Paryavarana Parirakshana Samithi, Nadikudi village expressed his opinion stating about the damage of biodiversity due to the proposed plant and existing cement plants. - And also raise comment on ministry how it is permitting for too many cement plants at one place	All the statutory guidelines will be implemented as per the stipulated norms.	The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha

8.3 Conclusion on Public Hearing

As there is no further representation from the Public present during public hearing, Joint Collector has summed up the Proceedings of the Public hearing and declared the Public Hearing as over.

Shri BMK Sharma from JAL given the clarification of the some of the issues by stating that all employees were retained on the rolls of Andhra Cements even after takeover of the unit and also promised that the loading & unloading contract workers also will be taken as per requirement after commencement of production.

Shri TGV Krishna Reddy, MLC special invitee of the public hearing suggested management to maintain good relationship and discuss the issues. And stressed on providing employment, greenbelt development and suggested for alternative technology solar energy system.

8.4 Written Suggestions and Complaints

Comments were received by regulatory authorities in response to the Public Notice. About 205 no of written representations were received expressing their opinion on establishment of proposed project. The copies of the comments and clarifications are given in **Annexure- XI**. The written comments are given in **Table-8.2**.

TABLE-8.2
REPLY TO APPLICATIONS RECEIVED IN WRITING

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
1	Shri Surkanti Venkata Reddy, Sri Siddhartha rural development & environment safe guard society, NGO	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent
2	Shri Chhintala Sailu, Mathrubhumi Prayavarana Parirakshna Samithi Shri Venkatareddy, President, Swan Environmental Safeguard Society (NGO)	- All environmental factors shall have to be taken care and requested to grant environmental clearances -Advised for 80% of local employment - Plantation has been done by the company in existing plant and effective control measures are adopted for control of pollution.	**Mitigation Measures** **Air** - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm3 - **Water** Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept **Noise** - Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex whereas Rs. 7.2 crores will be spent every year for recurring cost.
3	Shri P.Ranjith Kumar, General secretary, Society of Media awareness service	- Adviced to take the suggestions from forest department for greenbelt development - Expressed willingness to the project	The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha. For developing green belt, advice and assistance will be obtained from Forest Dept.
5	Shri Shyamal Nagasena Reddy, President, Charumathi Child Care Centre	- Advised to improve CSR activities - Views expressed on greenbelt development and allotment of budget on environment protection measures	- Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures - Total amount of Rs.0.54 crores will be incurred on CSR activities
6	Shri P.V.Sudhakar Rao, Co-Ordinator, Disha Service Heights Voluntary Organisation	All environmental factors shall have to be taken care and requested to grant environmental clearances	We shall take care of all environmental elements - CSR activities will be

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
		- Expressed views that the coming project will improve the socio-economic conditions of nearby villages	strengthened for socio-economic development of the region
7	Shri A.Kumar, Co-ordinator, Tribal Rural Development society & G.Janardhan Reddy, President, Paryavarana Praja Parirakshana Samithi, PLN.Rao, Front Line Environment Safe Guard Society	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent
8	The people from Bodugala, Srinagar, Gamalapadu, Pondugala, Ramapuram, Katarapadu and other nearby villages	-Expressed positive concerns for the coming project and suggested to adapt effective measure for abatement of pollution and requested to grant environmental clearance	Thanks for consent
9	PDM, Guntur district	- Opposes the project stating that the levels of pollution due to the project activity will have impact on health of the people	**Mitigation Measures** **Air** - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm3 - **Water** Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface water bodies. The plant will be working on zero discharge concept **Noise** - Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex whereas Rs. 7.2 crores will be spent every year for recurring cost. All the statutory guidelines will be implemented as per the stipulated norms so that proposed CPP will not impact the health of local villagers and livestock.
10	People of Gamalapadu village	- Requested to stop the project and opinioned that it will damage agricultural land	Necessary steps will be taken for the abatement of pollution. The produced ash

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
			will be 100% utilised in cement plant
11	Public of Bhatrupalem thanda, Chips & welfare unit, Nadikudi	-Expressed concerns on dust pollution and requested to stop the project as it will be damaging the agricultural land and cause health problems to the villages nearby	All standards are being strictly followed by the company in the existing cement plants and regular inspections are done by pollution control board and other departments.
12	Shri V.Venkata reddy, Andhra Cement Company Employees Union	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent
13	The following members who attended public hearing expressed their willingness in writing: Shaik Chand, Pondugala Thanda Ibrahim Pondugala Jhakka Ramnaidu Pondugala Thanda Modhin Pondugala T.M.Kareem Pondugala Thanda Jilani Pondugala G.Masthan Pondugala K.Pichaih Pondugala Gurajala Ghani Pondugala Thanda Odesa Pondugala K. Mutaih Pondugala J.Ramakoteswarao Pondugala M.D.Kalil Pondugala B.Murali Krishna Pondugala Thanda Jilani Basha Pondugala S.K.Fayaziddun Vadapalli G.Narsaiah Vadapalli M.Nageswarao Vadapalli S.K.Salem Vadapalli Shaik Liakathali Vadapalli Maram Koteswarao Vadapalli Ramaswami Srinivas reddy Vadapalli	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Korra Nageswarao Vadapalli Shaik Dastagiri Vadapalli G.Rambabu Vadapalli Surepalli Srinivasrao Vadapalli Vattepu Kasiah Vadapalli Shaik Nazir Nadikudi B.Koteswarao Nadikudi Shaik Nazir Nadikudi K.Saidaih Nadikudi B.Krishna Nadikudi ThantiKondalu Gamalapadu Kondalu Gamalapadu D.Nageswarao Gamalapadu Pamula Parvathi Srinagar Settiprolu Srinivasa Rao Gamalapadu Jinkala Kasim Gamalapadu Bomma Suresh Gamalapadu Ch. Venkataka Kotaiah Gamalapadu Viriyala China Narasimham Gamalapadu Allari Kondaiah Gamalapadu Palle Saidaiah Gamalapadu Y. Srinivasa Rao Gamalapadu Y. Adinarayana Gamalapadu G. Suresh Babu Gamalapadu Sankarasetti Appara Rao Gamalapadu Munavathu Baghya Naik Batrupalem P. Venkateswarlu Srinagar Devadathu Parama Naik Batrupalem M Saida Naik Batrupalem R. Tikya Naik Batrupalem M. Bimla Naik		

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Batrupalem SK. Leela Srinagar Taviti Subba Rao Srinagar Mukku Madhusudan Srinagar R. Raghu Gamalapadu T. Venkateswararam Gamalapadu Y. Yedukondalu Pondugula K.V.Rao Srinagar P. Venkaiah Ramapuram Lela Srinagar Shyam Babu Nadikudi Korrapati Purnaiah Ramapuram V. Vinod Reddy Ramapuram Vemula Srinivasara Ramapuram A. Kondaiah Gamalapadu Chilaka Marthamma Nadikudi Erisi Mashaiah Nadikudi Erisi Jargi Nadikudi Velpula Santhosham Nadikudi Velpula Suryanarayana Nadikudi Mamidi GOpal Nadikudi Velpula Linkan Nadikudi Eriki Durga Rao Nadikudi Velpula Ambhedkar Nadikudi V. Ramesh Babu Ramapuram B. Yesaiah Srinagar B. Parameswara Rao Gamalapadu Karasani Nagireddi Srinagar Bidigula Nagaiah Gamalapadu R. Ravi Naik Vadapalli K. Saidaiah CHoudhary Nadikudi		

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Md. Basheer Ahmed Vadapalli Md. Jahangir Vadapalli Kothapalli Anandababu Nadikudi Patrapu Saibabu Batrupalem Sudhakar Gamalapadu Saidalu Gamalapadu Ramalinga Reddy Dachepalli B. Venkat Reddy Srinagar Mallu Madi Reddy Batrupalem Vishnu Babu Srinagar Koti Reddy Ramapuram G.P.Rao Gamalapadu P.G. Rao Srinagar K. Rama Rao Srinagar M. V.V. Reddy Ramapuram C. Ramaiah Gamalapdu P. Lakshmi Gamalapadu S. Venkateswarao Gamalapadu K. Patha Kalaiah Gamalapadu G. Anjaneyulu Gamalapadu N. Srinivas Gamalapadu A. Saidulu Gamalapadu B. Koteswara Rao Srinagar P. Kondaiah Gamalapadu M. Devasahayam Gamalapadu P. Sathanandham Srinagar M. Yesu Gamalapadu K. Saidulu Gamalapdu T. Balaji Hyderabad K. Anki Reddy Gamalapadu N. Chandra Sekhar		

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Gamalapadu Vemula Nagamani Ramapuram Todeti Punna Rao Nadikudi Kobbari Murali Nadikudu Velpula Jakkaiah Nadikudi B.V.Veswara Rao Srinagar V. Satyanarayana Dachepalli K.Srinivasa Reddy Srinagar Sk. Kasim Gamalapadu V. Satyanarayana Dachepalli K. Srinivasa Reddy Srinagar T. Sambasiva Rao Gamalapadu Koya Koteswara Rao Gamalapadu Sudhakar Kumar Srinagar B. Sekhar Durgapuram K. Sekhar Gamalapadu Rajkiran Gamalapadu M. Nagulu Gamalapadu V. Venkat Reddy Durga Puram S. Anji Reddy Gamalapadu K. Meera Reddy Gamalapadu A. Bharathi Ramapuram V. Krishnaveni Ramapuram V. Sambrajamma Gamalapadu Sk. Shahina Kousar Gamalapadu Vemula Lingamma Gamalapadu Annangi Anjamma Gamalapadu A.V. Rao Durgapuram V . Padma Ramapuram Sripathi Ananda Rao Nadikudi L.C.H. Meerabhi Ramapuram		

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Rudraiah Bodugula Ramapuram Lakshmi Srinagar C. Krisha Rao Dachepalli P. Saidulu Pondugula Jamula Naik Gamalapadu Md. Janmiya Dachepalli Mangaraithu Srinagar Tulasiraithu Srinagar Maisamma Raithu Srinagar L. Samy Goud Srinagar S. Yadaih Srinagar B. Lingaiah Srinagar Saleru Buchamma Pondugula B. Krishna Rao Ramapuram K. Jagga Rao Katarapadu V. Sankar Batrupalem Y. Sathi Reddy Irika Gudem J. Kamili Ganesh Pahad P. Damodhar Reddy Vadapalli K. Janaiah Vadapalli K. Yadi Reddi Vadapalli D. Manga Naik Vadapalli D. Peer Naik Vadapalli D. Mamatha Vadapalli K. Ramuli Dachepalli K. Ramireddi Nadikudi V. Koti rEddi Gamalapadu Sankar Naik Vadapalli D. Ravidhar Naik Vadapalli		

8.5 RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

8.5.1 Risk Assessment and Disaster Management Plan

Hazard analysis involves the identification and quantification of various hazards (unsafe conditions) that exist in the plant. On the other hand, risk analysis deals with the identification and quantification of risks, the plant equipment and personnel are exposed to, due to accidents resulting from the hazards present in the plant.

Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks the neighboring populations are exposed to as a result of hazards present. This requires a thorough knowledge of failure probability, credible accident scenario, vulnerability of populations etc. Much of this information is difficult to get or generate. Consequently, the risk analysis is often confined to maximum credible accident studies.

In the sections below, the identification of various hazards, probable risks in the plant, maximum credible accident analysis and consequence analysis are addressed which gives a broad identification of risks involved in the cement and captive power plant. Based on the risk estimation, disaster management plan has also been prepared.

8.5.2 Approach to the Study

Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas;
- Identification of representative failure cases;
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion;
- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios;
- Assess the overall suitability of the site from hazard minimization and disaster mitigation point of view;
- Furnish specific recommendations on the minimization of the worst accident possibilities; and
- Preparation of broad Disaster Management Plan (DMP), On-site and Off-site Emergency Plan, which includes Occupational Health and Safety plan.

8.5.3 Hazard Identification

Identification and quantification of hazards in plant is of primary significance in the risk analysis. Hence, all the components of a system/plant/process has been thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident. The following two methods for hazard identification have been employed in the study:

- Identification of major hazardous units based on Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 of Government of India (GOI Rules, 1989); as amended in 2000; and

- Identification of hazardous units and segments of plants and storage units based on relative ranking technique, viz. Fire-Explosion and Toxicity Index (FE&TI).

Hazardous substances may be classified into three main classes: Flammable substances, unstable substances and Toxic substances. The ratings for a large number of chemicals based on flammability, reactivity and toxicity have been given in NFPA Codes 49 and 345-M. The storages of raw materials, products of power and cement plants are given in **Table-8.3.**

Coal is the main fuel used in the Captive Power Plant and Kiln in cement plant.

Hazardous characteristics of the major flammable materials and chemicals that are employed in different processes and storages of the cement and power plant are listed in **Table-8.4.**

TABLE- 8.3
CATEGORYWISE SCHEDULE OF STORAGE TANK

Sr. No	Product	No. of Tanks	Classification	Design Capacity (KL)
1	HSD	1	B	200

A: Dangerous Petroleum B: Non- Dangerous Petroleum C: Heavy Petroleum

TABLE-8.4
PROPERTIES OF FUELS/CHEMICALS USED AT THE PLANT

Chemical	Codes/Label	TLV	FBP	MP	FP	UEL	LEL
			°C			%	
HSD	Flammable	5 mg/m^3	400	338	32-96	7.5	0.6

TLV : Threshold Limit Value
FBP : Final Boiling Point
MP : Melting Point
FP : Flash Point
UEL : Upper Explosive Limit
LEL : Lower Explosive Limit

8.5.3.1 Identification of Major Hazard Installations Based on GOI Rules, 1989 (amended in 2000)

Following accidents in industries in India over a few decades, a specific legislation covering major hazard activities has been enforced by Govt. of India in 1989 in conjunction with Environment Protection Act, 1986. This is referred here as GOI Rules 1989 (amended in 2000). For the purpose of identifying major hazard installations the rules employ certain criteria based on toxic, flammable and explosive properties of chemicals. A systematic analysis of the fuels and their quantities of storage has been carried out, to determine threshold quantities as notified by GOI Rules and the applicable rules are identified. The results are summarized in **Table-8.5.**

TABLE-8.5
APPLICABILITY OF GOI RULES TO FUEL/CHEMICAL STORAGE

Sr. No.	Fuel	Listed in Schedule	Total Quantity [KL]	Threshold Quantity (T) for Application of Rules	
				5,7-9,13-15	10-12
1	HSD	3(1)	200	25 MT	200 MT

8.6 Hazard Assessment and Evaluation

An assessment of the conceptual design is conducted for the purpose of identifying and examining hazards related to feed stock materials, major process components, utility and support systems, environmental factors, operations, facilities and safeguards.

8.6.1 Preliminary Hazard Analysis (PHA)

A preliminary hazard analysis is carried out initially to identify the major hazards associated with storages and the processes of the plant. This is followed by consequence analysis to quantify these hazards. Finally the vulnerable zones are plotted for which risk reducing measures are deduced and implemented. The potential risk areas in the plant are given in **Table-8.6 &** hazard analysis in **Table-8.7**.

TABLE-8.6
PRELIMINARY HAZARD ANALYSIS FOR PROCESS AND STORAGE AREAS

Sr. No.	Blocks/Areas	Hazards Identified
1	Coal Handling Plant	Fire and/or Dust Explosions
2	Boilers	Fire (mainly near oil burners), steam; Explosions, Fuel Explosions
3	Kiln	Fires in - a) Lube Oil systems b) Cable galleries c) Short circuits in i) Control Rooms ii) Switchgears
4	Power Transformers	Explosion and fire.
5	Switch-yard Control Room	Fire in cable galleries and Switchgear/Control Room.
6	Tank Farms Furnace Oil	Fire

TABLE-8.7
PRELIMINARY HAZARD ANALYSIS FOR THE WHOLE PLANT IN GENERAL

PHA Category	Description of Plausible Hazard	Recommendation	Provision
Environ-mental factors	If there is any leakage and eventuality of source of ignition.	--	All electrical fittings and cables are provided as per the specified standards. All motor starters are flame proof.
Environ-mental factors	Highly inflammable nature of the chemicals may cause fire hazard in the storage facility.	A well-designed fire protection including protein foam, dry powder and CO2 extinguisher shall be provided.	Fire extinguisher of small size and big size are provided at all potential fire hazard places. In addition to the above, fire hydrant network is also provided.

8.6.2 Fire Explosion and Toxicity Index (FE&TI) Approach

Fire, Explosion and Toxicity Indexing (FE & TI) is a rapid ranking method for identifying the degree of hazard. The application of FE&TI would help to make a quick assessment of the nature and quantification of the hazard in these areas. However, this does not provide precise information.

The degree of hazard potential is identified based on the numerical value of F&EI as per the criteria given below:

F&EI Range	Degree of Hazard
0-60	Light
61-96	Moderate
97-127	Intermediate
128-158	Heavy
159-up	Severe

By comparing the indices F&EI and TI, the unit in question is classified into one of the following three categories established for the purpose are presented in **Table-8.8.**

TABLE-8.8
FIRE EXPLOSION AND TOXICITY INDEX

Category	Fire and Explosion Index (F&EI)	Toxicity Index (TI)
I	F&EI < 65	TI < 6
II	65 < or = F&EI < 95	6 < or = TI < 10
III	F&EI > or = 95	TI > or = 10

Certain basic minimum preventive and protective measures are recommended for the three hazard categories.

- ***Results of FE and TI for Storage/Process Units***

Based on the GOI Rules, the hazardous fuels used in the plant were identified. Fire and Explosion are the likely hazards, which may occur due to the fuel storages. Hence, Fire and Explosion index has been calculated for in plant storage. Detailed estimates of FE&TI are given in **Table-8.9.**

TABLE-8.9
FIRE EXPLOSION AND TOXICITY INDEX FOR STORAGE FACILITIES

Sr. No.	Chemical	Total Quantity	F&EI	Category	TI	Category
1	HSD	200 KL	10.1	Light	Nil	-

Furnace oil storage falls into 'light' category of F&EI and 'nil' toxicity index.

8.6.3 Maximum Credible Accident (MCA) Analysis

Hazardous substances may be released as a result of failures or catastrophes, causing possible damage to the surrounding area. This section deals with the question of how the consequences of the release of such substances and the damage to the surrounding area can be determined by means of models. Major hazards posed by flammable storage can be identified taking recourse to MCA analysis. MCA analysis encompasses certain techniques to identify the hazards and calculate the consequent effects in terms of damage distances of heat radiation, toxic releases, vapor cloud explosion, etc. A host of probable or potential accidents of the major units in the complex arising due to use, storage and handling of the hazardous materials are examined to establish their credibility. Depending upon the effective hazardous attributes and their impact on the event, the maximum effect on the surrounding environment and the respective damage caused can be assessed.

The reason and purpose of consequence analysis are many folds like:

- Part of Risk Assessment;
- Plant Layout/Code Requirements;
- Protection of other plants;
- Protection of the public;
- Emergency Planning; and
- Design Criteria (e.g. loading on Control Room).

The results of consequence analysis are useful for getting information about all known and unknown effects that are of importance when some failure scenario occurs in the plant and also to get information as how to deal with the possible catastrophic events. It also gives the workers in the plant and people living in the vicinity of the area, an understanding of their personal situation.

8.6.3.1 Damage Criteria

The fuel storage and the supply pipelines may lead to fire and explosion hazards. The damage criteria due to an accidental release of any hydrocarbon arise from fire and explosion. Contamination of soil or water is not expected as these fuels will vaporize slowly and would not leave any residue. The vapors of these fuels are not toxic and hence no effects of toxicity are expected.

- **Fire Damage**

A flammable liquid in a pool will burn with a large turbulent diffusion flame. This releases heat based on the heat of combustion and the burning rate of the liquid. A part of the heat is radiated while the rest is convected away by rising hot air and combustion products. The radiations can heat the contents of a nearby storage or process unit to above its ignition temperature and thus result in a spread of fire. The radiations can also cause severe burns or fatalities of workers or fire fighters located within a certain distance. Hence, it will be important to know beforehand the damage potential of a flammable liquid pool likely to be created due to leakage or catastrophic failure of a storage or process vessel. This will help to decide the location of other storage/process vessels, decide the type of protective clothing the workers/fire fighters need, the duration of time for which they can be in the zone, the fire extinguishing measures needed and the protection methods needed for the nearby storage/process vessels. **Tables-8.10** and **Table-8.11** tabulated the damage effect on equipment and people due to thermal radiation intensity.

TABLE-8.10
DAMAGE DUE TO INCIDENT RADIATION INTENSITIES

Sr. No	Incident Radiation (kW/m^2)	Type of Damage Intensity	
		Damage to Equipment	Damage to People
1	37.5	Damage to process equipment	100% lethality in 1 min. 1% lethality in 10 sec.
2	25.0	Minimum energy required to ignite wood at indefinitely long exposure without a flame	50% Lethality in 1 min. Significant injury in 10 sec.
3	19.0	Maximum thermal radiation intensity allowed on thermally unprotected adjoining equipment	--
4	12.5	Minimum energy to ignite with a flame; melts plastic tubing	1% lethality in 1 min.
5	4.5	--	Causes pain if duration is longer than 20 sec, however blistering is un-likely (First degree burns)
6	1.6	--	Causes no discomfort on long exposures

Source: Techniques for Assessing Industrial Hazards by World Bank

TABLE-8.11
RADIATION EXPOSURE AND LETHALITY

Radiation Intensity (kW/m^2)	Exposure Time (seconds)	Lethality (%)	Degree of Burns
1.6	--	0	No Discomfort even after long exposure
4.5	20	0	1 st
4.5	50	0	1 st
8.0	20	0	1 st
8.0	50	<1	3 rd
8.0	60	<1	3 rd
12.0	20	<1	2 nd
12.0	50	8	3 rd
12.5	--	1	--
25.0	--	50	--
37.5	--	100	--

8.6.3.2 Fuel Storage

Only one storage tank is provided in the plant for Furnace Oil storage. The oil is supplied by road tankers. In case of tank or fuel released in the dyke area catching fire, a steady state fire will ensue. Failures in pipeline may occur due to corrosion and mechanical defect. Failure of pipeline due to external interference is not considered as this area is licensed area and all the work within this area is closely supervised with trained personnel.

8.6.3.3 Modeling Scenarios

Based on the storage and consumption of furnace oil, the following failure scenarios for the plant have been identified for MCA analysis and the scenarios are discussed in **Table-8.12.**

TABLE-8.12
SCENARIOS CONSIDERED FOR MCA ANALYSIS)

Sr. No.	Fuel/Chemical	Total Storage Quantity (KL)	Scenarios Considered
1	Failure of HSD Tank	200	Pool Fire

8.6.3.4 Details of Pool Fire Model

Heat Radiation program **RADN** has been used to estimate the steady state radiation effect from various storage of fuel and chemicals at different distances. The model has been developed by VIMTA based on the equations compiled from literatures by Prof.J.P.Gupta, Department of Chemical Engineering, IIT Kanpur. The equations used for computations are described below:

8.6.3.5 Properties of Fuels Considered for Modeling Scenarios (Pool fire)

The data for various fuels used for modeling is tabulated in **Table-8.13** and are compiled from various literatures.

TABLE-8.13
PROPERTIES OF FUEL CONSIDERED FOR MODELING

Sr. No.	Fuel	Molecular Weight kg/kg. mol	Boiling Point ^{0}C	Density kg/m^3
1	HSD	114.24	400.0	920.0

8.6.3.6 Results and Discussion - Pool Fire

The results of MCA analysis are tabulated indicating the distances for various damages identified by the damage criteria. Calculations are done for radiation intensities levels of 37.5, 25, 19, 12.5, 4.5 and 1.6 kW/m^2, which are presented in **Table-8.14** for different scenarios. The distances computed for various scenarios are given in meters and are from the edge of the pool fire. The radiation intensities are computed for the maximum and minimum diameter of the storage tanks. It is further assumed that all other tank diameters fall in between the maximum and minimum diameter, thereby the radiation intensities also fall in between the maximum and minimum radiation intensities.

TABLE-8.14
OCCURRENCE OF VARIOUS RADIATION INTENSITIES- POOL FIRE

Failures	Quantity KL	Radiation Intensities (kW/m^2)/Distances (m)			
		37.5	25.0	4.5	1.6
Failure of HSD tank	200	12.3	15.4	41.1	74

A perusal of modeling results tabulated in **Table-8.14** indicate that the radiation intensity of 37.5 kW/m^2 (100% lethality) and 25.0 kW/m^2 (50% lethality) are likely to occur within the radius of the pool, which is computed at 12.3 m and 15.4 m respectively.

Similarly, the radiation intensity of 4.5 kW/m^2 is likely to occur within a distance of 41.1 m from the center of fuel storage tank. First-degree burns are likely to occur within this distance. The radiation contours are shown in **Figure-8.3**.

8.6.3.7 Effect of Thermal Radiation on Population

The radiation of 1.6 kW/m^2 represents the safe radiation intensity for human population even for long exposures.

In case of pool fire of tank the safe distance i.e. distance of occurrence of 1.6 kW/m^2 is observed to be 74 m and falls within the plant boundary.

8.6.4 Risk Associated with Coal Handling Plant - Dust Explosion

Coal dust when dispersed in air and ignited would explode. Coal crusher house and conveyor systems are most susceptible to this hazard. To be explosive, the dust mixture should have:

- Particles dispersed in the air with minimum size (typical figure is 400 microns); and
- Dust concentrations must be reasonably uniform.

Failure of dust extraction and suppression systems may lead to abnormal conditions and increasing the concentration of coal dust to the explosive limits. Sources of ignition present are incandescent bulbs with the glasses of bulk head fittings missing, electric equipment and cables, friction, spontaneous combustion in accumulated dust.

Dust explosions may occur without any warnings with Maximum Explosion Pressure upto 6.4 bar. Another dangerous characteristic of dust explosions is that it sets off secondary explosions after the occurrence of the initial dust explosion. Many a times, the secondary explosions are more damaging than primary ones. The dust explosions are powerful enough to destroy structures, kill or injure people and set dangerous fires likely to damage a large portion of the Coal Handling Plant including collapse of its steel structure, which may cripple the life line of the power plant.

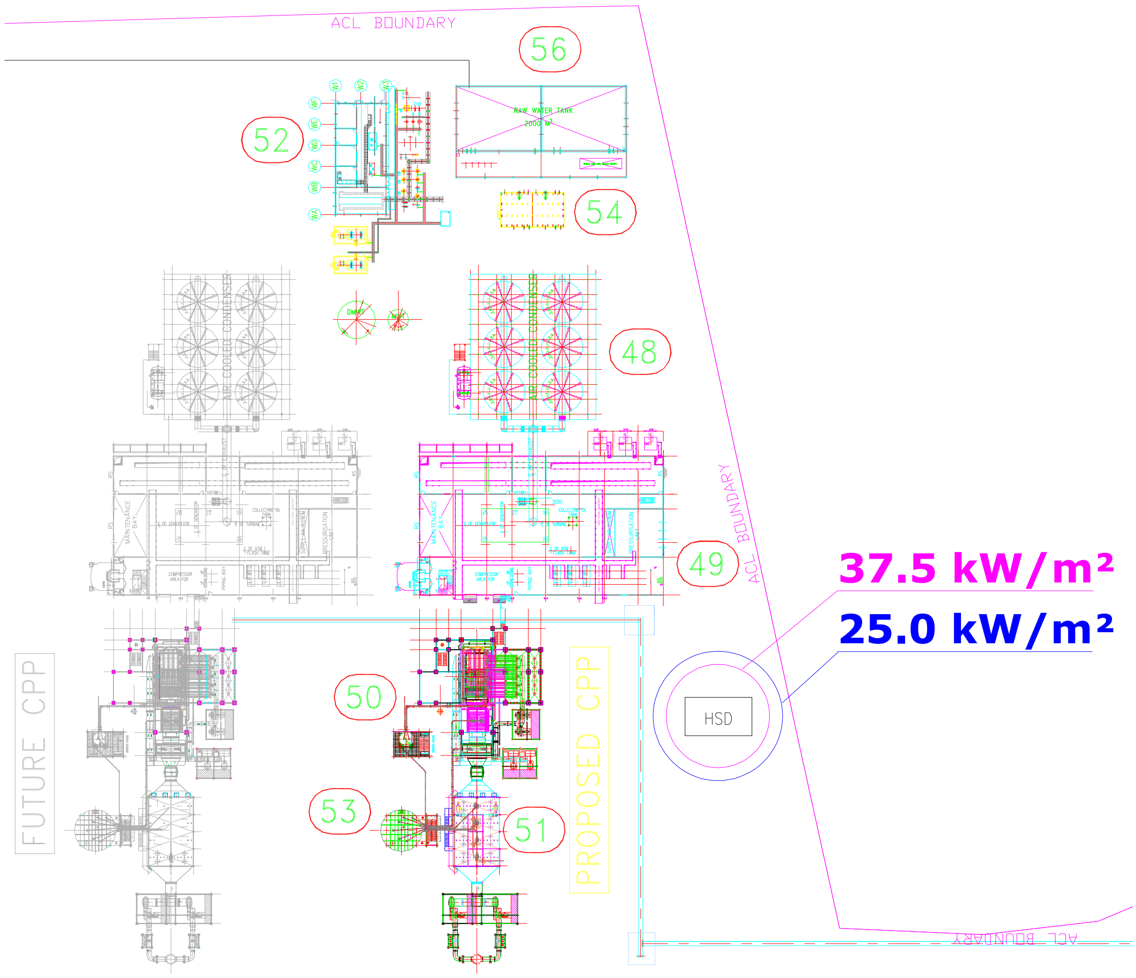


FIGURE-8.3
RADIATION CONTOURS

Stockpile areas shall be provided with automatic garden type sprinklers for dust suppression as well as to reduce spontaneous ignition of the coal stockpiles. Necessary water distribution network for drinking and service water with pumps, piping, tanks, valves etc will be provided for distributing water at all transfer points, crusher house, control rooms etc.

A centralized control room with microprocessor based control system (PLC) has been envisaged for operation of the coal handling plant. Except for locally controlled equipment like traveling tripper, dust extraction/ dust suppression / ventilation equipment, sump pumps, water distribution system etc, all other in-line equipment will be controlled from the central control room but will have provision for local control as well. All necessary interlocks, control panels, MCC's, mimic diagrams etc will be provided for safe and reliable operation of the coal handling plant.

8.3.5 Control Measures for Coal Yards

The total quantity of coal shall be stored in separate stockpiles, with proper drains around to collect washouts during monsoon season.

Water sprinkling system shall be installed on stocks of coal in required scales to prevent spontaneous combustion and consequent fire hazards. The stock geometry shall be adopted to maintain minimum exposure of stock pile areas towards predominant wind direction.

8.6.6 Identification of Hazards

The various hazards associated, with the plant process apart from fuel storage have been identified and are outlined in **Table-8.15.**

TABLE-8.15
HAZARD ANALYSIS FOR PROCESS IN POWER PLANT

Sr. No.	Blocks/Areas	Hazards Identified
1	Coal storage in open yard	Fire, Spontaneous Combustion
2	Coal Handling Plant including Bunker area	Fire and/or Dust Explosions
3	Boilers	Fire (mainly near oil burners), Steam Explosions, Fuel Explosions
4	Steam Turbine Generator Buildings	Fires in – a) Lube oil system b) Cable galleries c) Short circuits in: i)Control rooms ii) Switch-gears Explosion due to leakage of Hydrogen and fire following it.
5	Switch-yard Control Room	Fire in cable galleries and Switch-gear/Control Room
6	LDO Tank Farms HFO Tank Farm	Fire

8.6.6 Generator Buildings

Turbo-Generator buildings are exposed to risks due to similar hazards given below:

1. As per the summary of study of losses in United States for a period of 50 years, the probability of fire in Turbo-Generators is one in 185 unit years. Therefore, there is a possibility of fire/explosion in turbo-generator set once in 50 years. The probable hazardous area is lubrication system in the turbo-generator.

2. Apart from the Turbo-Generator sets, other major hazardous areas in Turbo-Generator Buildings are:

   - Cable Galleries;
   - Control Rooms;
   - Switchgears;
   - Oil drums stored at Ground Floor level; and
   - Battery Rooms.

PVC cables can be involved in fire. Such fires are known to propagate at speeds upto 20 m/min. Hence, there is a possibility of starting fresh fires in all directions wherever cable runs cross each other or bifurcate. On combustion, every kilogram of PVC compound produces 1000 M^3 of highly dense smoke, which mainly contains hydrogen chloride fumes sufficient to produce 1 liter of Hydrochloric acid, which may condense on cooler metallic parts and instruments in presence of moisture damaging them severely. Since length of PVC cables is several kilometers in Turbo-Generator Buildings, the hazard is tremendous.

Apart from PVC cables, the oil installation is a large one for Turbo-Generator sets and can burn furiously spreading fires to Cable Galleries and other places.

The rapidity of spread of fire may create problems such as safe shutdown of units not involved initially in fire and safe evacuation of personnel, particularly operators and engineers in control rooms.

Turbo-Generator building is a steel structure with no insulation, and in case of a major fire, may collapse as the strength of steel would get reduced by half at temperature of $550^{O}C$ (yield point of steel) and above.

There will also be serious implications for supply in power grids including its total collapse following major fires.

8.7 Disaster Management Plan

8.7.1 Introduction

Disaster Management Plan for an industrial unit is necessarily a combination of various actions which are to be taken in a very short time but in a pre-set sequence to deal effectively and efficiently with any disaster, emergency or major accident with an aim to keep the loss of men, material, plant/machinery etc., to the minimum.

Creation and establishment of a cell within the industrial unit is a pre-requisite for an effective implementation of any disaster management plan. The main functions of the Disaster Management Cell are to prepare a detailed disaster management plan, which includes:

- Identification of various types of expected disasters depending upon the type of the industrial unit;
- Identification of various groups, agencies, departments etc. necessary for dealing with a specific disaster effectively;
- Preparation - by intensive training - of relevant teams/groups within the organization to deal with a specific disaster and keep them in readiness;
- Establishment of an early detection system for the disasters;
- Development of a reliable instant information/communication system; and
- Organization and mobilization of all the concerned departments/ organizations/ groups and agencies instantly when needed.

Major disaster that can occur in this Cement Plant /CPP may be due to fire. In the existing cement plant already having a good and well-maintained

8.7.2 Emergency Planning For Disaster due to Fire

Coal storage, cable rooms, transformer unit, auxiliary transformers, oil tanks, coal bunkers including all conveyor lines etc., within the plant are the likely areas for which plan is outlined to deal with any eventuality of fire. Stores, workshop, canteen and administration building have also been included.

8.7.2.1 Classification of Fires

The various classes of fire, explanation of the classes of fire and method of fighting the different classes of fire are given in **Table-8.16**.

TABLE-8.16
CLASSES OF FIRE

Class	Explanation	Method of Fire	Fire Fighting
A	Solid – Carbonaceous inflammable material	Fire involving wood, paper, coal, cloth and other material	Water
B	Liquid	Fire involving oil, kerosene etc.	Foam or dry powder chemical extinguisher
C	Special	Electrical fire	DCP or CO_2 extinguisher

8.7.2.2 Equipment System Dealing with Coal Handling

The whole system dealing with coal handling can be summarized as follows:

- A wagon tripper for unloading transported coal from the racks/trucks;
- Coal is unloaded into ground level hopper(s) from where it is transported to pre-blending stock pile through belt conveyors;
- Coal is reclaimed for the above stock pile and is transported to the raw coal hopper for vertical mill by a set of belt conveyors;
- For collection of the pulverized fuel as well as venting the mill, a high efficiency bag filters will be provided; and
- The fine coal from the hoppers will be sent to kiln firing by a set of pumps.

Water sprinklers will be provided for the stockpile at the unloading point to prevent fire. Pull cords and emergency switches will be provided all along the conveyor belt to avoid the spreading of fire.

8.7.2.3 Need for a Fire Fighting Group

A small spark of fire may result into loss of machines and conveyors and the damage by fire may be of the order of few crores of Rupees. This type of losses can be avoided by preventing and controlling the fire instantly for which fire-fighting group shall be established.

8.7.2.4 Fire Fighting with Water

Adequate and reliable arrangement is required for fighting the fire with water such as:

- Identification of source of water and equipping with pumps;
- Arrangement of pipe lines along and around all vulnerable areas;
- Alternative water supply arrangements to divert the water from one set of pipe lines (connected to another source) or to connect to other source;
- Provisions of valves at appropriate points to enable supply of water at the required place/area or divert the same to another direction/pipe line; and
- Each source of water shall be equipped with one standby diesel driven pump to serve in case of power failure.

- ***Water Line Arrangement***

Water lines shall be provided at coal handling area along the conveyors and around the stockyards, transformers, oil tanks, coal crusher house etc. Water lines shall also be provided around other infrastructures in the plant like administration building, canteen, stores and other plant equipment. The system shall be designed in conformity with the recommendations of the NFPA of Insurance Association of India. A reserve water level shall be maintained in the sump as per NFPA requirements.

Hydrant system feed pressurized water to hydrant valves shall be located throughout the plant and also at strategic locations. The water pressure shall be maintained at 6 to 8 kg/cm^2 in these lines. By operating a few of the valves water pressure can be increased at one particular place. There are two types of valves. Non-return valves shall be provided to allow only unidirectional flow of water. Gate valves shall be provided for closing or opening the water supply. An adequate number of gate valves shall be provided at appropriate points to tap water to deal with fire if it breaks out at any point of the plant.

8.7.2.5 Fire Fighting with Fire Extinguishers

To deal with fires - other than carbonaceous fires, which can be dealt with by water - suitable fire extinguishers are required to do the job effectively. Adequate number of "Fire stations' are to be established with the following types of equipment and arrangements:

- Soda Acid Fire Extinguishers;
- CO_2 Extinguishers;
- Dry Powder Chemical Extinguishers;
- Foam Extinguishers;
- Fire buckets; and
- 50-mm spray hoses up to 150-m length.

Appropriate types of fire extinguishers shall also be provided at conveyor drive heads, crusher house, control rooms, in machines like stacker and reclaimer, electrical yard, sub-station and other infrastructure facilities within the premises.

In the transformer yard, automatic fire detecting and quenching system shall be provided for each transformer. This system comes into operation whenever the temperature of surrounding air exceeds 80°C and sprays water over the transformer to prevent spreading of fire and quenches the same. In order to avoid fire in cable galleries, all the power and control cables of FRLS type (Fire Resistant Low Smoke) shall be used. In addition, fire detecting and Fire Alarm Systems shall be installed in the cable galleries.

8.7.2.6 Inspection

- Fire alarm panel (electrical) shall cover the entire plant. Fire Extinguishers in Fire Stations and machines and other places shall be periodically inspected by the inspection group;

- The temperature of the coal stack shall be regularly measured and recorded. If the temperature exceeds 80°C, water quenching shall be carried out;

- Emergency telephone numbers shall be displayed at vital points by the groups; and

- General inspection for fire shall be regularly carried out by the group.

8.7.2.7 Procedure for Extinguishing Fire

The following steps shall be taken during a Fire Accident in the system:

- As soon as the message is received about fire, one of the spray groups in the system shall be diverted to the place of the fire accident along with a staff member;

- Simultaneously plant Fire Station shall be informed by phone, walkie-talkie for fire brigades;

- Fire stations nearby also be informed by phone to be in readiness;

- In the meanwhile, the pipe system shall be operated to obtain maximum pressure and output;

- In case cables are within the reach of fire, power supply shall be tripped and the cables shifted;

- Further, other spray groups from the system shall be diverted to the spot;

- In case of fire in the belt, belt shall be cut near the burning portion, to save the remaining parts; and

- After extinguishing the fire, the area shall be well prepared for re-use.

8.7.3 Specific Emergencies Anticipated

Fire consequences can be disastrous, since they involve huge quantities of fuel either stored or in dynamic inventory in pipe lines or in nearby areas. Toxic releases can affect persons working around. Preliminary hazard Analysis has provided a basis for consequence estimation. Estimation can be made by using various pool fires, tank fire consequence calculations. During the study of Risk Assessment, the nature of damages is worked out and probability of occurrence of such hazards is also drawn up.

8.7.4 Emergency Action Plan

The emergency action plan consists of:

- First information;
- Responsibilities of Work Incident Controller;
- Responsibilities of Chief Incident Controller;
- Responsibilities for Declaration of Emergency;
- Responsibilities for Emergency Communication Officer;
- Responsibilities of key personnel;
- Responsibilities and action to be taken by essential staff and various teams during emergency; and
- Responsibilities for All Clear Signal.

8.7.4.1 First Information

The first person who observes/identities the emergencies shall inform by shouting and by telephone to the Shift Engineer and Fire Station about the hazard. The Shift Engineer will inform to Works Incident Controller, Chief Incident Controller and also telephone operator, who shall communicate it to all key personnel.

8.7.4.2 Responsibilities of Work Incident Controller (WIC)

The Work Incident Controller on knowing about an emergency immediately will rush to the incident site and take overall charge and inform the same to Chief Incident Controller (CIC). On arrival, he will assess the extent of emergency and decide if major emergency exists and inform the communication officer accordingly.

8.7.4.3 Responsibilities of Chief Incident Controller (CIC)

The Additional General Manager, who is also the Chief Incident Controller, will assume overall responsibilities for the factory/storage site and its personnel in case of any emergency. His responsibilities are to:

1. Assess the magnitude of the situation and decide if staff needs to be evacuated from their assembly point to identified safer places. Declare onsite/offsite emergency;

2. Exercise direct operational control over areas other than those affected;

3. Undertake a continuous review of possible developments and assess in consultation with key personnel as to whether shutting down of the plant or any section of the plant and evacuation of personnel are required;

4. Laison with senior officials of Police, Fire Brigade, Medical and Factories Inspectorate and provide advice on possible effects on areas out side the factory premises;

5. Look after rehabilitation of affected persons on discontinuation of emergency; and

6. Issue authorized statements to news media, and ensures that evidence is preserved for enquiries to be conducted by the statutory authorities.

8.7.4.4 Responsibilities for Declaration of Major Emergency

It is important to make the emergencies known to every one in the plant. The major emergency will be made known to every one inside the plant by sounding the alarm. Separate alarms to warn different types of major emergencies such as fire and explosion or toxic gas escape are provided. Public address system is also available throughout the plant.

Announcement will be made by the concerned official/interpreter in local language. Similarly, announcement for termination of the emergency will also be announced.

8.7.4.5 Responsibilities of Emergency Communication Officer (ECO)

On hearing the emergency alarm he will proceed to Emergency Control Center. He will

- Report to Chief Incident Controller and Work Incident Controller and maintain contact with them;
- On information received from the WIC of the situation, recommending if necessary, evacuate the staff from the assembly points;
- Identify suitable staff to act as runners or messengers who are listed in the Essential staff, between him and the Works Incident Controller if the telephone and other system of communication fail due to any reason;
- Maintain inventory of items in the emergency control center;
- Contact local meteorological office to receive early notification of changes in weather condition in case of gas leak and prolonged action;
- Maintain a log of incidents;
- Keep in constant touch with happenings at the emergency site and with WIC;
- Liaise with neighbor fire brigade, hospital, civil and police authorities on advice from CIC.

8.7.4.6 Key Personnel

Apart from Works Incident Controller and Chief Incident Controller, other works personnel will have key role to play in providing advice and in implementing the decisions made by the Chief Incident Controller. The key personnel include:

A. Sr. Superintendents/Engineer-in-charge responsible for :

- Operation;
- Electrical Maintenance;
- Mechanical maintenance;
- C&I; and
- Chemical.

B. Head of Personnel and Officers connected with IR and Labour Welfare

C. Head (Technical Service)

8.7.4.7 Responsibilities of Key Personnel

- ***Department Heads***

The departmental heads will provide assistance as required by the WIC. They will decide which members of their departments are required at the incident site.

- ***Chief Personnel Manager***

He will have following responsibilities:

a) Report to Work Incident Controller;
b) Ensure that all non-essential workers in the affected areas are evacuated to assembly points in consultation with the Chief Incident Controller;
c) Receive reports from nominated persons from assembly points, and pass on the absence information services;
d) Keep liaison with other coordinators to meet the requirements of services such as materials, security management, transportation, medical, canteen facilities etc. as required during emergency;
e) Be in constant touch with the Chief Incident Controller and feed him correct information of the situation;
f) Give information to press, public and authorities concerned on instructions from the CIC/WIC;
g) Ensure that casualties receive adequate attention at medical center and arrange required additional help and inform relatives of the injured;
h) Arrange to inform public on Radio and TV about evacuation etc.; and
i) Arrange TV coverage on handling emergency.

- ***In-Charge (TS)***

On knowing about an emergency, he will report to CIC and assist him in all activities. He will also liaison with all teams.

- ***Medical Officer***

Medical Officer will render medical treatment to the injured and if necessary will shift the injured to nearby Hospitals. He will mobilize extra medical help from outside if necessary.

- ***Head of Safety***

On hearing the emergency alarm, he will proceed to the site. He will

a. Make sure that all safety equipment are made available to the emergency teams;
b. Participate in rescue operations;
c. Co-ordinate to transfer the injured persons to medical center and arrange for first aid; and
d. Keep in contact with ECO and the WIC and advice them on the condition of injured persons

- ***Security Officer***

On hearing the Emergency alarm, he will proceed to main entrance/main gate. He will

a. Arrange to control the traffic at the gate and the incident area;

b. Direct the security staff to the incident site to take part in emergency operations under his guidance and supervision;
c. Evacuate the persons in the plant or in the nearby areas as advised by WIC after arranging the transport through the Transport in-charge;
d. Allow only those people who are associated with handling emergency;
e. Maintain law and order in the area, if necessary seek the help of police; and
f. Maintain communication with CIC/WIC and ECO.

- ***Fire Officer***

On hearing the emergency, he will reach the fire station and arrange to sound the alarm as per the type of emergency in consultation with WIC, He will:

a. Guide the fire fighting crew i.e. firemen and trained plant personnel and shift the fire fighting facilities to the emergency site. Adequate facilities will be made available;
b. Take guidance of the WIC for fire fighting as well as assessing the requirement of outside help; and
c. Maintain communication with WIC, CIC and ECO.

- ***Transport Engineer-in-Charge***

On hearing the emergency alarm, he will immediately report to Work Incident Controller. He will:

a. Ensure availability of auto base vehicles for evacuation or other duties, when asked for; and
b. Make all arrangements regarding transportation.

8.7.5 General Responsibilities of Employees During an Emergency

During an emergency, it becomes more enhanced and pronounced when an emergency warning is raised, the workers if they are in charge of process equipment shall adopt safe and emergency shut down and attend any prescribed duty as essential employee. If no such responsibility is assigned, he shall adopt a safe course to assembly point and await instructions. He shall not resort to spread panic. On the other hand, he must assist emergency personnel towards objectives of DMP.

8.7.6 Emergency Facilities

8.7.6.1 Emergency Control Center (ECC)

For the time being Office Block is identified as Emergency Control Center. It would have external Telephone, Fax, Telex facility. All the Site Controller/ Incident Controller Officers, Senior Personnel would be located here. Also, it would be an elevated place. The following information and equipment are to be provided at the Emergency Control Center (ECC).

- Intercom, telephone;
- P and T telephone;

- Safe contained breathing apparatus;
- Fire suit/gas tight goggles/gloves/helmets;
- Hand tools, wind direction/velocities indications;
- Public address megaphone, hand bell, telephone directories;
- (internal, P and T) factory layout, site plan;
- Emergency lamp/torch light/batteries;
- Plan indicating locations of hazard inventories, plant control room, sources of safety equipment, work road plan, assembly points, rescue location vulnerable zones, escape routes;
- Hazard chart;
- Emergency shut-down procedures;
- Nominal roll of employees;
- List of key personnel, list of essential employees, list of Emergency Co-ordinators;
- Duties of key personnel;
- Address with telephone numbers and key personnel, emergency coordinator, essential employees; and
- Important address and telephone numbers including Government agencies, neighboring industries and sources of help, out side experts, chemical fact sheets population details around the factory.

8.7.6.2 Assembly Point

Number of assembly depending upon the plant location would be identified wherein employees who are not directly connected with the disaster management would be assembled for safety and rescue. Emergency breathing apparatus, minimum facilities like water etc. would be organized. In view of the size of plant, different locations are ear marked as assembly points. Depending upon the location of hazard, the assembly points are to be used.

8.7.6.3 Emergency Power Supply

Plant facilities would be connected to Emergency Power supply units and would be placed in auto mode. Thus water pumps, plants lighting and emergency control center. Administrative building and other auxiliary services are connected to emergency power supply. In all the blocks, flame proof type emergency lamps would be provided.

8.7.6.4 Fire Fighting Facilities

First Aid Fire fighting equipment suitable for emergency shall be maintained in each section in the plant. This would be as per statutory requirements as well as per NFPA Regulations. However, fire hydrant line covering major areas would be laid. It would be maintained as 6 kg/sq.cm pressure. Fire alarms would be located in the bulk storage areas. On the top of the Administration block, top of each production blocks, wind socks would be installed to indicate direction of wind for emergency escape.

8.7.6.5 Emergency Medical Facilities

Stretchers, gas masks and general first aid materials for dealing with chemical burns, fire burns etc. would be maintained in the medical center as well as in the emergency control room. Private medical practitioners help would be sought. Government hospital would be approached for emergency help. Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of near by industrial management's in this regard would taken on mutual support basis.

An ambulance with driver availability in all the shifts, emergency shift vehicle would be ensured and maintained to transport injured or affected persons. Number of persons would be trained in first aid so that, in every shift first aid personnel would be available.

8.7.7 Emergency Actions

8.7.7.1 Emergency Warning

Communication of emergency would be made familiar to the personnel inside the plant and people outside. An emergency warning system would be established.

8.7.7.2 Emergency Shutdown

There are number of facilities which can be provided to help deal with hazardous conditions, fire breaks out. Under this situation the supply of the fuel will be disconnected immediately. Whether a given method is appropriate depends on the particular case. Cessation of agitation may be the best action in some instances but not in others. Stopping of the feed may require the provision of by pass arrangements.

Methods of removing additional heat include removal through the normal cooling arrangements or use of an emergency cooling system. Cooling facilities, which use vapouring liquid, may be particularly effective, since a large increase in vaporization can be obtained by dropping pressure.

8.7.7.3 Evacuation of Personnel

There could be more number of persons in the storage area and other areas in the vicinity. The area would have adequate number of exits, stair cases. In the event of an emergency, unconnected personnel have to escape to assembly point. Operators have to take emergency shutdown procedure and escape. Time Office maintains a copy of deployment of employees in each shift, at ECC. If necessary, persons can be evacuated by rescue teams.

Also, at the end of an emergency, after discussing with Incident Controllers and Emergency Co-ordinators, the Site Controller orders an all clear signal. When it becomes essential, the Site Controller communicates to the District Emergency Authority, Police, and Fire Service personnel regarding help required or development of the situation into an Off-Site Emergency.

8.7.8 General

8.7.8.1 Employee Information

During an emergency, employees would be warned by raising siren in specific pattern. Employees would be given training of escape routes, taking shelter, protecting from toxic effects. Employees would be provided with information related to fire hazards, antidotes and first aid measures. Those who would be designated as key personnel and essential employees shall be given training to emergency response.

8.7.8.2 Public Information and Warning

The industrial disaster effects related to this plant may mostly be confined to the plant area. The detailed risk analysis has indicated that the effects would not be felt outside. However, as an abundant precaution, the information related to chemicals in use would be furnished to District Emergency Authority for necessary dissemination to general public and for any use during an off site emergency.

8.7.8.3 Co-ordination with Local Authorities

Keeping in view of the nature of emergency, two levels of coordination are proposed. In the case of an On Site Emergency, resources within the organization would be mobilized and in the event of extreme emergency local authorities help shall be sought.

In the event of an emergency developing into an off site emergency, local authority and District Emergency Authority (normally the Collector) would be appraised and under his supervision, the Off Site Disaster Management Plan would be exercised. For this purpose, the facilities that are available locally, i.e. medical, transport, personnel, rescue accommodation, voluntary organizations etc. would be mustered. Necessary rehearsals and training in the form of mock drills shall be organized.

Mutual aid in the form of technical personnel, runners, helpers, special protective equipment, transport vehicles, communication facility etc. shall be sought from the neighboring industrial management.

8.7.8.4 Mock Drills

Emergency preparedness is an important aspect in the planning of Industrial Disaster Management. Personnel would be trained suitably and prepared mentally and physically in emergency response through carefully planned, simulated procedures. Similarly, the key personnel and essential personnel shall be trained in the operations.

8.7.8.5 Important Information

Once the plant goes into stream, important information such names and addresses of key personnel, essential employees, medical personnel, out side the plant, transporters address, address of those connected with Off Site Emergency such as

Police, Local Authorities, Fire Services, District Emergency Authority shall be prepared and maintained.

8.8 Off-Site Emergency Preparedness Plan

The task of preparing the Off-Site Emergency Plan lies with the district collector, however the off-site plan will be prepared with the help of the local district authorities. The proposed plan will be based on the following guidelines.

8.8.1 Introduction

Off-site emergency plan follows the on-site emergency plan. When the consequences of an emergency situation go beyond the plant boundaries, it becomes a off-site emergency. Off-site emergency is essentially the responsibility of the public administration. However, the factory management will provide the public administration with the technical information relating to the nature, quantum and probable consequences on the neighboring population.

The off-site plan in detail will be based on those events, which are most likely to occur, but other less likely events, which have severe consequence, will also be considered. Incidents, which have very severe consequences yet have a small probability of occurrence, shall also be considered during the preparation of the plan. However, the key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan.

The roles of the various parties who will be involved in the implementation of an off-site plan are described below. Depending on local arrangements, the responsibility for the off-site plan shall be either rest with the works management or, with the local authority. Either way, the plan shall identify an emergency co-ordinating officer, who would take the overall command of the off-site activities. As with the on-site plan, an emergency control center shall be setup within which the emergency co-ordinating officer can operate.

An early decision will be required in many cases on the advice to be given to people living "within range" of the accident - in particular whether they shall be evacuated or told to go indoors. In the latter case, the decision can regularly be reviewed in the event of an escalation of the incident. Consideration of evacuation may include the following factors:

- In the case of a major fire but without explosion risk (e.g. oil storage tank), only houses close to the fire are likely to need evacuation, although a severe smoke hazard may require this to be reviewed periodically; and

- If a fire is escalating and in turn threatening a store of hazardous material, it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people shall be advised to stay indoors and shield them from the fire. This latter case particularly applies if the installation at risk could produce a fireball with vary severe thermal radiation effects.

8.8.2 Aspects Proposed to be Considered in the Off-Site Emergency Plan

The main aspects, which shall be included in the emergency plan, are:

- **Organization**

Names and appointments of incident controller, site main controller, their deputies and other key personnel.

- **Communications**

Identification of personnel involved, communication center, call signs, network, lists of telephone numbers.

- **Specialized knowledge**

Details collected of specialized bodies, firms and people upon whom it may be necessarily to call e.g. those with specialized chemical knowledge, laboratories.

- **Voluntary organizations**

Details of organizers telephone numbers, resources etc.

- **Chemical information**

Details of the hazardous substances stored or procedure on each site and a summary of the risk associated with them.

- **Meteorological information**

Arrangements are done for obtaining details of weather conditions prevailing at the time and weather forecasts.

- **Humanitarian arrangements**

Transport, evacuation centers, emergency feeding treatment of injured, first aid, ambulances, temporary mortuaries.

- **Public information**

Arrangements for:
(a) Dealing with the media press office;
(b) Informing relatives, etc.

- **Assessment of emergency plan**

Arrangements for:
(a) Collecting information on the causes of the emergency;
(b) Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

8.8.3 Role of the Emergency Co-coordinating Officer

The various emergency services shall be co-ordinated by an emergency co-coordinating officer (ECO), who will be designated by the district collector. The ECO shall liaise closely with the site main controller. Again depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control shall be passed to a senior local authority administrator or even an administrator appointed by the central or state government.

8.8.4 Role of the Local Authority

The duty to prepare the off-site plan lies with the local authorities. The emergency planning officer (EPO) appointed shall carry out his duty in preparing for a whole range of different emergencies within the local authority area. The EPO shall liaise with the works, to obtain the information to provide the basis for the plan. This liaison shall ensure that the plan is continually kept upto date.

It will be the responsibility of the EPO to ensure that all those organizations, which will be involved off site in, handling the emergency, know of their role and are able to accept it by having for example, sufficient staff and appropriate equipment to cover their particular responsibilities. Rehearsals for off-site plans should be organized by the EPO.

8.8.5 Role of Police

Formal duties of the police during an emergency include protecting life and property and controlling traffic movements. Their functions shall include controlling bystanders evacuating the public, identifying the dead and dealing with casualties, and informing relatives of death or injury.

8.8.6 Role of Fire Authorities

The control of a fire shall be normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer shall also have a similar responsibility for other events, such as explosions and toxic release. Fire authorities in the region shall be apprised about the location of all stores of flammable materials, water and foam supply points, and fire-fighting equipment. They shall be involved in on-site emergency rehearsals both as participants and, on occasion, as observers of exercises involving only site personnel.

8.8.7 Role of Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances, and so on, shall have a vital part to play following a major accident, and they shall form an integral part of the emergency plan.

For major fires, injuries shall be the result of the effects of thermal radiation to a varying degree, and the knowledge and experience to handle this in all but extreme cases may be generally available in most hospitals.

Major off-site incidents are likely to require medical equipment and facilities additional to those available locally, and a medical "mutual aid" scheme shall exist to enable the assistance of neighboring authorities to be obtained in the event of an emergency.

8.8.8 Role of Government Safety Authority

There will be the factory inspectorate available in the region. Inspectors are likely to want to satisfy themselves that the organization responsible for producing the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies. They may wish to see well documented procedures and evidence of exercise undertaken to test the plan.

In the event of an accident, local arrangements regarding the role of the factory inspector will apply. These may vary from keeping a watching brief to a close involvement in advising on operations in case involvement in advising on operations.

8.9 Occupational Health and Safety

Large industries, in general where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance, the men, materials and machines are the basic inputs. Along with the boons, the industrialization generally brings several problems like occupational health and safety.

The industrial planner, therefore, has to properly plan and take the steps to minimize the impacts of industrialization and to ensure appropriate occupational health, safety including fire plans. All these activities again may be classified under construction and erection, and operation and maintenance. The proposed safety plan is given below:

8.9.1 Occupational Health

Occupational health needs attention during operation and maintenance of the plant. However, the problem varies both in magnitude and variety in the above phases.

The hazardous area of work place in the cement plant, the projected numbers of employees to be employed in the hazardous activities and the safety measures to be adopted in the proposed cement plant are given in **Table-8.17.**

TABLE-8.17
HAZARDOUS ACTIVITIES AND SAFETY MEASURES TO BE ADOPTED

Sr. No.	Hazardous Activities	Safety Measures
1	Working in confined spaces	work permits system to be followed strictly
2	Working at height	work permits system to be followed strictly
3	Excavations/Trenching/Penetration/Digging	work permits system to be followed strictly
4	Hot work	work permits system to be followed strictly
5	Lockout/tag out	work permits system to be followed strictly
6	Scaffolding	Training , checklist and continues monitoring by safety

Sr. No.	Hazardous Activities	Safety Measures
		patrollers
7	Demolition works	Safe work procedures and under supervision and SOPs
8	Reinforcement bending & laying	Training and use of PPEs
9	Concrete formwork	use of of PPEs
10	Concreting	use of PPEs
11	Structural works	use of PPEs
12	Lifting with Cranes	Proper Taining to personnel and lifting area barricading
13	Lifting tools and tackles operation	Testing of all lifting tools and tackles with competent and training to operators
14	High pressure testing, cleaning and painting	Proper training , use of PPEs and work procedures for high pressure vessels
15	Overhead works	Use of PPEs and
16	Working in dust and noise	Use of PPEs display of sign boards
17	Storing, Transportation & handling of Materials	Proper work instructions
18	Machining operations (drilling, shaping, turning, sawing, grinding etc.)	Use of PPEs and Awareness training
19	Bending & rolling	Use PPEs
20	Hand tools operation	Use of PPEs and WI
21	Pneumatic tools operation	use of PPEs and Proper WI
22	Electrical tool operation	use of PPEs SOPs
23	Commissioning	use of PPEs SOPs
24	Working in electrical load centres EHT/HT/LT	use of PPEs SOPs

The personnel protective equipment shall be given to employees based on the work area.

- Industrial Safety Helmet
- Crash Helmets
- Face shield with replacement acrylic vision
- Zero power plain goggles with cut type filters on both ends
- Zero power goggles with cut type filters on both sides and blue color glasses
- Welders equipment for eye and face protection
- Cylindrical type earplug
- Ear muffs
- Canister Gas mask
- Self contained breathing apparatus
- Leather apron
- Aluminized fiber glass fix proximity suit with hood and gloves
- Boiler suit
- Safety belt/line man's safety belt
- Leather hand gloves
- Acid/Alkali proof rubberized hand gloves
- Canvas cum leather hand gloves with leather palm
- Electrically tested electrical resistance hand gloves
- Industrial safety shoes with steel toe
- Electrical safety shoes without steel toe and gum boots

Full fledged hospital facilities shall be made available round the clock for attending any emergency, if any. All working personnel shall be medically examined at least once in every year and at the end of his term of employment.

The problem of occupational health, in the operation and maintenance phase is due to noise and dust, which may lead to ailments related to lung and hearing losses. DCW has a well equipped hospital where, the Occupational Health Survey of the employees is carried out regularly. During occupational health survey following tests are conducted:

1. Lung Function Test;
2. Hearing Loss (audiometer)

The details of the existing Occupational System practiced are given in **Table-8.17.**

8.9.2 Safety Plan

Safety of both men and materials during construction and operation phases is of concern. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. The disaster in proposed plant is possible due to leakage of fuels, collapse of structures and fire/explosion etc.

Keeping in view the safety requirement during construction, operation and maintenance phases, the plant shall formulate safety policy with the following regulations:

- To allocate sufficient resources to maintain safe and healthy conditions of working environment;
- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment;
- To ensure that adequate safety instructions are given to all employees;
- To provide wherever necessary protective equipment, safety appliances and clothing and to ensure their proper use;
- To inform employees about materials, equipment or processes used in their work, which are known to be potentially hazardous to health or safety;
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and upto date knowledge;
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work;
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters;
- To ensure proper implementation of fire prevention methods and an appropriate fire fighting service together with training facilities for personnel involved in this service;
- To organize collection, analysis and presentation of data on accident, sickness and incident involving personal injury or injury to health with a view to taking corrective, remedial and preventive action;
- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees;
- To publish/notify regulations, instructions and notices in the common language of employees;

- To prepare separate safety rules for each types of occupation/processes involved in a project; and
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipment, work places and operations.

8.9.3 Safety Organization

- **Construction and Erection Phase**

A qualified and experienced safety officer shall be appointed. The responsibilities of the safety officers include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programs and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/ Statutory Provisions. In addition to employment of safety officer by power plant, every contractor, shall also employ one safety officer to ensure safety of the worker, in accordance with the conditions of contract.

- **Operation and Maintenance Phase**

When the construction is completed the posting of safety officers shall be in accordance with the requirement of Factories Act and their duties and responsibilities shall be as defined there of.

8.9.4 Safety Circle

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circles would be constituted in each area of work. The circle would consist of 5-6 employees from that area. The circle normally shall meet for about an hour every week.

8.9.5 Safety Training

Safety training shall be provided by the Safety Officers with the assistance of faculty members called from Corporate Center, Professional Safety Institutions and Universities. In addition to regular employees, limited contractor labors shall also be provided safety training. To create safety awareness safety films shall be shown to workers and leaflets etc. Some precautions and remedial measures proposed to be adopted to prevent fires are:

- Compartmentation of cable galleries, use of proper sealing techniques of cable passages and crevices in all directions would help in localizing and identifying the area of occurrence of fire as well as ensure effective automatic and manual fire fighting operations;
- Spread of fire in horizontal direction would be checked by providing fire stops for cable shafts;
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarms are effective protection methods for conveyor galleries.
- Housekeeping of high standard helps in eliminating the causes of fire and regular fire watching system strengthens fire prevention and fire fighting; and

- Proper fire watching by all concerned would be ensured.

8.9.6 Health and Safety Monitoring Plan

All the potential occupational hazardous work places such as fuel storage area, coal handling area shall be monitored regularly. The health of employees working in these areas shall be monitored once in a year for early detection of any ailment.

Though effective measures are taken to combat pollution in ambient conditions, occupational health hazards are not overlooked. Project will provide well organized occupational health services to all its employees by taking responsibility for establishment and maintenance of safe and healthy working environment and assessment of the physical and mental capabilities to turn out specific work loads.
The industrial medical centre will have following responsibilities:

1. Surveillance of workers health in relation to work;
2. Surveillance of working environments;
3. Identification and evaluation of environmental factors which may affect the workers health;
4. Assessment of conditions of occupational workers health; and
5. Observance of safety norms and reduce/eliminate exposure to hazardous environs.

9.0 PROJECT BENEFITS

Proposed power plant will result in considerable growth of stimulating the industrial and commercial activities in the state. Small and medium scale industries may be further developed as a consequence.

Proposed power plant would be beneficial in reducing the existing and ever escalating demand of electricity in northern part of the country.

In operation phase, the proposed plant would require significant workforce of non-technical and technical persons. Migration of persons with better education and professional experience will result in increase of population and literacy in the surrounding villages.

9.1 Improvements in the Physical Infrastructure

The beneficial impact of proposed power plant on the civic amenities will be substantial after the commencement of project activities. The basic requirement of the community needs will be strengthened by extending healthcare, educational facilities to the community, building/strengthening of existing roads in the area. DCW will initiate the above amenities either by providing or by improving the facilities in the area, which will help in uplifting the living standards of local communities.

The construction of new roads /strengthening of roads in the project area will enhance the transportation facilities. With improved transportation facilities there is always a scope for development.

9.2 Corporate Social Responsibility

The activities which are proposed by M/s. DCW to be taken up during first three years are given below:

- Infrastructure development;
- Education;
- Medical facilities;
- Sanitation;
- Community development and awareness programmes; and
- Vocational training in and around the project site.

➢ Infrastructure development

- Pure & safe drinking facilities;
- Improve the village sanitation system;
- Construction of suitable approach roads and bus shelters;
- Repair and diversion of the existing roads and drains; and
- Improve street and general lighting requirements.

➢ Education

- To upgrade the existing primary school;
- In addition to this, the following facilities will be provided:

- Sponsoring meritorious scholarship for students of college/ ITI/Polytechnic etc;
- Stipend to females would continue even after marriage if education continued;
- Organise computer training for the children / youth of weaker section;
- Up-gradation / Renovation of existing schools; and
- Providing water supply, furniture, computers, library, books, school bags, sports kits etc.

- Medical facilities

- Hospital with complete facilities;
- Development of primary health centers;
- Ambulance to take patients to hospital in emergency situation;
- A mobile medical van to conduct health campaigns;
- Conducting Vaccination/ Immunization programmes including polio camps;
- First aid, free medicines, special concessions to the land affected people etc. and
- Eye camps.

- Drinking water facility

- Pure and safe drinking water to meet daily household water requirement.

- Sanitation

- Proper sewerage system will be created and will start Suvidha Public Toilet (SPT) at project site and adjoining villages.

- Vocational training

- Bakery, Papad and Agarbathi making;
- Candle making;
- Computer training;
- Fashion technology courses;
- Food preservation;
- Handicraft;
- Mushroom cultivation;
- Organize skill development and vocational training for enabling people to form self help group;
- Spices grinding and packing;
- Tailoring embroidery classes to surrounding villagers;
- Training for girls and ladies of weaker section of society; and
- Welders.

- Self Employment

- Self help groups;
- Income generation schemes; and

- Community welfare/ Panchayat halls

- Renovation and modernization of existing community/ panchayat halls;

- Assistance to Anganwadi centres;
- Provision of solar energy to community/panchayat buildings

➢ Communication

- Provision of public telephone booths in each village; and
- Provision of internet facility in the schools, community / panchayat halls.

➢ Religious places

- Keeping in view the religious values of villagers worship buildings as desired will be constructed; and
- Provision of solar energy in worship buildings.

➢ Physically challenged

- Physically challenged persons would be shown avenues of employment by facilitating requisite financial assistance;
- Organizing camps and suitable training;
- Formation of self help groups;
- Organizing sports activities; and
- Donate wheelchairs

9.3 Estimated Budget

The status of CSR activities are being undertaken in the neighbouring villages of Durga Cement Works as on 28.01.2013. The details of the same are provided in **Table-9.1**.

TABLE-9.1
CSR ACTIVITEIS AS ON 28.01.2013

Sr. No	Name of the Village	Item	Status
1	Pondugala	1. Medical camp to be held quarterly 2. a) Repair & white-wash of the mandal parishad school b. Improvement in sitting arrangement for students 3. Cutting & cleaning of bushes on both sides of village roads 4. Renovation of Panchayat bhavan & statues of National leaders. 5. Maintenance of street lights	1. Medical camp held 2.a. Job completed b. Mats provided 3. Job completed 4. Job being taken up 5. Jobs are being taken up wherever required
2	Bhatrupalem	1. Medical camp to be held quarterly 2. Cutting & cleaning of bushes on both sides of village roads 3. Repair of CC Roads 4. Drinking water facility 5. Maintenance of street lights	1. Medical camp held 2. Jobs will be taken up shortly wherever required
3	Ramapuram	1. Medical camp to be held quarterly	1. Two medical camps held

Sr. No	Name of the Village	Item	Status
		2. Renovation work in Temple & Church 3. Improvement in sitting arrangement for students in elementary school 4. Cutting & cleaning of bushes on both sides of village roads 5. Repair of CC Roads 6. Maintenance of street lights	2. Job is being done 3. Mats provided for students 4. Jobs will be taken up shortly 5. Jobs are being taken up wherever required
4	Srinagar	1. Medical camp to be held quarterly 2. Cutting & cleaning of bushes on both sides of village roads 3. Repair of CC Roads 4. Maintenance of street lights	1. Two Medical camps held 2. Jobs will be taken up shortly 3. Jobs are being taken up wherever required
5	Gamalapadu	1. Medical camp to be held quarterly 2. Cutting & cleaning of bushes on both sides of village roads 3. Repair of CC Roads 4. Maintenance of street lights	1. Two Medical camps held 2. Jobs will be taken up shortly 3. Jobs are being taken up wherever required
6	Durga Public school Situated at Nadikudi, Dachapalli (Mandal) is being run by the company. It is the only one CBSE school that has been there for las 30 years in Guntur district. The children belonging to the surrounding villaes are getting education in out school with nominal fees. Currently classes are run upto 10th Standar and the same will be upgraded to 12th soon. We are maintaining quality education without compromise comparable to any good school	1. We have conducted medical checkup for the students and provided medicines in cases of need 2. The renovation work of school building with model class rooms, toilets and playground for students 3. Pure R.O drinking water is being supplied 4. Laboratory and library renovation work and their apparatus and books are being arranged	Rs. 20.00 laks
7	Transport for Durga public school	We have carried repairs to the existing bus and additional bus purchased	Rs. 12.00 laksh

Common Scheme for the three villages of Srinagar, Ramapura & Gamalapadu

This project caters to supply of drinking water to above mentioned villages. As part CSR activities the management of DCW (Jaypee group) is giving Rs. 20,000/- p.m to Srinagar village Panchayat Since July, 2012 towards running & maintenance of various pumps and other facilities under the scheme. So far an amount of Rs.1, 50,085/- has been given to the village Panchayat.

The breakup of budget incurred on CSR activities under taken from the year 2007-10 to 2012-2013 given in **Table-9.2**.

TABLE-9.2
BUDGET BREAKUP OF CSR ACTIVITIES UNDERTAKEN

Sr. No.	Item	Expenditure incurred during 2007-2010 (Rs. In lakhs)	Expenditure to be incurred during 2012-13 (Rs. In lakhs)
1	Renovation work in Durga Public School, Nadikudi	10.55	20.00
2	Drinking water supply scheme & community development	27.05	2.40
3	Assistance in improving health & hygiene	0.70	25.40
Total		**48.85**	**47.80**

The proposed activities would be undertaken in phased manner and the budget has been categorised into:

- One time capital expenditure; and
- Recurring annual expenditure.

The total cost of the proposed project will be Rs.135.87 crores. The budgetary allocation for the CSR activities is given in **Table-9.3.**

TABLE-9.3
BUDGET FOR PROPOSED CSR SCHEMES

(Expressed in Lakhs)

Sr. No.	Activity	Annual expenditure	One time expenditure
1	Mobile Medical Clinic	2.00	10.00
2	Health camps	1.00	3.00
3	Education allowance	2.00	--
4	School up gradation	0.50	5.00
5	Vocational courses	0.50	5.00
6	Sanitation & Drinking Water	0.20	4.00
7	Roads & Drainage	0.20	4.00
8	Improvement in electricity supply	--	3.00
9	Renewable resources	--	2.00
10	Rainwater harvesting	0.50	4.00
11	Community Centers in villages	0.20	4.00
12	Cultural and Social events	0.20	--
13	Exigency Assistance	3.00	5.00
14	Woman and child welfare	0.50	5.00
Total		**10.80**	**54.00**

The CSR activities under progress are shown in the **Figure-9.1**.

9.4 Improvement in the Social Infrastructure

- Generation of employment: The project will create opportunities for direct and indirect employment;
- Increase in purchasing power and improved standard of living of the area;
- Further development of small and medium scale industries may be developed as consequence;
- Increased revenue to the state by way of royalty, taxes and duties;
- Overall Growth of the neighboring area viz. :
  - Agriculture and animal husbandry;
  - Health and family welfare;
  - Watershed development;
  - Sustainable livelihood and strengthening of village Self Help Groups; and
  - Infrastructure development.

In addition to above, due to increase in purchasing power of local habitants:

- There shall be significant change in the socio-economic scenario of the area;
- The proposed project shall enhance the prospects of employment;
- Recruitment for the unskilled and semiskilled workers for the proposed project will be from the nearby villages;
- The basic amenities viz. roads, transportation, electricity, proper sanitation, educational institutions, medical facilities, entertainment etc will be developed as far as possible; and
- Overall the proposed project will change living standards of the people and improve the socio-economic conditions of the area.

9.5 Employment Potential

The impact of the project on the economic aspects can be clearly observed. The proposed project activities will provide employment to persons of different skills and trades. The local population will be given preference to employment. The employment potential will ameliorate economic conditions of these families directly and provide employment to many other families indirectly who are involved in business and service oriented activities.

The employment of local people in primary and secondary sectors of project shall upgrade the prosperity of the region. This in-turn will improve the socio-economic conditions of the area.

- During construction phase of the project, this project will provide temporary employment to many unskilled and semi-skilled laborers in nearby villages. This project will also help in generation of indirect employment to those people who render their services for the personnel directly working in the project; and

- During operational phase, considerable number of people will be benefited by provision of services to the residents. Thus, the direct and indirect employment generation by this project.

The trend of out migration for employment, if any, is likely to be reduced due to better economic opportunities available in the area. Approximately 300 people will be deployed temporarily during construction of the project and about 50 people will be employed during operational stage of the project.

FIGURE-9.1 (A)
CSR ACTIVITIES
HEALTH - FREE MEDICAL CAMPS AT PONDUGALA

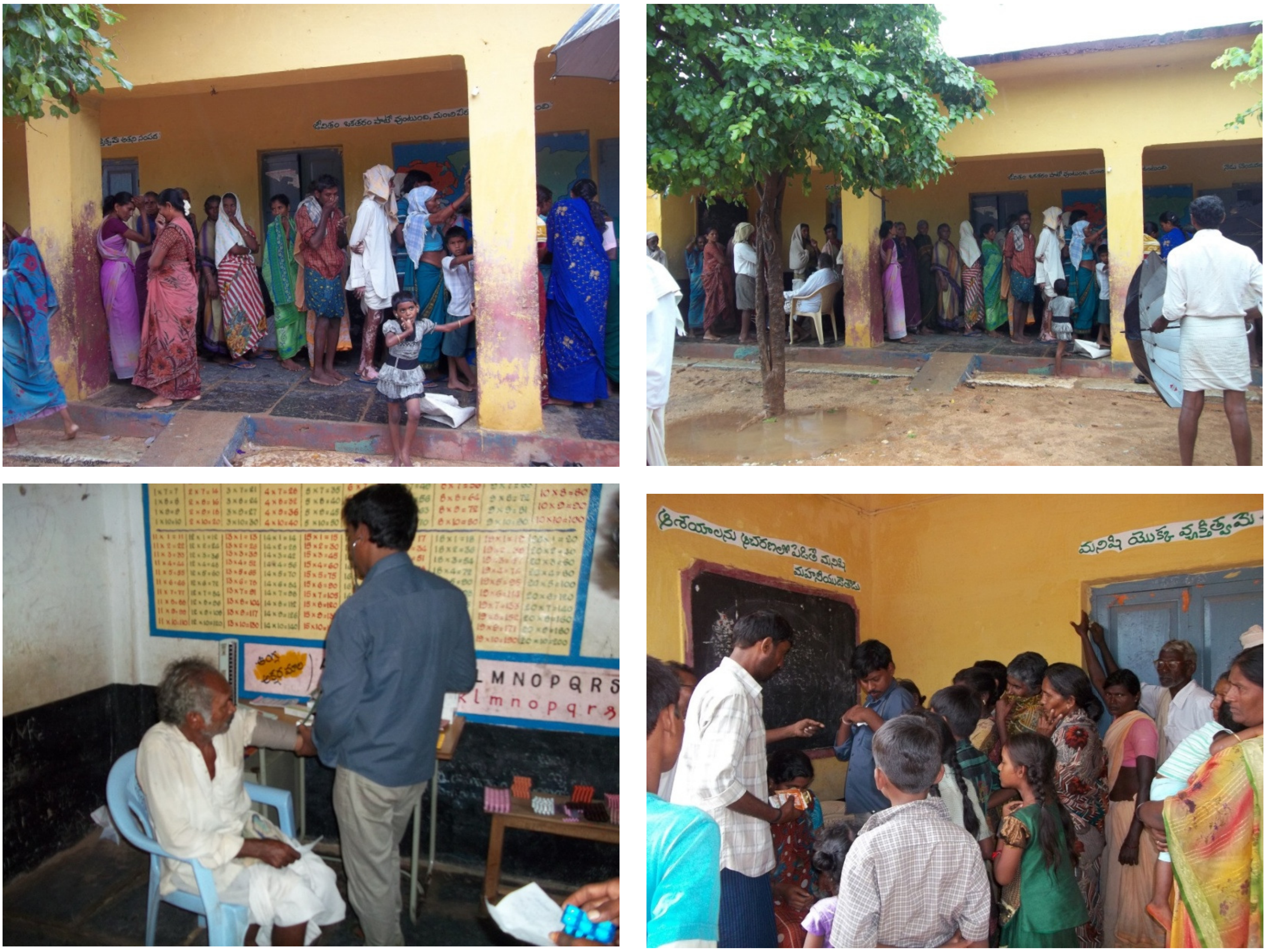


FIGURE-9.1 (B)
CSR ACTIVITIES
HEALTH - FREE MEDICAL CAMPS AT RAMAPURAM

FIGURE-9.1 (C)
CSR ACTIVITIES
EDUCATION - PONDUGALA VILLAGE SCHOOL

FIGURE-9.1 (D)
CSR ACTIVITIES
EDUCATION - DURGA PUBLIC SCHOOL

FIGURE-9.1 (E)
CSR ACTIVITIES
RAMAPURAM TEMPLE, CHURCH & WATER SUPPLY

10.0 SUMMARY & CONCLUSION

10.1 Introduction

Durga Cement Works (DCW) which is a unit of Andhra Cements Limited (ACL) is proposing to install of 30 MW coal based Captive power plant for meeting the power requirement of 2.31 MTPA existing cement plant at Durgapuram village, Dachepalli, Guntur District, Andhra Pradesh. ACL has been taken-over by Jaypee group.

Durga Cement Works at village Durgapuram village, Dachepalli, Guntur district in operation since 1986. Now it is proposed to install 30 MW coal based power plant which is intended to meet the uninterrupted power requirement of existing cement plant under operation.

10.2 Screening Category

The proposed power plant project falls under 'Category B', as per Environment Impact Assessment (EIA) notification dated 14th September 2006 which requires preparation of EIA Report to get Environmental Clearance (EC) from the State Environmental Appraisal Committee, Hyderabad.

10.3 Objective of the Report

The present EIA report has been prepared based on the Terms of Reference (TOR) approved by MoEF, Vide letter no. SEIAA/AP/GTR/2012, dated 24/07/2012 and based on primary data collected during 1st March – 31st May 2012 representing pre-monsoon season.

10.4 Magnitude of the Project

The proposed power plant will be installed with a production capacity of 30 MW.

10.5 Cost of the Project

The cost estimated for the proposed power plant including utilities, offsite, auxiliary services etc is about Rs.135.87 crores. The anticipated capital expenditure for the in-built pollution control measures is Rs. 16.3 crores.

10.6 Environmental Setting

The study area map of 10-km radius around the proposed site is given in **Figure-10.1**. The environmental setting of the proposed plant site is as follows:

- The project site is located at an elevation of 80 m above Mean Sea Level (MSL);
- The geographical co-ordinates of the proposed plant range between 16^{0} 38' 2.83" N to 79^{0} 42' 38.29" E;
- Present land use at the proposed plant site is under industrial category;
- The State Highway, SH-2 at a distance of 20-m, SSE from the proposed plant boundary;

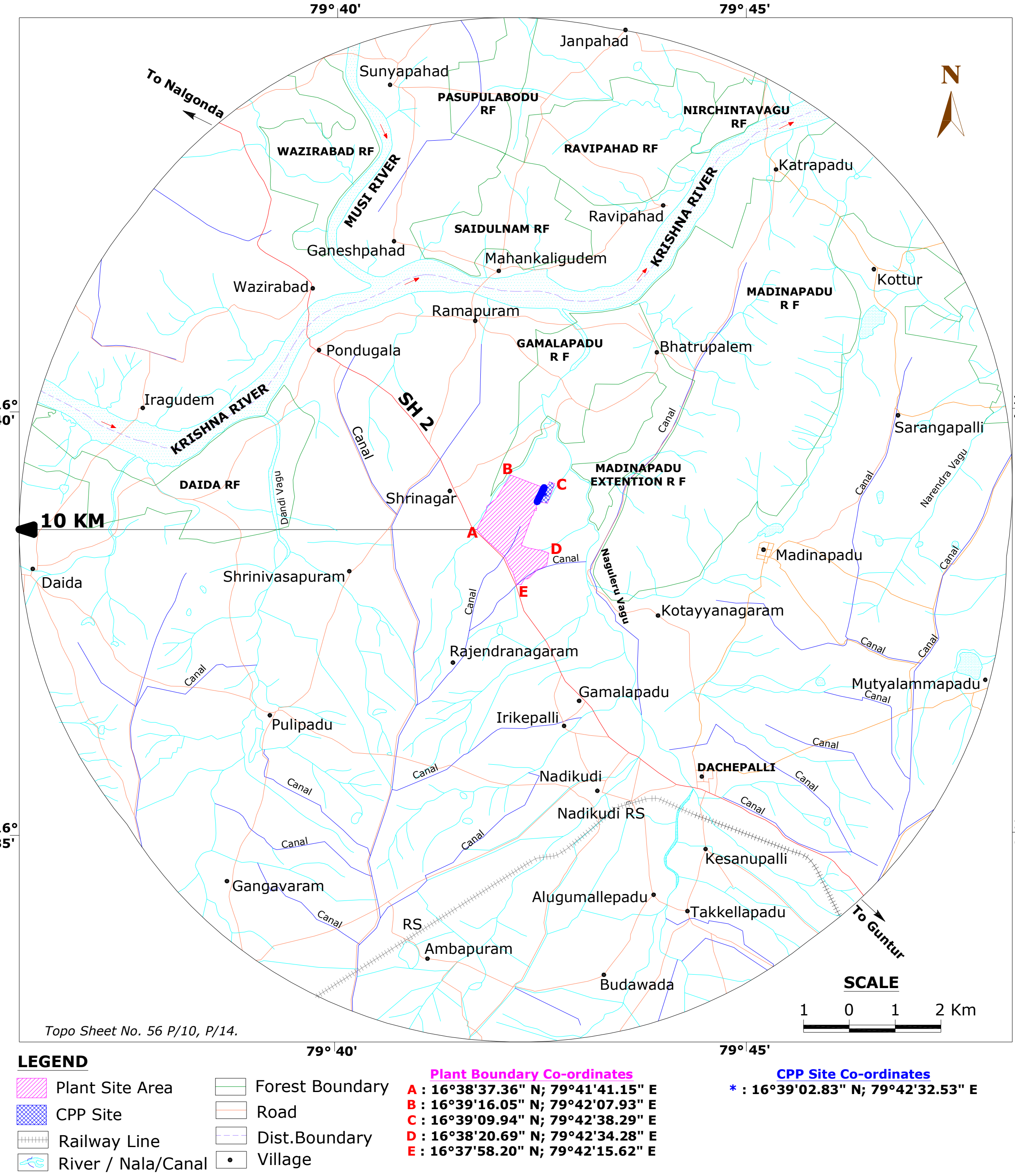


FIGURE-10.1
STUDY AREA MAP (10-KM RADIUS)

- Nadikudi Railway station located at a distance of 5.3 km, SSE from the proposed plant boundary;
- The nearest airport to the project site is located at Hyderabad at a distance of about 145-km, NW from the proposed plant site;
- Krishna river and Dandivagu river are two water bodies within the study area located at distance of 3.6-km (N) and 4.1–km (W) respectively from the project site;
- 9 reserve forest blocks exists within 10-km radius; and
- The project area falls under Seismic Zone-I as per Indian Standards, IS:1893 (Part-1) 2002.

10.7 Process Description and Sources of Pollution

10.7.1 Process Description

The power plant employs with AFBC boiler. The primary fuel to be used for the power generation will be coal. The mode of transportation of coal will be by rail/road.

Steam is generated in the boiler of the Thermal Power Plant using the combustion heat of the fuel (coal) burnt in the combustion chamber. The steam generated is passed through steam turbine where part of its thermal energy is converted in to mechanical energy. This mechanical energy is further used for generating electric power. The steam coming out of steam turbine is condensed in the air cooled condenser and condensate is supplied back to the boiler with the help of the boiler feed pumps and cycle is repeated.

The installation of two boilers of 132 TPH at BMCR, generating steam at a temperature of 480^0C with Condensing Turbo Generator Sets having generating capacity of 30 MW of power. Installation of associated mechanical and electrical equipment, auxiliary units like coal, ash handling plant, water treatment plant, cooling water system, electrostatic precipitators (ESPs), low NOx burners, Online Stack Monitoring System etc. will form a part of the total installation.

10.7.2 Resource Requirement

- ***Land Requirement***

Land requirement for the proposed CPP is around 3-ha out of 141.57-ha land available for cement plant which is already in industrial use. The proposed power plant will be built within existing cement plant premises hence no change in land use. No additional land acquisition.

- ***Fuel Requirement***

Coal requirement for the proposed 30 MW power plant is about 0.21 MTPA.

- ***Water Requirement***

The water requirement for the proposed project is about 550 m^3/day which will be met from rain water collected mines pit. No water extraction from surface is envisaged.

- ***Manpower***

The total manpower requirement during construction stage will be about 300 no and during operation phase requirement will be about 50 nos. including skilled and unskilled workers.

- ***Township***

A full-fledged township comprising of guest house, school, shopping centre, club, etc. is already in place. The township will have essential facilities for key plant personnel.

10.7.3 Sources of Pollution and Control

- ***Air Pollution Sources and Control***

The major sources of pollution are particulate matter and gaseous emissions from power plant boilers. The emissions of particulate matters from stack will be limited to 50 mg/Nm^3 as per norms specified by State Pollution Control Board. A part from dust, gaseous pollutants like SO_2, NO_X, CO will also be generated.

- ***Wastewater Generation and Treatment***

The wastewater generated in the plant area will be utilized in various activities such as ash/coal handling, fly ash conditioning, ash disposal, and service water and greenbelt development. The domestic wastewater from plant & colony will be treated in the proposed Sewage treatment plant and used in greenbelt development. The plant will be operated on zero discharge concept.

- ***Solid Waste Generation and Utilization***

Bottom ash and fly ash generated from the proposed coal based captive power plant. The fly ash generated from the CPP will be (100%) utilized by the proposed cement plant for manufacturing the Portland Pozzolona Cement (PPC). Collection, Storage and handling facilities for bottom ash and fly ash will be established in the proposed project.

Total flyash generation in the proposed power plant will be 258.90 TPD out of which 51.78 is bottom ash and the 207.12 TPD is fly ash. The ash generated is 100% utilized in cement plant.

- ***Noise Levels***

The noise generation from various equipments of the proposed plant will not exceed 90 dB(A) at work place and earplug and earmuff will be provided to employees working in high noise zone. All the equipments will be designed to comply with the regulatory norms.

10.8 Baseline Environmental Status

Primary baseline environmental monitoring studies were conducted during pre-monsoon of 2012. The details are as follows:

10.8.1 Soil Characterization

It has been observed that the pH of the soil in the study area ranged from 7.8 to 8.2. The electrical conductivity was observed to be in the range of 226 µmhos/cm to 466 µmhos/cm. The nitrogen values range between 71 - 112 kg/ha. The phosphorus values range between 48 to 82 kg/ha. The potassium values range between 472 – 1196 kg/ha.

10.8.2 Meteorological Data Generated at Site

The meteorological parameters were recorded on hourly basis during the study period near proposed plant site and comprises of parameters like wind speed, wind direction (from 0 to 360 degrees), temperature, relative humidity, atmospheric pressure, rainfall and cloud cover.

- Temperature — Min: 21.5°C and Max: 42.5°C
- Relative Humidity — Min: 36.4% and Max: 58.3%
- Mean wind speed — 3.9 kmph
- Predominant Wind Direction — SE, S

10.8.3 Air Quality

The study area represents mostly rural/residential environment. Eight ambient air quality monitoring stations were selected in and around project site during March-May, 2012 and four locations during June-July, 2012. And the studies were carried for $PM_{2.5}$, PM_{10}, SO_2 and NOx. The concentrations of air quality parameters are given in **Table-10.1**.

TABLE-10.1
AIR QUALITY RESULTS

Sr.No	Parameter	March- May	June-July
		Range (μg/m³)	
1	$PM_{2.5}$	11.4-23.8	8.9-15.6
2	PM_{10}	27.8-67.3	20.2-60.4
3	SO_2	7.9-13.9	6.5-11.9
4	NOx	<9.0-14.9	<9.0-14.2

Ambient air quality analysis reveals that these results are well within limits in all locations as per National Ambient Air Quality standards.

10.8.4 Water Quality

Eight ground and five surface water samples were collected and analyzed for various parameters to compare with the standards.

- ***Ground Water***

The ground water analysis results indicate that the pH ranges in between 7.2 to 7.9 which is well within the specified standard of 6.5 to 8.5. The Total Dissolved Solids (TDS) concentrations are found to be ranging in between 989 to 2940 mg/l. Total hardness was observed to be ranging from 345 to 690 mg/l.

- ***Surface Water***

Surface water analysis results indicate that the pH of the surface water samples collected ranges in between 7.7 to 8.1. The conductivity recorded in between 693 to 1805 µs/cm in the sample. The sodium and potassium concentrations varied between 75.1 to 239.9 mg/l and 0.8 to 15.6 mg/l respectively. Total hardness expressed as $CaCO_3$ ranges between 170 to 370 mg/l. The concentration of nitrate fluctuates between <0.1 to 0.7 mg/l.

10.8.5 Noise Level Survey

The noise monitoring has been conducted for determination of noise levels at eight locations in the study area. Noise monitoring results reveal ambient noise levels in all locations are well within the limits as per Ambient Noise standards.

- The daytime noise levels at all the locations are observed to be within the range of 39.7 to 48.0 dB (A).
- The night time noise levels at all the locations were found to be in the range of 35.8 to 44.3 dB (A).

10.8.6 Flora and Fauna Studies

Detailed ecological studies were conducted to assess the present biological resources in and around the proposed project area. Field survey conducted in pre monsoon season revealed a total of 251 species of plants of which 112 were phanerophytes, 108 were therophytes, 22 hemicryptophytes, and 9 geophytes.

39 species of fauna observed in study area during study period. Out of which 1 sc-I species, 2 SC-II species and the remaining are SC-IV species. Literature survey and data collected from forest department reveals that there are no wildlife sanctuaries, national parks and biospheres and no migratory paths of birds and animals in 10 km radius.

10.9 Anticipated Environmental Impacts and Mitigation Measures

10.9.1 Anticipated Environmental Impacts

- ***Impacts during Construction Phase***

Impact on Land use

DCW requires 3.0-ha of land for construction of power plant. The proposed project site is located within the cement plant premise. However, the land identified for the cement complex construction is under industrial use. Hence, the impact on land usages is insignificant.

Impact on Soil

Apart from localized constructional impacts at the proposed project site, no significant adverse impact on the soil in the surrounding area is anticipated.

Impact on Air Quality

During construction phase, dust will be the main pollutant, which would be generated from the site development activities and vehicular movement on the road. The impact of such activities would be confined within the project boundary and restricted to the construction phase. To mitigate these impacts, periodic sprinkling of water will be done at the construction site. The approach roads will be paved and vehicles will be kept in good order to minimize automobile exhaust.

Impact on Noise Levels

Heavy construction traffic for loading and unloading, fabrication and handling of equipment and materials are likely to cause an increase in the ambient noise levels. However, the noise will be temporary and will be restricted mostly to daytime. The noise control measures during construction phase include regular maintenance of the equipment and restricting the operating hours to day time.

Impact on Terrestrial Ecology

Most of the land identified for the proposed project contains few trees. Trees will be cut only if required. Therefore, no major loss of biomass is envisaged during construction phase.

Demography and Socio-Economics

The non-workers constitute about 66.6% of the total population in 10-km radius study area. Some of them will be available for employment in the proposed plant during construction activities. As the labourers are generally un-skilled, the locals would get opportunities for employment during construction activities.

- ***Impacts During Operational Phase***

Impact on Soil

Most of the impacts of project on soils are restricted to the construction phase, which will get stabilized during operational phase. The impact on the topsoil will be confined to the proposed main plant area only.

Impact on Air Quality

Adequate stack height will be provided to disperse gaseous emissions over a wider area. In order to control emissions of Particulates adequate control equipment are proposed.

Prediction of impacts on air environment has been carried out by using Industrial Source Complex (ISCST3) and these concentrations are found to be well below the permissible NAAQS norms for rural/residential zone and Industrial/Mixed zone. Therefore, the proposed activity is not likely to have any significant adverse impact on the air environment. The incremental concentrations are presented in **Table-10.2**.

TABLE-10.2
PREDICTED 24-HOURLY SHORT TERM INCREMENTAL CONCENTRATIONS

Pollutant	Incremental Concentration ($\mu g/m^3$)	Distance (km)	Direction
PM_{10}	0.17	1.0	NW
SO_2	6.4	1.0	NW
NO_X	2.24	1.0	NW

Fugitive Emissions

Fugitive dust emissions from the proposed plant would be significant as there will be air pollution due to activities like transport of coal, coal handling and generally due to the movement of vehicles on the roads. Hence, the impact due to fugitive emissions would be insignificant. The proposed greenbelt and periodic water sprinkling will further help reduction in fugitive emissions.

CPCB guidelines as per GSR 414 (E) will be implemented to control the fugitive dust emissions

Impact on Water Resources

The total water requirement for the proposed integrated plant will be about 550 m^3/day, which will be sourced from mine pit. However, DCW is proposing to develop rain water harvesting structures, roof top harvesting structures in the area to recharge ground water in the region.

The treated CPP wastewater will be re-cycled back for use in greenbelt development. The domestic wastewater from CPP will be treated and utilized for green belt development.

Impact on Noise Levels

The main noise generating sources from the proposed power plant will be compressors along with cooling tower and boilers. The noise levels at the source for these units will be maintained below 85 dB (A).

Impact of Solid Waste Generation

- ***Ash Utilization***

Fly ash utilization will be as per MoEF flyash utilization notification. Flyash will be 100% utilized for production of pozzolona cement making by the cement plant. Solid waste in the form of sludge is generated from the Sewage Treatment Plant (STP). The waste will be used for maintaining the MLSS in the activated sludge process of STP and the balance waste is used as manure for greenbelt development.

Impact on Ecology

Development of a thick green belt and transportation of material through closed conveyor system will further reduce the pollution loads in the surroundings areas and contain the negative impact on forests and terrestrial ecology and also increase the presence of avifauna and related faunal components which a positive impact over the project.

10.9.2 Mitigation Measures

During construction, some of the vegetation in the plant premises is required to be cleared. The measures required to be undertaken to minimise the impact on the ecology are:

- The felling of trees will be kept at minimum;
- Transplantation of existing matured trees will be undertaken and transplanted in the area earmarked for greenbelt development; and
- The greenbelt having vegetation density of 2500 trees/ha will be developed

Environment Management during Operation Phase

Air Pollution Management

In power plant an electrostatic precipitator (ESP) has been considered. The particulate matter will be limited to less than 50 mg/Nm^3.

To control the fugitive emissions, the following measures are proposed:

- All the conveyors will cover by hoods to offset any trapping of material in wind stream.
- Unloading of coal from trucks will be carried out with proper care avoiding dropping of the materials from height. It is advisable to moist the material by sprinkling water while unloading;
- The sprinkling of water will be done along the internal roads in the plant in order to control the dust arising due to the movement of vehicular traffic;
- All the workers and officers working inside the plant will be provided with disposable dust masks; and
- Greenbelt will be developed around the plant to arrest the fugitive emissions.

Air Pollution Control Schemes

Adequate and efficient control equipment will be installed in the proposed plant to keep the dust emission at a minimum. The following measures will be taken:

- Energy efficient boiler will be installed at the Captive Power Plant, which will control the emissions of SO_2. Low NOx burners will be installed to control the NOx emissions. Further, chimney of 77-m height is proposed for adequate dispersion of gaseous emissions; and

- As far as gaseous pollution is concerned, the impact of Carbon Monoxide (CO) emission is negligible in view of the firing technique of keeping a positive oxygen balance.

Noise Pollution Management

The greenbelt proposed around the boundary of the plant will attenuate the noise emitted by the various sources in the plant. Earplugs will be provided for the personnel working close to the noise generating units as a part of the safety policy. Apart from this, some of the design features provided to ensure low noise levels are as follows:

- High noise sources such as compressors & Turbo generators will be housed inside the building to reduce the noise impacts;
- Development of greenbelt to attenuate noise levels;
- Personal protection equipment to employees;
- Necessary enclosures will also be provided on the working platforms/areas to provide local protection in high noise level areas;
- The workers will be provided with ear plugs; and
- Plantation in the zone between plant and township would attenuate noise in the residential area.

Water Pollution Management

Wastewater from captive power plant is planning to treat in Effluent Treatment Plant (ETP) and treated effluents will be used in greenbelt or in plant operations and there will be no wastewater discharge from the proposed plant. Domestic waste water will treated in Sewage Treatment plant and treated water will be 100 % reused in different activities

Solid Waste Management

All the solid waste generated will be reused either in process or in ancillary operations.

- Entire fly ash generated will be used in cement manufacture.
- The sludge from STP can be used as manure for green belt development.
- Bottom ash will be collected and used for land filling.

Greenbelt Development

Due care will be taken to ensure that a greenbelt is developed around the plant and colony. All areas devoid of vegetation and having low density will be systematically and scientifically afforested.

10.10 Risk Assessment and Disaster Management

An effective Disaster Management Plan (DMP) to mitigate the risks involved has been prepared. This plan defines the responsibilities and resources available to respond to the different types of emergencies envisaged. Training exercises will be held to ensure that all personnel are familiar with their responsibilities and that communication links are functioning effectively.

10.11 Environmental Monitoring Programme

Regular environmental monitoring studies will be conducted in and around power plant area as per stipulated guidelines by State Pollution Control Board norms and Central pollution Control Board, New Delhi and as per conditions stipulated in environmental clearance.

10.12 Occupational Health and Safety

The health of all employees will be monitored once in a year for early detection of any ailment due to exposure to dust, heat and noise. All the potential occupational hazardous work places such as fuel storage area, coal handling area shall be monitored regularly. The health of employees working in these areas shall be monitored once in a year for early detection of any ailment. Though effective measures are taken to combat pollution in ambient conditions, occupational health hazards are not overlooked. Project will provide well organized occupational health services to all its employees by taking responsibility for establishment and maintenance of safe and healthy working environment and assessment of the physical and mental capabilities to turn out specific workloads.

10.13 Project Benefits

The proposed power plant will result in improvement in the social infrastructure in following manner:

- Generation of employment and improved standard of living;
- Establishment of small and medium scale engineering ancillaries,
- Revenue to Government;
- Change in the socio-economic scenario of the area;
- Direct and in direct employment during construction and in operation phases. Recruitment for the unskilled and semiskilled workers for the proposed project will be from the nearby villages;
- Development of the basic amenities viz. roads, transportation, electricity, drinking water, proper sanitation, educational institutions, medical facilities, entertainment
- Overall the project will change living standards of the people and improve the socio-economic conditions of the area.
- About Rs. 54 lakhs is proposed to spend on CSR activities as a capital cost with a recurring cost of Rs.10.80 lakhs.

Thus, in view of considerable benefits from the project without any adverse environmental impact, the proposed project is most advantageous to the region as well as to the nation.

Annexure-I

Compliance to TOR Conditions

ANNEXURE-I
COMPLIANCE TO TOR CONDITIONS

State Level Environment Impact Assessment Authority (SEIAA)
Andhra Pradesh
Government of India
Ministry of Environment & Forests
A-3, Industrial Estate, Sanathnagar, Hyderabad- 500 018.

Lr. No. SEIAA/AP/GTR- /2012- Dt. 24.07.2012.

To

Sri. Manoj Gaur, Chairman,
M/s. Andhra Cements Ltd.,
Sector - 128, Noida - 201 304,
Uttar Pradesh.
Ph: 120-4609000
e-mail: manoj.gaur@jalindia.co.in

Sir,

Sub: **SEAC, AP – Proposed 30 MW Captive Power plant of Durga Cement Works (a unit of M/s. Andhra Cements Ltd.), Durgapuram (V), Dachepalli (M), Guntur District – Environmental Clearance – TORs Issued -Reg.**

Ref:
1. Your lr.dt. 12.05.2012 recd. on 21.06.2012.
2. T.O.lr.dt. 23.06.2012.

In continuation of the above, the above proposal was examined by the State Expert Appraisal Committee (SEAC) in its meeting held on 04.07.2012. The SEAC observed as following:

The representative of the project proponent Sri V.S. Bajaj, President; and Sri Shyam Sunder of M/s. Vimta Labs Ltd,. Hyderabad, attended and made a presentation before the SEAC.

It is reported that the existing cement plant obtained EC from MoE&F, GOI, New Delhi. Now, the proponent approached SEAC /SEIAA for establishment of 30 MW Captive Power plant in the existing premises. The project is considered as an independent project.

*After detailed discussions **the draft TORs proposed by the proponent are approved.** In addition to these, the following additional TORs shall be considered for preparing the draft EIA:*

(i) All the coordinates of the plant site with topo sheet of Survey of India.

(ii) Land use and land cover map of the study area of 10km radius and a vicinity map of 3km radius shall be prepared using high resolution satellite data. Location of any National Park, Sanctuary, Elephant / Tiger Reserve (existing as well as proposed), migratory routes, if any, within 10 km of the project site shall be specified and marked on the land use and land cover map.

(iii) Land requirement for the project to be optimized. Item wise break up of land requirement and its availability to be furnished. The norms prescribed by CEA should be kept in view. It should also include land to be acquired, if any, for fuel transportation system.

(iv) Quantity of fuel required, its source and transportation. A confirmed fuel linkage (MOU) should be provided on Rs. 100/- Stamp paper under company seals of both the parties.

(v) The source of water, water balance report shall be submitted. The proponent shall examine the feasibility of zero discharge. In case of any proposed discharge, its quantity, quality and point of discharge, users downstream etc. should be provided.

ANNEXURE-I
COMPLIANCE TO TOR CONDITIONS

(vi) *Optimization of COC for water conservation. Other water conservation measures proposed in the project should also be given. Quantity of water requirement for the project should be optimized.*

(vii) *Risk assessment should be carried out. It should take into account the maximum inventory of storage at site at any point in time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be provided.*

(viii) *All documents to be properly referenced with index, page numbers and continuous page numbering.*

(ix) *Where data is presented in the report especially in table, the period in which the data was collected and the source should invariably be indicated. In addition to that the standards prescribed by the MoE&F, GoI for the respective parameters shall be indicated.*

The proponent shall prepare draft EIA considering above mentioned TORs in addition to the TORs submitted by them, undergo the process of public hearing in consultation with APPCB, submit final EIA, minutes of public hearing and response of the proponent to the issues emerged in the public hearing to the SEAC for appraisal. The terms of the reference are valid for a period of TWO years.

In view of the above, you are requested to prepare draft EIA report considering above mentioned TORs in addition to the TORs submitted, undergo the process of public hearing in consultation with APPCB, submit final EIA, minutes of public hearing and response of the proponent to the issues emerged in the public hearing to the SEAC for appraisal.

Yours faithfully,
Sd/-
SECRETARY, SEAC, A.P.

-//T.C.F.B.O//-

SENIOR ENVIRONMENTAL ENGINEER (EC)

ANNEXURE-I
COMPLIANCE TO TOR CONDITIONS

Sr. No.	TOR Condition	Compliance Status
(i)	All the coordinates of the plant site with topo sheet of Survey of India.	The geographical co-ordinates of the plant site are given below: Plant: A: 16^0 38'37.36" N to 79^0 41.0' 41.15" E B: 16^0 39'16.05" N to 79^0 42.0' 07.93" E C: 16^0 39'09.94" N to 79^0 42.0' 38.29" E D: 16^0 38'20.69" N to 79^0 42.0' 34.28" E E : 16^0 39'02.83" N to 79^0 42.0' 32.53" E
(ii)	Land use and land cover map of the study area of 10km radius and a vicinity map of 3km radius shall be prepared using high resolution satellite data. Location of any National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes, if any, within 10km of the project site shall be specified and marked on the land use and land cover map.	Land use details based on satellite data is given in Chapter-3, Section- 3.3.4
(iii)	Land requirement for the project to be optimized. Item wise break up of land requirement and its availability to be furnished. The norms prescribed by CEA should be kept in view. It should also include land to be acquired, if any, for fuel transportation system.	The land requirement of the project is given in Chapter-2, Table- 2.5 The primary fuel for 30 MW power plant will be Singareni collieries limited and the mode of transportation is by rail route/Indonesia.
(iv)	Quantity of fuel required its source and transportation. A confirmed fuel linkage (MOU) should be provided on Rs. 100/- Stamp paper under company seals of both the parties.	The primary fuel for 30 MW power plant will be Singareni collieries limited and the mode of transportation is by rail route/Indonesia. The particulars of coal from singereni colleries are given below: GCV of Coal Considered(kcal/kg): 3200 Power Cycle Heat Rate(kcal/kw-hr): 2400 Boiler efficiency(%): 85% Total Cycle Heat Rate(kcal/kw-hr): 2823.529412 Coal required for per kw-hr (kg): 0.882352941 Coal required for per kw-hr (mioTPA): 0.200117647 Application of the long term indigenous coal linkage is in progress, it is proposed to use the imported coal as an interim arrangement to meet the coal requirement for the proposed 30 MW CPP. Fuel supply agreement is enclosed as **Annexure-XII** and details of imported coal are provided in **Annexure-XII(A)**.
(v)	The source of water, water balance report shall be submitted. The proponent shall examine the feasibility of zero discharge. In case of any proposed discharge, its	The plant will be operated on zero discharge concept. The water of 550 m^3/day will be sourced from mine pit. The schematic diagram of water balance is shown in Chapter-4, Table-4.9 , Figure-4.7

ANNEXURE-I
COMPLIANCE TO TOR CONDITIONS

Sr. No.	TOR Condition	Compliance Status
	quantity, quality and point of discharge, users downstream etc. should be provided.	
(vi)	Optimization of COC for water conservation. Other water conservation measures proposed in the project should also be given. Quantity of water requirement for the project should be optimized.	The air cooled condensers will be used which optimizes the water requirement and COC maintained is 5. The break of water requirement is provided in Chapter-2, Section- 2.7
(vii)	Risk assessment should be carried out. It should take into account the maximum inventory of storage at site at any point in time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be provided.	The risk assessment and disaster management plan has been provided in Chapter- 7.

Annexure-II

Environmental Clearance Letter

ANNEXURE-II
EC LETTER

F No. J-11011/719/2007- IA II (I)
Government of India
Ministry of Environment and Forests
(I.A. Division)

Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003

E-mail : pb.rastogi@nic.in
Telefax : 011: 2436 7668
Dated 20th December, 2007

To,
M/s Andhra Cement Ltd.
2nd Floor, Chanderlok Complex
111, S.D. Road, Secundrabad-500 003
Andhra Pradesh.

E-mail : nalwaya@andhracements.com ; Fax No. : 040-27810103, 08649-257429

Subject : Expansion of Cement Production (0.8 to 2.31 MTPA), Clinker Production (1.00 to 2.00 MTPA) at Village Durgapuram, Mandal Dachepalli, District Guntur and Captive limestone mine (1.50 to 3.00 MTPA) at Village Garualapadu, Mandal Dachepalli, District Guntur, A. P. by M/s Durga Cement Works Limestone Mine and M/s Andhra Cements Ltd. - Environmental clearance reg.

Sir,

Kindly refer your letter no. ACL/MOEF/REIA/Plant and mine 2007 dated 21st June, 2007 alongwith project documents including Application Form, Questionnaire, EIA / EMP Report and subsequent clarifications furnished vide communications dated 12th July, 2007, 1st September, 2007 and 8th October, 2007 regarding above mentioned cement project.

2.0 The Ministry of Environment and Forests has examined your application. It is noted that M/s Andhra Cements Ltd. have proposed for the expansion of Cement (0.8–2.31 MTPA), Clinker production (1.00–2.00 MTPA) and Captive limestone mine (1.50 to 3.00 MTPA) at Garualapadu, Dachepalli, Guntur A. P. and Limestone Mine at Durgapuram, Dachepalli, Guntur, A. P by M/s Durga Cement Works Limestone Mine and M/s Andhra Cements Ltd.

3.0 Total land acquired for cement plant is 141.574 ha. Expansion of cement plant will be carried out within the existing premises. Total mine lease area is 170.22 ha. Out of 170.22 ha., 120 ha. will be excavated for mining. No forest land and rehabilitation and resettlement is involved. No national park and wildlife sanctuary is located within 10 km. radius of the cement plant. Gamalapadu RF (0.1-0.4 km.), Madinapadu RF (1.2–1.8 km.), Daida RF (4.7-4.9 km.), Saidulnam RF (3.8–5.0 km.), Ravipahad RF (5.3–6.6 km.) and Warivabad RF (6.2–6.8 km) are located within 10 km of the cement plant and mine site. Proven and indicated mineral reserves are 33.34 Million tons and 59.39 Million tons respectively. Mineable reserves are 63.56 Million Tons. Rated Capacity of the mine mineral after expansion will be 3.00 MTPA. Life of the mine at the proposed capacity will be 21 years and mining lease is valid for 20 years upto 18th January, 2018. However, limestone is excavated @ 1.5 MTPA will last 24 years and proposed @ 3.0 MTPA in next 5 years (till 2013). Out of 120 ha, 55 ha is already broken for mining and

65 ha is yet to be broken. Mining Plan is approved by the Indian Bureau of Mines vide letter dated 31st May, 2007. Total capital cost of the cement and mine plant is Rs. 312.70 Crore.

4.0 Ordinary Portland Cement (OPC), Portland Pozzolona Cement (PPC) will be manufactured. Total ground water requirement for cement plant and mining will be 420 and 60 m^3/day (including 56 m^3/day mine water) respectively. Mined out area will be developed as artificial reservoir. No wastewater will be discharged.

5.0 Public hearing meeting for the expansion of cement plant and limestone mine was held on 20th June, 2007.

6.0 The Ministry of Environment and Forests hereby accords environmental clearance to the above project under the provisions of EIA Notification dated 14th September, 2006 subject to strict compliance to the following specific and general conditions.

A. Specific Conditions :

i. Continuous monitoring system to monitor gaseous emissions shall be provided and limit of SPM shall be controlled within 50 mg/Nm^3 by installing adequate air pollution control system and data submitted to the Ministry's Regional Office at Bangalore, A. P. Pollution Control Board (APPCB) and CPCB regularly.

ii. The company shall install adequate dust collection and extraction system to control fugitive dust emissions at various transfer points, raw mill handling (unloading, conveying, transporting, stacking), vehicular movement, bagging and packing areas etc. Crusher shall be operated with high efficiency bag filters. All conveyers shall be covered with GI sheets. Covered sheds for storage of raw materials and fully covered conveyers for transportation of materials shall be provided besides coal, cement, fly ash and clinker shall be stored in silos. Pneumatic system shall be used for fly ash handling.

iii. Secondary fugitive emissions shall be controlled within the latest permissible limits issued by the Ministry and regularly monitored. Guidelines / Code of Practice issued by the CPCB shall be followed and data submitted to the Ministry's Regional Office at Bangalore, CPCB and APPCB.

iv. Digital processing of the entire lease area using remote sensing technique should be done regularly once in three years for monitoring land use pattern and report submitted to Ministry of Environment and Forests and its Regional Office, Bangalore.

v. Regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of SPM and RPM such as haul road, loading and unloading points, transfer points and other vulnerable areas. It shall be ensured that the ambient air quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.

vi. Vehicular emissions shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operations and in transportation of mineral. The vehicles shall be covered with a tarpaulin and shall not be overloaded.

vii Asphalting/concreting of roads and water spray all around the stockyard and loading / unloading areas.in the cement plant shall be carried out to control fugitive emissions.

viii Total ground water requirement for cement plant and mining shall not exceed 420 and 60 m^3/day (including 56 m^3/d mine water) respectively. All the treated wastewater shall be recycled and reused in the process and/or for ash quenching, dust suppression, green belt development and other plant related activities etc. No process wastewater shall be discharged outside the factory premises and 'zero' discharge shall be adopted

ix 'Permission' for the drawl of ground water from SGWB / CGWA shall be obtained. Mined out area shall be developed as artificial reservoir. The water stored in the artificial reservoir made in the mine pit shall be used maximum to reduce ground water consumption.

x Sewage treatment plant (STP) shall be installed for the colony. Treated domestic effluent shall be used for green belt development within the plant premises. Domestic waste from colony and STP shall be segregated into bio-degradable and non-biodegradable. Bio-degradable waste shall be composted and non-biodegradable waste shall be land filled at identified sites. ETP should also be provided for workshop and mineral separation plant wastewater.

xi. The project proponent shall ensure that no natural watercourse shall be obstructed due to any mining operations.

xii All the bag filter dust, raw meal dust, coal dust, clinker dust and cement dust from pollution control devices shall be recycled and reused in the process and used for cement manufacturing. Sludge from domestic sources shall be used as manure for green belt development. Waste oil shall be sold to authorized recyclers / reprocessors only.

xiii. An effort shall be made to use of high calorific hazardous waste in the cement kiln and necessary provision shall be made accordingly.

xiv. Efforts shall be made to use low grade lime, more fly ash and solid waste in the cement manufacturing.

xv Action plan for the mining, management of over burden (removal, storage, disposal etc.), reclamation of the mined out area and mine closure shall be submitted to the Ministry and its Regional Office at Bangalore.

xvi. The top soil and solid waste shall be stacked separately at specified dumping site with proper safeguards. Top soil shall be used for the plantation / green belt development during reclamation and solid waste for backfilling.

xvii The over burden (OB), inter burden and other waste generated from mines, if any, shall be stacked at the earmarked dump sites only and should not be kept active for long period. Backfilled OB dumps shall be scientifically vegetated with suitable native species to prevent erosion and surface run off. Monitoring and management of reclaimed areas shall continue until the vegetation becomes self-sustaining. Regular

ANNEXURE-II
EC LETTER

compliance shall be submitted to the Ministry and its Regional Office at Bangalore on six monthly basis

xviii. The area for external over burden dump shall be reduced by suitably increasing the height of the dumps with proper terracing It shall be ensured that the overall slope of the dump does not exceed 28°.

xix. Garland drains shall be constructed to arrest silt and sediment flows from soil The water so collected shall be used for watering the mine area, haul roads, green belt development etc. The drains shall be regularly de-silted and maintained properly.

xx. Suitable rainwater harvesting and conservation measures to augment groundwater resources in the area on long term basis shall be planned and implemented in consultation with Regional Director, Central Ground Water Board in cement plant and mining area to augment ground water resources and use for dust suppression and horticulture.

xxi. Regular monitoring of ground water level and quality shall be carried out by establishing a network of existing wells and new peizometers at suitable locations by the project proponent in and around project area in consultation with Regional Director, Central Ground Water Board during the mining operation. The ground water monitoring shall be carried out 4 times in a year i.e. pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January) and data thus collected shall be regularly sent to the Ministry, its Regional Office at Bangalore, Central Ground Water Authority and State Ground Water Board, Bangalore.

xxii. The project proponent shall take appropriate mitigative measures to prevent pollution of nearby River and other surface water body, if any.

xxiii. Deep hole wet drilling sequential blasting method shall be adopted and provision for the control air emissions during blasting using dust collectors/ extractors etc shall be made. Blasting operation shall be carried out during the daytime only and one bench at a time shall be blasted. The mitigative measures for control of ground vibrations and to arrest fly rocks and boulders shall be implemented. 'No objection certificate' from the Chief Controller of Explosives shall be obtained.

xxiv. Out of total 141.574 ha., green belt shall be developed in at least 36 ha. (25 %) in and around the cement plant as per the CPCB guidelines to mitigate the effects of air emissions in consultation with local DFO. In mining, out of 170.22 ha., plantation shall be raised in an area of 46.72 ha. by planting the native species around mining lease area, over burden dumps, around water body, roads etc. in consultation with the local DFO / Agriculture Department At least, 1,500 trees per year shall be planted with a tree density of 2,000 trees per ha. An action plan shall be submitted in this regard.

xxv. The void left unfilled shall be converted into water body. The higher benches of excavated void/mining pit shall be terraced and plantation done to stabilize the slopes. The slope of higher benches shall be made gentler for easy accessibility by local people to use the water body. Peripheral fencing shall be carried out along the excavated area.

xxvi The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna. Action plan for conservation of flora and fauna shall be prepared and implemented in consultation with the State Forest and Wildlife Department. Necessary allocation of funds for implementation of the conservation plan shall be made and the funds so allocated shall be included in the project cost. Copy of action plan may be submitted to the Ministry and its Regional office within 3 months from the date of issue of this letter

xxvii. A final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.

xxviii. Mechanized open casting shall be adopted and no change in mining technology and scope of working shall be made without prior approval of the Ministry of Environment & Forests.

xxix. Consent to Operate shall be obtained from APPCB before starting enhanced production from the mine.

xxx. 'Permission' of the State Forest Department shall be obtained regarding impact of cement plant and mining activities on the surrounding 6 reserve forests viz. Gamalapadu RF (0.1-0.4 km.), Madinapadu RF (1.2–1.8 km.), Daida RF (4.7-4.9 km.), Saidulnam RF (3.8–5.0 km.), Ravipahad RF (5.3–6.6 km.) and Warivabad RF (6.2–6.8 km) and all the recommendations shall be followed.

xxxi. The company shall obtain necessary clearances / approval from the concerned Departments i.e. Indian Bureau of Mines, State Government, MoEF etc. for the linked mining component before undertaking any construction activity at the project site.

xxxii. Rehabilitation and Resettlement Plan for the project affected population as per the policy of the State Govt. shall be prepared and implemented.

xxxiii. Acoustic enclosures shall be provided to control noise wherever necessary. Mine machine shall be provided with silencers. Noise shall also be controlled from cooler fans, compressor house, cement mill and raw mill, cement plant and drilling machines, excavator, blasting at mine site using appropriate noise control measures.

xxxiv. All the safety norms stipulated by the Director General, Mine & Safety (DGMS) should be implemented.

B. **General Conditions :**

i. The project authority shall adhere to the stipulations made by Andhra Pradesh Pollution Control Board (APPCB) and State Government.

ii. No further expansion or modification of the plant shall be carried out without prior approval of this Ministry.

iii. The gaseous and particulate matter emissions from various units shall conform to the standards prescribed by the T.N. Pollution Control Board. At no time, the particulate emissions from the cement plant shall exceed APPCB limit. Interlocking facility shall

ANNEXURE-II
EC LETTER

be provided in the pollution control equipment so that in the event of the pollution control equipment not working, the respective unit(s) is shut down automatically

iv One ambient air quality monitoring station shall be installed in downwind direction Ambient air quality including ambient noise levels shall not exceed the standards stipulated under EPA or by the State authorities. Monitoring of ambient air quality and stack emissions shall be carried out regularly in consultation with APPCB and report submitted to the APPCB quarterly and to the Ministry's Regional Office at Bangalore half-yearly.

v The company must harvest the rainwater from the rooftops and storm water drains to recharge the ground water and use the same water for the various activities of the project to conserve fresh water.

vi The company shall undertake eco-development measures including community welfare measures in the project area.

vii. The overall noise levels in and around the plant area shall be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under Environmental (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

viii. All recommendations made in the Corporate Responsibility for Environment Protection (CREP) for cement plants shall be implemented.

ix. Proper house keeping shall be taken up. Regular annual medical examination of all the employees shall be carried out from the occupational health point of view and records maintained.

x A separate environmental management cell to carry out various management and monitoring functions shall be set up under the control of Senior Executive

xi As proposed in EIA/EMP, Rs. 28.00 Crores and Rs. 0.95 Crores earmarked towards the capital cost and recurring cost/annum respectively for environment pollution control measures for the cement plant and Rs. 35.00 Lakhs and Rs. 23.2 Lakhs earmarked towards the capital cost and recurring cost/annum respectively for environment pollution control measures for the mine shall be suitably used to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government. The funds so provided shall not be diverted for any other purpose.

xii. The Regional Office of this Ministry at Bangalore / CPCB / APPCB shall monitor the stipulated conditions. A six monthly compliance report and the monitored data alongwith statistical interpretation shall be submitted to them regularly.

xiii. The Project Authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.

(vi) *Optimization of COC for water conservation. Other water conservation measures proposed in the project should also be given. Quantity of water requirement for the project should be optimized.*

(vii) *Risk assessment should be carried out. It should take into account the maximum inventory of storage at site at any point in time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be provided.*

(viii) *All documents to be properly referenced with index, page numbers and continuous page numbering.*

(ix) *Where data is presented in the report especially in table, the period in which the data was collected and the source should invariably be indicated. In addition to that the standards prescribed by the MoE&F, GoI for the respective parameters shall be indicated.*

The proponent shall prepare draft EIA considering above mentioned TORs in addition to the TORs submitted by them, undergo the process of public hearing in consultation with APPCB, submit final EIA, minutes of public hearing and response of the proponent to the issues emerged in the public hearing to the SEAC for appraisal. The terms of the reference are valid for a period of TWO years.

In view of the above, you are requested to prepare draft EIA report considering above mentioned TORs in addition to the TORs submitted, undergo the process of public hearing in consultation with APPCB, submit final EIA, minutes of public hearing and response of the proponent to the issues emerged in the public hearing to the SEAC for appraisal.

Yours faithfully,
Sd/-
SECRETARY, SEAC, A.P.

-//T.C.F.B.O//-

SENIOR ENVIRONMENTAL ENGINEER (EC)

Annexure-III

Consent for Establishment

ANNEXURE-III
CONSENT FOR ESTABLISHMENT

Andhra Cements Limited

2nd FLOOR, CHANDRALOK COMPLEX,
111, S.D. ROAD, SECUNDERABAD - 500 003, A.P.
Phones : 27841651, 66260110, 111, 112, Fax : 040-27810153

6th February 2010

The Senior Environmental Engineer
Task Force,
Andhra Pradesh Pollution Control Board
Plot No. 41, Sri Kanakadurga Officer's Colony
Gurunanak Road,
Vijayawada – 8.

Dear Sir,

Compliance of directions at our Durga Cement Works, Dachepalli.

We thank you very much for giving us time to comply with the requirements of pollution related works by December 2009 vide your Order No. 321/PCB/TF-VJA/2006/383 dated 19.06.09.

We are enclosing herewith a copy of the Compliance Report submitted to AP Pollution Control Board, Guntur on 06.02.10.

We would like to inform you that our Plant was stopped on 27.10.09 to take up all the pollution related jobs including installation of Bag filters etc., and we expect to commence production by 2nd week of Feb. 10. We are also enclosing herewith the photographs of each and every work carried out at our plant. **We have complied with all the conditions as directed by the Task Force, APPCB, Vijayawada.**

In view of the above, we request your goodselves to kindly visit our factory and issue appropriate order.

We shall be highly thankful for your kind consideration of our request sympathetically.

Thanking you

Yours faithfully
For Andhra Cements Limited

P G Nhiwaya
Managing Director

A.P. POLLUTION CONTROL BOARD
ZONAL OFFICE, VIJAYAWADA
No.
Date
10/2/2010

Encl: as above.

ANNEXURE-III
CONSENT FOR ESTABLISHMENT

Andhra Cements Limited

DURGA CEMENT WORKS

Ref: ACL/DCW/P&QC/2009-10. Date: 5.02.2010.

To
The Environmental Engineer
A.P.Pollution Control Board
Regional Office,
Door No: 4-4-87, 1st Lane
Chandramouli Nagar,
GUNTUR – 522 007.

Dear Sir,

Sub: Compliance of your order no: 321/PCB/TF-VJA/2005-225,
Dated 03-05-2008-Reg

With reference to the above subject, please find enclosed the compliance report on various conditions imposed by APPCB.

The plant was stopped on 27.10.09 to hookup the RABH for Kiln, PC & Raw mills, Jet pulse filter house for Coal mills, ESP for Cooler along with other pollution control equipments and up gradation of plant capacity which is expected to commence production by the second week of February 2010.

We have complied with all the conditions imposed by APPCB and further assure that all the possible care will be taken to prevent air pollution in the surrounding areas.

Thanking you,

Yours faithfully

For Andhra Cements Ltd,
Durga Cement Works.

(S.C.Bhanot)
President (Works)

CC:-Sr.Environmental Engineer. APPCB.
Task force office, Gurunanak road, Vijayawada.

ANNEXURE-III
CONSENT FOR ESTABLISHMENT

DURGA CEMENT WORKS
A Unit of Andhra Cements Limited

ACL/DCW/APPCB/CFO/GNT/2012-'13/ 26 Date: 27-4-2012.

The Environmental Engineer,
APPCB. Regional office,Flat no. 102, Raghavaiah apartment,
Brundawan garden, GUNTUR-522 006.

Sub:- Application for renewal of CFO of Air & water to our plant &mines for one year, as well as readjustment of earlier charges paid for CFO to plant &mines for further one year (total two years).

Ref: - 1, Our previous application for CFO for air &water to our plant& mines, dt.19-10-2009.
2, Our lt.no.ACL/DCW/APPCB/GNT/2011-2012/878, DT.25-012012.
3, Your lt.no.G-41/PCB-RO-GNT/CFO/2012-1326,Dt.25-02-2012.

Dear Sir,

We would like to bring the following facts for favour of your kind consideration on the aforesaid subject:

1. As per the reference no. 1 cited above, we applied for Consent for Operation of air & water to our Durga Cement Works plant and mines (covering letters are enclosed for your ready reference).

2. You are well aware that after a course of time our plant was shut down due to unavoidable circumstances. Now the unit has gone a change pf management to M/s. Jaypee group.

3. For running the plant we requested your through out lt. cited in the ref. no. 2, to readjust the amount paid by us as per clause no.1 as we neither could operate the unit, nor we got the CFO for that year (a copy is enclosed for your ready reference). This issue was discussed with you and we were very happy to receive your sympathetic consideration.

4. In response to our said letter, through your office lt. cited in the ref. no.3 you advised us to apply for renewal of consent afresh along with balance sheet and necessary enclosures along with CFO renewal fee at the earliest and obtain the consent order commissioning of the unit. While the issue concerning sl.3 point above gets considered.

As per advice, kindly find here with enclosed dully filled on with required details, Forms, balance sheet and necessary enclosures for Consent For Operation of Air & water to our plant and mines for period of one year. The amount paid in the form of DDs as follows:

a, two DDs bearing nos.: 560969 & 560970, 3-4-2012, each For Rs. 75, 000/-towards the fee for Air &Water to plant.

b, two DDs bearing nos.: 560967 & 560968, 3-4-2012, each For Rs. 30, 000/-towards the fee for Air & Water to mines.

It is, therefore, requested your good self that CFO for Air & water for our DCW plant &mines may kindly be granted for one year.

We, in view of the above circumstances, further, request your kind self to re-evaluate the earlier paid amount as said in the clause no.1 may kindly be issued consent order for further one year in continuation of the above CFO (for total two years) as we proposed to run the unit with in a short time. For which we shall be highly thankful to you for this act.

Thanking you,

CFO Application for Plant is received with a fee of Rs 1,50,000. Application shall be inwarded subject to the payment of balance CFO fee of Rs 1,50,000.

Yours truly,
For Andhra Cements Limited,
Durga Cement Works,
(RK. DOODA)
Sr. VP (Works.).

Copy to: Member Secretary, APPCB, Paryavaran Bhawan, Sanathnagar, Hyderabad.

S. [signature]
30.4.12

Office of the Environmental Engineer A.P. Pollution Control Board, Guntur
Inw. No:

ANDHRA CEMENTS LIMITED
Regd. Office & Factory : Durga Cement Works, Durgapuram, Sitnagar (Po.), Dachepalli - 522414, Guntur District, Andhra Pradesh
Ph : +91 - 8649 - 257420-29 Fax : +91 - 8649-257432

JAYPEE

Annexure-IV

Methodology Adopted for Sampling and Analysis

ANNEXURE-IV
METHODOLOGY FOR SAMPLING AND ANALYSIS

1.0 Meteorology

The methodology adopted for monitoring surface observations is as per the standard norms laid down by Bureau of Indian Standards (IS : 8829) and India Meteorological Department (IMD).

1.1 Methodology of Data Generation

The Central Monitoring Station (CMS) equipped with continuous monitoring equipment was installed at site at a height of about 10-m above ground level to record wind speed, direction, relative humidity and temperature. The meteorological monitoring station was located in such a way that it is free from any obstructions and as per the guidelines specified under IS:8829. Cloud cover was recorded by visual observation. Rainfall was monitored by rain gauge.

The continuous recording meteorological instrument of Dynalab, Pune (Model No.WDL1002) has been used for recording the met data. The sensitivity of the equipment is as given in **Table-1**.

TABLE-1
SENSITIVITY OF METEOROLOGY MONITORING STATION

Sr. No.	Sensor	Sensitivity
1	Wind speed Sensor	± 0.02 m/s
2	Wind direction Sensor	± 3 degrees
3	Temperature Sensor	± 0.2°C

Hourly maximum, minimum and average values of wind speed, direction and temperature were recorded continuously with continuous monitoring equipment. All the sensors were connected to filter and then logged on to datalogger. The readings were recorded in a memory module, which was attached to datalogger. The memory module was downloaded in computer through Dynalab software. The storage capacity of memory module was 256 KB. Data was downloaded every fortnight into the computer. The data was recorded continuously. The recovery of data was about 98%. The rest of 2 % data gaps were filled by referring to IMD data and daily weather reports in the local newspapers. However, Relative Humidity and Rainfall were recorded manually.

1.2 Ambient Air Quality

1.2.1 Method of Analysis

The air samples were analyzed as per standard methods specified by Central Pollution Control Board (CPCB), IS: 5184 and American Public Health Association (APHA).

1.2.2 Instruments used for Sampling

Respirable Dust Samplers APM-451 instruments have been used for monitoring Suspended Particulate Matter (SPM), Respirable fraction (<10 microns) and gaseous pollutants like SO_2 and NOx. Charcoal filled glass tubes were deployed for collection of carbon monoxide. Gas Chromatography techniques have been used for the estimation of CO.

ANNEXURE-IV
METHODOLOGY FOR SAMPLING AND ANALYSIS

1.2.3 Instruments used for Analysis

The make and model of the instruments used for analysis of the samples collected during the field monitoring are given in **Table-2**.

TABLE-2
INSTRUMENTS USED FOR ANALYSIS OF SAMPLES

Sr. No	Instrument Name	Make	Model	Parameters
1	Spectrophotometer	HACH	DR 2000; Sl. No. 911016344	SO_2, NOx, O_3
2	Electronic Balance	Metler	AE 200S; Sl. No M10774	SPM, RPM
3	Gas Chromatograph With FID, pFPD, ECD	GC-3, VARIAN	CP- 3800-44; Sl. No. 8094	CO

1.2.4 Sampling and Analytical Techniques

1] SPM, RPM, SO_2 and NOx

SPM (>10 μ) and RPM (<10 μ) present in ambient air is drawn through the cyclone. Coarse and non-respirable dust (>10μ) is separated from the air stream by centrifugal forces acting on the solid particles. These separated particulates fall through the cyclone's conical hopper and collect in the sampling cup placed at the bottom of the cyclone. The fine dust (<10 microns) forming the respirable fraction passes the cyclone and is retained by the filter paper. The TSPM is estimated by summing up the SPM and RPM fractions collected separately as above.

A tapping is provided on the suction side of the blower to provide suction for sampling air through a set of impingers. Samples of gases are drawn at a flow rate of 0.2 Liters Per Minute (LPM).

SPM and RPM have been estimated by Gravimetric method (IS: 5182, Part IV). Modified West and Gaeke method (IS-5182 Part-II, 1969) has been adopted for estimation of SO_2. Jacobs-Hochheiser method (IS-5182 Part-VI, 1975) has been adopted for the estimation of NOx.

Calibration:

Calibration charts have been prepared for all gaseous pollutants. The calibration is carried out whenever new absorbing solutions are prepared. All the Resirable Dust Samplers are calibrated as per ASTM D-4096. The rotameter is calibrated using soap bubble meter.

2] Carbon Monoxide

Charcoal filled glass tubes have been used for collecting the samples of Carbon monoxide. The CO levels were analyzed through Gas Chromatography techniques.

The techniques used for ambient air quality monitoring and minimum detectable level are given in **Table-3.**

ANNEXURE-IV
METHODOLOGY FOR SAMPLING AND ANALYSIS

TABLE-3
TECHNIQUES USED FOR AMBIENT AIR QUALITY MONITORING

Parameters	Test Method [as per GSR 826(E), Sch-VII]	Minimum Detectable Limit (μg/m^3)
Sulphur dioxide (SO_2)	Modified West and Gaeke Method	4.0
Nitrogen dioxide (NO_2)	Sodium Arsenite Method	9.0
PM10 (Respirable Particulate Matter) and SPM (Suspended Particulate Matter)	Respirable dust sampler/High volume sampling(Gravimetric)	5.0
PM2.5 (Particulate matter size <2.5 μm)	FRM / Low volume sampling (Gravimetric)	2.0
NH_3, Ammonia	Indophenol Blue method	20.0
Carbon Monoxide (CO) (3 x 8 hr)	Gas Monitor	12.5
Ozone (O_3) (3 x 8 hr)	Spectrophotometric method	2.0
Benzene, C_6H_6 (ng/m^3)	Solvent extraction followed by GC MS	1.0
Benzo(a)pyrene in Particulate phase (ng/m^3)	Solvent extraction followed by GCMS analysis	1.0
Pb Lead (ng/m^3)	AAS / ICP-MS method after sampling EPM filter paper	GFFA/ICP-MS - 0.05
Ni Nickel (ng/m^3)	AAS / ICP-MS method after sampling EPM filter paper	GFFA/ICP-MS- 0.10
As Arsenic (ng/m^3)	AAS / ICP-MS method after sampling EPM filter paper	GFFA/ICP-MS - 0.20

Analysis of Collected Matter

Analysis was carried out at central laboratory. The pH of the water was measured by pH meter. The weight of the total un-dissolved matter was obtained after filtration. The weight of ash was obtained by combustion of the undissolved matter. The weight of the total dried soluble matter obtained from the residue from a measured portion of filtrate after evaporation to dryness.

1.3 Water Analysis

Samples for chemical analysis were collected in polyethylene carboys. Samples collected for metal content were acidified with 1 ml HNO_3. Samples for bacteriological analysis were collected in sterilized glass bottles. Selected physico-chemical and bacteriological parameters have been analyzed for projecting the existing water quality status in the study area. Parameters like temperature, Dissolved Oxygen (DO) and pH were analyzed at the time of sample collection.

The methodology for sample collection and preservation techniques was followed as per the Standard Operating Procedures (SOP) mentioned in **Table-4**.

TABLE-4
STANDARD OPERATING PROCEDURES (SOP) FOR WATER AND WASTEWATER SAMPLING

Parameter	Sample Collection	Sample Size	Storage/ Preservation
pH	Grab sampling Plastic /glass container	50 ml	On site analysis
Electrical	Grab sampling	50 ml	On site parameter

ANNEXURE-IV
METHODOLOGY FOR SAMPLING AND ANALYSIS

Parameter	Sample Collection	Sample Size	Storage/ Preservation
Conductivity	Plastic /glass container		
Total suspended solids	Grab sampling Plastic /glass container	100 ml	Refrigeration, can be stored for 7 days
Total Dissolved Solids	Grab sampling Plastic /glass container	100 ml	Refrigeration, can be stored for 7 days
BOD	Grab sampling Plastic /glass container	500 ml	Refrigeration, 48 hrs
Hardness	Grab sampling Plastic /glass container	100 ml	Add HNO_3 to pH<2, refrigeration; 6 months
Chlorides	Grab sampling Plastic /glass container	50 ml	Not required; 28 days
Sulphates	Grab sampling Plastic /glass container	100 ml	Refrigeration; 28 days
Sodium, Potassium	Plastic container	100 ml	Not required; 6 months
Nitrates	Plastic containers	100 ml	Refrigeration; 48 hrs
Fluorides	Plastic containers only	100 ml	Not required; 28 days
Alkalinity	Plastic/ glass containers	100 ml	Refrigeration; 14 days
Ammonia	Plastic/ glass containers	100 ml	Add H_2SO_4 to pH>2, refrigeration, 28 days
Hexavalent Chromium, Cr^{+6}	Plastic/ Glass rinse with 1+1 HNO_3	100 ml	Grab sample; refrigeration; 24 hrs
Heavy Metals (Hg, Cd, Cr, Cu, Fe, Zn, Pb etc.)	Plastic/ Glass rinse with 1+1 HNO_3	500 ml	Filter, add HNO_3 to pH>2; Grab sample; 6 months

Source: Standard Methods for the Examination of Water and Wastewater, Published By APHA, AWWA, WEF 19th Edition, 1995

1.3.1 Analytical Techniques

The analytical techniques used for water and wastewater analysis is given in the **Table-5.**

TABLE-5
ANALYTICAL TECHNIQUES
FOR WATER AND WASTEWATER ANALYSIS

Parameter	Method
pH	APHA-4500-H^+
Colour	APHA-2120 C
Odour	IS: 3025, Part-4
Temperature	APHA-2550 B
Dissolved Oxygen	APHA-4500 O
BOD	APHA-5210 B
Electrical conductivity	APHA-2510 B
Turbidity	APHA-2130 B
Chlorides	APHA-4500 Cl^-
Fluorides	APHA-4500 F^-
Total dissolved solids	APHA-2540 C
Total suspended solids	APHA-2540 D
Total hardness	APHA-2340 C
Sulphates	APHA-4500 SO_4^{-2}
Arsenic	APHA-3120 B/ APHA-3114 B/ APHA-3500 As
Calcium	APHA-3120 B/ APHA-3500 Ca
Magnesium	APHA-3120 B/ APHA-3500 Mg
Sodium	APHA-3120 B/ APHA-3500 Na
Potassium	APHA-3120 B/ APHA-3500 K
Manganese	APHA-3120 B/ APHA-3500 Mn
Mercury	APHA-3112 B/ APHA-3500 Hg
Selenium	APHA-3120 B/ APHA-3114 B/ APHA-3500 Se
Lead	APHA-3120 B/ APHA-3500 Pb
Copper	APHA-3120 B/ APHA-3500 Cu

ANNEXURE-IV
METHODOLOGY FOR SAMPLING AND ANALYSIS

Parameter	Method
Cadmium	APHA-3120 B/ APHA-3500 Cd
Iron	APHA-3120 B/ APHA-3500 Fe
Zinc	APHA-3120 B/ APHA-3500 Zn
Boron	APHA-4500 B
Coliform organisms	APHA-9215 D
Alkalinity	APHA-2320 B

1.4 Soil Quality

At each location, soil samples were collected from three different depths viz. 30 cm, 60 cm and 90 cm below the surface and are homogenized. This is in line with IS: 2720 & Methods of Soil Analysis, Part-1, 2nd edition, 1986 of (American Society for Agronomy and Soil Science Society of America). The homogenized samples were analyzed for physical and chemical characteristics. The soil samples were collected and analyzed once in each season.

The samples have been analyzed as per the established scientific methods for physico-chemical parameters. The heavy metals have been analyzed by using Atomic Absorption Spectrophotometer and Inductive Coupled Plasma Analyzer.

The methodology adopted for each parameter is described in **Table-6.**

TABLE-6
ANALYTICAL TECHNIQUES FOR SOIL ANALYSIS

Parameter	Method (ASTM number)
Grain size distribution	Sieve analysis (D 422 – 63)
Textural classification	Chart developed by Public Roads Administration
Infiltration capacity	Infiltrometer
Bulk density	Sand replacement, core cutter
Porosity	Void ratio
Sodium absorption ratio	Flame colourimetric (D 1428-82)
PH	pH meter (D 1293-84)
Electrical conductivity	Conductivity meter (D 1125-82)
Nitrogen	Kjeldahl distillation (D 3590-84)
Phosphorus	Molybdenum blue, colourimetric (D 515-82)
Potassium	Flame photometric (D 1428-82)
Copper	AAS (D 1688-84)
Iron	AAS (D 1068-84)
Zinc	AAS (D 1691-84)
Boron	Surcumin, colourimetric (D 3082-79)
Chlorides	Argentometric (D 512-81 Rev 85)
Fluorides	Fusion followed by distillation and estimation by Ion selective electrod.

1.5 Noise Levels

1.5.1 Method of Monitoring

Noise level monitoring was carried out continuously for 24-hours with one hour interval starting at 0030 hrs to 0030 hrs next day. The noise levels were monitored on working days only and Saturdays, Sundays and public holidays were not monitored. During each hour L_{eq} were directly computed by the instrument based on the sound pressure levels. Lday (Ld), Lnight (Ln) and Ldn values were computed using corresponding hourly Leq of day and night respectively. Monitoring was carried out at 'A' response and fast mode.

ANNEXURE-IV
METHODOLOGY FOR SAMPLING AND ANALYSIS

Parameters Measured During Monitoring

For noise levels measured over a given period of time interval, it is possible to describe important features of noise using statistical quantities. This is calculated using the percent of the time certain noise levels exceeds the time interval. The notation for the statistical quantities of noise levels is described below:

- Hourly L_{eq} values have been computed by integrating sound level meter.
- L_{day}: As per the CPCB guidelines the day time limit is between 07:00 hours to 22.00 hours as outlined in Ministry of Environment and Forest Notification S.O. 123 (E) dated 14/02/2000.
- L_{night}: As per the CPCB guidelines the night time limit is between 22:00 hours to 07.00 hours as outlined in Ministry of Environment and Forest Notification S.O. 123 (E) dated 14/02/2000.

A rating developed by Environmental Protection Agency, (US-EPA) for specification of community noise from all the sources is the Day-Night Sound Level, (L_{dn}).

L_{dn}: It is similar to a 24 hr equivalent sound level except that during night time period (10 pm to 07 am) a 10 dB (A) weighting penalty is added to the instantaneous sound level before computing the 24 hr average. This nighttime penalty is added to account for the fact that noise during night when people usually sleep is judged as more annoying than the same noise during the daytime.

The L_{dn} for a given location in a community may be calculated from the hourly L_{eq}'s, by the following equation.

$$L_{dn} = 10Log \frac{[\sum_{i=1}^{15} 10^{(L_{eq}i/10)} + \sum_{i=1}^{9} 10^{(L_{eq}i+10/10)}]}{24}$$

Annexure-V

Applicable Environmental Standards

ANNEXURE-V
APPLICABLE ENVIRONMENT STANDARDS

1.0 Ambient Air Quality Standards

National Ambient Air Quality Standards for ambient air has been prescribed by the Environment (Protection) Seventh Amendment Rules, 2009 dated 16th November 2009. The prescribed Standards are given below in **Table-1**.

TABLE-1
NATIONAL AMBIENT AIR QUALITY STANDARDS

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur dioxide (SO_2), µg/m^3	Annual*	50	20	-Improved West and Gaeke -ultraviolet fluorescence
		24 Hours**	80	80	
2	Nitrogen Dioxide (NO_2), µg/m^3	Annual*	40	30	-Modified Jacob & Hochheiser (Na-Arsenite) -Chemiluminesence
		24 Hours**	80	80	
3	Particulate Matter (Size less than 10µm) or PM_{10} µg/m^3	Annual*	60	60	-Gravitmetric -TOEM -Beta attenuation
		24 Hours**	100	100	
4	Particulate Matter (Size less than 2.5µm) or $PM_{2.5}$ µg/m^3	Annual*	40	40	-Gravitmetric -TOEM -Beta attenuation
		24 Hours**	60	60	
5	Ozone (O_3) µg/m^3	8 hours **	100	100	-UV photometric -Chemiluminiscence -Chemical Method
		1 hour **	180	180	
6	Lead (Pb) µg/m^3	Annual*	0.50	0.50	-AAS /ICP method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
		24 Hours**	1.0	1.0	
7	Carbon monoxide (CO) mg/m^3	8 Hours	02	02	-Non Dispersive Infra Red (NDIR)
		1 Hour**	04	04	
8	Ammonia (NH_3) µg/m^3	Annual*	100	100	-Chemiluminiscence -Indophenol blue method
		24 Hours**	400	400	
9	Benzene (C_6H_6) µg/m^3	Annual*	05	05	-Gas chromatography based continuous analyzer -Adsorption and Desorption followed by GC analysis
10	Benzo(α) Pyrene (BaP)- particulate phase only ng/m^3	Annual*	01	01	-Solvent extraction followed by HPLC/GC analysis

ANNEXURE-V
APPLICABLE ENVIRONMENT STANDARDS

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
11	Arsenic (As) ng/m^3	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni) ng/m^3	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

Note:

* *Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform intervals.*

** *24 hourly or 8 hourly or, 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, the may exceed the limits but not on two consecutive days of monitoring.*

2.0 Ambient Noise Standards

Ambient standards with respect to noise have been notified by the Ministry of Environment and Forests vide gazette notification dated 26th December 1989 (Amended on January, 2010), Noise Pollution (Regulation and Control) Rules, 2010. It is based on the A weighted equivalent noise level (L_{eq}). The standards are presented in **Table-2.**

TABLE-2
AMBIENT NOISE STANDARDS

Area Code	Category of Area	Noise Levels dB(A) eq	
		Day time*	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone**	50	40

Note: - 1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.
"A",in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.
Leq: It is an energy mean of the noise level over a specified period.

ANNEXURE-V
APPLICABLE ENVIRONMENT STANDARDS

3.0 Noise Standards for Occupational Exposure

Noise standards in the work environment are specified by Occupational Safety and Health Administration (OSHA-USA) which are being enforced by Government of India through model rules framed under Factories Act. These are given in **Table-3** below.

TABLE-3
STANDARDS FOR OCCUPATIONAL EXPOSURE

Total Time of Exposure per Day in Hours (Continuous or Short term Exposure)	Sound Pressure Level in dB(A)
8	90
6	92
4	95
3	97
2	100
3/2	102
1	105
¾	107
½	110
¼	115
Never	>115

Note:
1. *No exposure in excess of 115 dB(A) is to be permitted.*
2. *For any period of exposure falling in between any figure and the next higher or lower figure as indicated in column (1), the permissible level is to be determined by extrapolation on a proportionate scale.*

4.0 Wastewater Discharge Standards

The wastewater discharge standards for "discharge on land for irrigation" are stipulated under the Environment Protection Rules (1993) and are given below in **Table-4.**

TABLE-4
WASTE WATER DISCHARGE STANDARDS

Sr. No.	List of Parameters	Units	Standard (On Land Irrigation)
1	Color and Odor	--	All efforts should be made to remove color and unpleasant odor as far as practicable.
2	Suspended Solids	Mg/l	200
3	Particle size of Suspended Solids	--	Shall pass 850 micron IS sieve.
4	pH value	--	5.5 to 9.0
5	Temperature	°C	Not specified.
6	Oil and grease, Max.	mg/l	10.0
7	Total residual chlorine, Max.	mg/l	Not specified
8	Ammonical nitrogen (as N), Max.	mg/l	Not specified
9	Total Kjeldhal nitrogen (as N),Max	mg/l	Not specified
10	Free ammonia (as NH_3), Max.	mg/l	Not specified
11	Biochemical oxygen demand (3 days at 27°C), Max.	mg/l	100.0
12	Chemical oxygen demand, Max.	mg/l	Not specified
13	Arsenic (as As), Max.	mg/l	0.2

ANNEXURE-V
APPLICABLE ENVIRONMENT STANDARDS

Sr. No.	List of Parameters	Units	Standard (On Land Irrigation)
14	Mercury (as Hg), Max.	mg/l	Not specified
15	Lead (as Pb), Max.	mg/l	Not specified
16	Cadmium (as Cd), Max.	mg/l	Not specified
17	Hexavalent chromium (as Cr^{+6}), Max.	mg/l	Not specified
18	Total chromium (as Cr), Max.	mg/l	Not specified
19	Copper (as Cu), Max.	mg/l	Not specified
20	Zinc (as Zn), Max.	mg/l	Not specified
21	Selenium (as Se), Max.	mg/l	Not specified
22	Nickel (as Ni), Max.	mg/l	Not specified
23	Cyanide (as CN), Max.	mg/l	0.2
24	Fluorides as F	mg/l	Not specified
25	Dissolved phosphates (as P),Max	mg/l	Not Specified
26	Sulphides as (S), Max.	mg/l	Not specified
27	Phenolic compounds (as C_2H_5OH), Max.	mg/l	Not specified
28	Radioactive Materials		
a]	Alpha Emitters, Max.	mC/ml	10^{-7}
b]	Beta Emitters, Max.	mC/ml	10^{-7}
29	Bio-assay test	--	90% survival of fish after 96 hours in 100% effluent.
30	Manganese (as Mn)	mg/l	Not specified
31	Iron (as Fe)	mg/l	Not specified
32	Vanadium (as V)	mg/l	Not specified
33	Nitrate nitrogen	mg/l	Not specified

Note: These standards shall be applicable for industries, operations or processes other than those industries, operations or process for which standards have been specified in Schedule of the Environment Protection Rules, 1989.

Annexure-VI

Landuse Pattern

ANNEXURE-VI
LANDUSE PATTERN

Sr. No.	Village Name	Area	Forest	Total Irriaged	Un irrigated	Cultivable Waste	Area not for cultivation
0-3 KM DACHEPALLE MANDAL,GUNTUR (DT) ,AP.							
1	RAMAPURAM	1458	77.33	680.27	133.54	18.13	548.73
2	GAMALAPADU	2135	68.90	978.71	122.01	61.78	903.60
	Sub total	3593	146.23	1658.98	255.55	79.91	1452.33
3-7 KM DACHEPALLE MANDAL,GUNTUR (DT) ,AP. 0							
3	PONDUGULA	3373	1010.00	0.00	1867.64	175.00	320.00
4	BHATRUPALEM	2905	2324.00	0.00	43.00	463.00	75.00
5	NADIKUDI	1996	0.00	739.53	259.00	14.85	982.29
3-7 KM NEREDICHARLA MANDAL,GUNTUR (DT) ,AP. 0							
6	MAHANKALI GUDEM	1005	716.29	0.00	84.98	140.00	63.94
7	RAVIPAHAD	626	201.53	4.04	174.01	75.00	171.58
3-7 KM GURAJALA MANDAL,GUNTUR (DT) ,AP. 0							
8	PULIPADU	2282	0.00	614.62	1273.62	0.00	393.76
	Sub total	12186.68	4251.82	1358.19	3702.25	867.85	2006.57
7-10 KM DACHEPALLE MANDAL,GUNTUR (DT) ,AP. 0							
9	MUTYALAMPADU	575	0.00	0.00	425.00	80.00	70.00
10	DACHEPALLE	3358	1183.00	0.00	1753.00	367.00	55.00
11	ALUGUMALLIPADU	377	0.00	0.00	125.00	40.00	212.00
12	KESANAPALLE	1734	0.00	0.00	1211.67	100.00	422.33
7-10 KM GURAJALA MANDAL,GUNTUR (DT) ,AP.0							
13	DAIDA	2793	882.00	758.09	512.00	500.00	140.95
14	GANGAVARAM	3237	0.00	1436.43	810.93	430.00	559.64
7-10 KM DAMARACHARLA MANDAL,GUNTUR (DT) ,AP.							
15	IRKIGUDEM	755	0.00	0.00	360.00	40.00	354.80
16	VADAPALLE	2922	478.40	243.60	1200.00	400.00	600.40
7-10 KM NEREDICHARLA MANDAL,GUNTUR (DT) ,AP.							
17	SUNYA PAHAD	650	151.75	48.55	230.00	80.00	140.02
18	JANAPAHAD	2948	1439.87	380.80	586.79	65.00	475.50
	Sub total	**19349.52**	**4135.02**	**2867.47**	**7214.39**	**2102**	**3030.64**
	Grand total	**35129.2**	**8533.07**	**5884.64**	**11172.19**	**3049.76**	**6489.54**

Annexure-VII

Ambient Air Quality Levels

ANNEXURE-VII
AMBIENT AIR QUALITY LEVELS

AAQ-1 PROPOSED PLANT SITE								
Date of Monitoring	PM2.5 (µg/m³)	PM10 (µg/m³)	SO_2 (µg/m³)	Nox (µg/m³)	CO			HC (µg/m³)
05.03.2012	20.3	49.5	11.2	13.4	251	326	365	112.4
06.03.2012	21.6	48.1	11.9	12.9	235	318	359	119.3
12.03.2012	22.4	46.3	12.5	13.7	288	331	350	115.3
13.03.2012	23.8	47.8	10.9	12.5	249	277	305	120.4
19.03.2012	22.4	45.1	11.3	12.7	246	266	321	122.8
20.03.2012	21.5	42.6	10.7	12.1	291	328	349	131.3
26.03.2012	20.9	41.7	12.5	14.2	228	330	332	120.7
27.03.2012	22.4	44.2	11.7	13.1	265	335	345	119.4
02.04.2012	19.6	45.9	11.2	12.9	293	316	328	113.7
03.04.2012	21.1	47.6	10.8	11.6	279	312	332	122.8
09.04.2012	20.5	48.9	12.7	13.4	283	350	357	120.4
10.04.2012	22.3	49.2	12.1	13.9	273	348	371	129.5
16.04.2012	20.1	51.3	10.9	11.6	283	320	355	126.8
17.04.2012	19.3	53.4	11.6	13.4	298	327	345	122.1
23.04.2012	18.4	55.6	11.9	12.6	266	351	354	119.2
24.04.2012	15.6	58.4	12.8	14.2	286	335	352	114.3
30.04.2012	17.2	60.7	13.9	14.9	281	337	344	118.3
01.05.2012	19.5	61.3	11.8	12.7	276	285	362	112.7
07.05.2012	20.4	63.7	12.9	14.2	275	297	315	115.1
08.05.2012	21.6	64.8	12.2	13.8	289	320	331	118.9
14.05.2012	22.5	65.9	11.5	12.7	282	307	318	120.4
15.05.2012	20.2	66.1	10.7	11.6	269	343	365	122.7
21.05.2012	18.5	67.3	12.3	13.2	289	346	368	125.8
22.05.2012	15.9	64.8	11.9	12.8	298	312	337	120.4
28.05.2012	16.5	62.2	12.8	13.7	280	319	355	117.3
29.05.2012	17.3	58.8	10.7	11.8	310	298	321	114.2
Max	**23.8**	**67.3**	**13.9**	**14.9**	**371**			**131.3**
Min	**15.6**	**41.7**	**10.7**	**11.6**	**228**			**112.4**
Average	**20.1**	**54.3**	**11.8**	**13.1**	**313**			**119.9**
98 % tile	**23.2**	**66.7**	**13.4**	**14.6**	**366**			**130.4**

AAQ-2 KOTAYYANAGARAM								
Date of Monitoring	PM2.5 (µg/m³)	PM10 (µg/m³)	SO_2 (µg/m³)	Nox (µg/m³)	CO			HC (µg/m³)
01.03.2012	11.9	29.6	8.6	9.8	253	348	365	101.6
07.03.2012	11.4	28.3	8.9	9.4	317	330	360	102.5
08.03.2012	12.3	27.8	9.3	10.6	307	349	355	104.9
14.03.2012	13.4	29.2	9.6	9.3	227	328	350	103.2
15.03.2012	14.8	31.3	10.2	11.6	241	344	367	100.5
21.03.2012	12.6	33.6	8.8	9.6	287	356	366	99.5
22.03.2012	11.8	35.9	7.9	9.2	249	360	368	98.4
28.03.2012	12.6	36.5	8.6	9.5	261	221	337	99.9
29.03.2012	13.7	38.4	9.5	10.9	265	331	359	100.7
04.04.2012	15.2	40.3	9.1	10.2	253	321	345	105.9
05.04.2012	16.4	42.8	8.4	9.7	297	340	352	109.5
11.04.2012	17.1	43.9	8.8	10.1	245	318	325	103.4
12.04.2012	15.2	41.2	9.3	10.9	253	328	344	107.2
18.04.2012	13.6	40.9	7.9	8.5	314	331	369	101.3
19.04.2012	12.7	38.2	8.9	10.3	271	350	360	99.7
25.04.2012	11.4	35.6	9.1	10.9	244	330	364	105.3
26.04.2012	12.8	33.2	8.4	9.6	247	328	358	104.5
02.05.2012	13.9	31.2	7.9	9.9	258	271	348	102.3
03.05.2012	15.1	29.5	8.6	10.1	220	325	329	100.8
09.05.2012	16.3	27.8	9.1	10.5	230	331	356	98.6
16.05.2012	14.9	28.6	7.9	10.2	288	350	362	99.1
17.05.2012	15.2	30.4	8.1	9.6	273	328	359	98.6
23.05.2012	14.5	33.8	8.9	10.9	267	321	365	102.3
24.05.2012	15.6	36.1	9.6	10.5	251	328	349	103.5
30.05.2012	13.8	38.6	8.4	10.9	275	324	357	101.2
31.05.2012	11.6	40.5	7.9	9.6	280	321	365	105.3
Max	**17.1**	**43.9**	**10.2**	**11.6**	**369**			**109.5**
Min	**11.4**	**27.8**	**7.9**	**8.5**	**220**			**98.4**
Average	**13.8**	**34.7**	**8.8**	**10.1**	**316**			**102.3**
98 % tile	**16.8**	**43.4**	**9.9**	**11.3**	**367**			**108.4**

ANNEXURE-VII
AMBIENT AIR QUALITY LEVELS

AAQ-3 GAMALAPADU								
Date of Monitoring	**PM2.5 (µg/m³)**	**PM10 (µg/m³)**	**SO_2 (µg/m³)**	**Nox (µg/m³)**	**CO**			**HC (µg/m³)**
05.03.2012	13.2	29.4	8.9	11.1	285	356	367	111.4
06.03.2012	12.8	31.5	9.5	11.6	318	330	342	109.5
12.03.2012	12.1	33.2	9.9	10.9	310	359	367	107.2
13.03.2012	13.5	35.8	10.2	12.1	274	326	332	102.4
19.03.2012	13.9	36.1	9.1	10.6	277	343	361	101.5
20.03.2012	15.2	38.2	10.8	11.9	285	340	372	109.3
26.03.2012	16.4	39.1	9.2	10.8	291	327	347	110.4
27.03.2012	16.9	40.6	9.9	11.2	294	358	362	105.4
02.04.2012	17.7	42.7	10.1	11.6	286	335	350	108.7
03.04.2012	16.1	43.1	9.2	10.4	287	326	355	106.2
09.04.2012	15.4	45.8	8.6	9.9	280	353	375	101.7
10.04.2012	13.2	46.7	8.1	10.3	266	291	350	103.7
16.04.2012	12.4	44.2	9.2	11.4	295	327	349	102.1
17.04.2012	11.9	41.9	9.9	11.3	311	329	362	105.6
23.04.2012	13.2	38.6	8.3	10.4	287	293	315	104.6
24.04.2012	14.1	36.4	8.7	10.9	288	311	322	108.9
30.04.2012	15.8	33.6	9.2	11.9	338	346	370	110.4
01.05.2012	16.2	31.2	9.8	10.8	301	344	348	103.4
07.05.2012	14.3	34.6	10.1	12.7	298	328	338	101.1
08.05.2012	12.7	36.8	8.4	9.6	291	341	351	105.7
14.05.2012	11.9	38.3	8.1	9.9	279	329	349	106.7
15.05.2012	12.8	40.2	9.2	10.8	255	323	348	101.9
21.05.2012	13.4	42.7	9.6	10.5	283	291	315	107.6
22.05.2012	15.3	43.1	10.2	11.2	297	328	336	105.7
28.05.2012	17.1	44.3	8.6	9.9	288	317	332	103.7
29.05.2012	14.2	41.5	8.2	9.9	297	331	345	106.9
Max	**17.7**	**46.7**	**10.8**	**12.7**	**375**			**111.4**
Min	**11.9**	**29.4**	**8.1**	**9.6**	**255**			**101.1**
Average	**14.3**	**38.8**	**9.3**	**10.9**	**323**			**105.8**
98 % tile	**17.4**	**46.3**	**10.5**	**12.4**	**371**			**110.9**
AAQ-4 MADINAPADU								
Date of Monitoring	**PM2.5 (µg/m³)**	**PM10 (µg/m³)**	**SO_2 (µg/m³)**	**Nox (µg/m³)**	**CO**			**HC (µg/m³)**
01.03.2012	14.3	41.8	9.8	10.6	291	317	328	114.20
07.03.2012	15.6	38.6	10.6	11.2	238	314	362	116.10
08.03.2012	16.3	40.1	9.6	11.9	280	326	337	109.30
14.03.2012	17.1	42.3	10.9	12.1	310	327	339	104.30
15.03.2012	18.4	44.9	9.6	10.6	316	332	352	108.30
21.03.2012	16.8	46.3	9.2	10.9	315	341	360	110.70
22.03.2012	15.1	47.6	8.9	11.1	296	319	362	112.40
28.03.2012	14.2	48.4	9.2	10.7	284	293	307	118.70
29.03.2012	13.5	50.8	9.9	11.9	298	312	337	112.40
04.04.2012	12.3	48.2	10.4	12.1	238	350	367	111.30
05.04.2012	13.6	47.1	11.5	12.9	261	358	368	110.10
11.04.2012	14.2	45.3	10.1	11.5	316	326	335	106.70
12.04.2012	15.1	44.2	9.2	10.3	279	285	316	103.80
18.04.2012	16.7	41.8	9.9	11.9	283	297	310	106.80
19.04.2012	17.2	40.5	10.1	11.1	311	315	319	109.30
25.04.2012	15.4	38.1	10.8	12.1	316	361	368	107.30
26.04.2012	16.6	33.1	9.4	10.3	328	335	346	111.80
02.05.2012	15.1	35.6	10.7	11.9	319	350	360	114.30
03.05.2012	14.3	38.3	9.6	11.1	318	330	351	116.80
09.05.2012	12.6	39.1	9.1	10.8	260	288	329	114.90
16.05.2012	15.8	42.3	8.9	11.4	284	297	330	111.70
17.05.2012	16.4	45.2	9.5	11.9	318	343	358	108.30
23.05.2012	17.2	46.8	9.9	10.6	326	330	344	107.10
24.05.2012	15.3	44.1	10.2	11.7	298	326	345	104.30
30.05.2012	13.2	41.8	10.8	12.3	260	346	351	109.60
31.05.2012	14.5	42.3	9.5	10.9	271	361	371	112.80
Max	**18.4**	**50.8**	**11.5**	**12.9**	**371**			**118.7**
Min	**12.3**	**33.1**	**8.9**	**10.3**	**238**			**103.8**
Average	**15.3**	**42.9**	**9.9**	**11.4**	**322**			**110.5**
98 % tile	**17.8**	**49.6**	**11.2**	**12.6**	**368**			**117.8**

ANNEXURE-VII
AMBIENT AIR QUALITY LEVELS

AAQ-5 SHRINAGAR								
Date of Monitoring	PM2.5 ($\mu g/m^3$)	PM10 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	Nox ($\mu g/m^3$)	CO			HC ($\mu g/m^3$)
05.03.2012	15.9	49.2	11.3	12.8	267	276	331	112.5
06.03.2012	17.2	52.3	11.9	13.4	289	307	315	115.6
12.03.2012	16.3	53.6	12.4	13.9	290	307	320	117.3
13.03.2012	14.8	55.4	12.6	13.5	258	287	331	113.9
19.03.2012	17.3	58.6	13.5	14.9	251	326	365	110.8
20.03.2012	16.2	53.1	11.3	12.6	235	318	359	109.9
26.03.2012	18.6	55.8	10.9	13.1	288	331	350	115.6
27.03.2012	20.4	58.6	10.2	11.9	249	277	305	117.3
02.04.2012	21.2	60.3	10.6	12.5	246	266	321	119.3
03.04.2012	22.2	61.8	11.8	12.9	275	327	348	112.8
09.04.2012	20.4	63.1	12.5	13.6	321	349	358	117.3
10.04.2012	18.3	60.2	10.3	11.9	319	324	345	121.3
16.04.2012	16.4	58.3	11.6	12.4	324	348	352	122.8
17.04.2012	17.2	55.2	12.4	13.6	299	326	335	124.6
23.04.2012	15.4	52.7	12.9	14.1	291	328	349	127.3
24.04.2012	14.8	51.6	11.6	13.4	228	330	332	128.5
30.04.2012	15.1	50.2	10.2	11.8	265	335	345	121.4
01.05.2012	15.9	47.6	10.9	12.3	287	349	369	122.8
07.05.2012	18.2	45.2	11.6	12.9	240	351	357	125.6
08.05.2012	19.6	42.3	11.9	13.7	248	358	372	123.4
14.05.2012	20.2	40.5	12.2	13.1	287	348	351	126.5
15.05.2012	21.1	43.6	12.8	14.3	263	287	331	122.4
21.05.2012	19.9	45.8	11.9	13.8	271	349	368	120.7
22.05.2012	17.5	49.2	12.4	14.1	314	324	344	119.8
28.05.2012	15.5	52.4	11.8	13.1	299	316	332	115.3
29.05.2012	19.7	55.3	10.9	11.9	271	317	329	114.2
Max	**22.2**	**63.1**	**13.5**	**14.9**	**372**			**128.5**
Min	**14.8**	**40.5**	**10.2**	**11.8**	**228**			**109.9**
Average	**17.9**	**52.8**	**11.7**	**13.1**	**315**			**119.2**
98 % tile	**21.7**	**62.5**	**13.2**	**14.6**	**369**			**127.9**

AAQ-6 RAMAPURAM								
Date of Monitoring	PM2.5 ($\mu g/m^3$)	PM10 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	Nox ($\mu g/m^3$)	CO			HC ($\mu g/m^3$)
01.03.2012	15.6	38.6	9.9	11.4	285	297	350	109.1
07.03.2012	16.8	39.1	10.4	12.1	271	319	362	115.6
08.03.2012	18.2	36.6	10.8	11.9	291	298	332	114.7
14.03.2012	19.3	38.2	11.3	12.7	285	328	362	110.3
15.03.2012	20.3	41.3	11.7	12.9	298	321	355	118.3
21.03.2012	17.2	44.6	12.4	13.7	299	328	347	119.2
22.03.2012	15.4	46.8	11.1	12.8	286	299	360	120.4
28.03.2012	13.4	48.3	10.5	11.8	281	331	351	121.8
29.03.2012	14.1	49.1	10.1	11.1	285	311	331	119.3
04.04.2012	15.9	53.7	9.9	12.8	315	357	362	117.2
05.04.2012	16.7	56.2	9.4	11.6	287	318	351	113.4
11.04.2012	18.4	53.1	10.2	11.4	303	338	348	111.2
12.04.2012	19.3	52.4	10.6	12.8	287	320	329	108.3
18.04.2012	18.4	50.6	11.2	12.1	286	321	345	102.3
19.04.2012	17.3	47.4	10.8	12.5	279	331	347	107.3
25.04.2012	16.8	41.3	9.3	11.6	300	329	341	105.1
26.04.2012	14.6	44.9	10.5	11.9	284	334	349	109.3
02.05.2012	15.7	43.1	11.1	12.6	305	312	328	111.7
03.05.2012	13.4	41.4	9.6	11.7	289	321	332	116.8
09.05.2012	14.8	45.7	9.9	10.8	273	317	337	118.3
16.05.2012	16.2	47.1	10.7	11.9	283	293	328	119.4
17.05.2012	15.6	52.3	11.3	12.6	276	327	339	114.2
23.05.2012	16.9	44.7	10.9	11.8	296	318	332	111.6
24.05.2012	17.2	53.4	10.2	11.4	290	328	332	105.3
30.05.2012	18.7	54.7	9.9	11.3	307	317	350	106.7
31.05.2012	19.1	54.9	10.1	12.4	300	318	322	104.2
Max	**20.3**	**56.2**	**12.4**	**13.7**	**362**			**121.8**
Min	**13.4**	**36.6**	**9.3**	**10.8**	**273**			**102.3**
Average	**16.7**	**46.9**	**10.5**	**12.1**	**318**			**112.7**
98 % tile	**19.8**	**55.6**	**12.1**	**13.3**	**361**			**121.1**

ANNEXURE-VII
AMBIENT AIR QUALITY LEVELS

AAQ-7 PONDUGALA								
Date of Monitoring	PM2.5 (µg/m³)	PM10 (µg/m³)	SO_2 (µg/m³)	Nox (µg/m³)	CO			HC (µg/m³)
05.03.2012	15.9	46.1	10.8	11.5	280	292	318	111.4
06.03.2012	16.2	49.9	11.2	12.6	261	286	329	116.8
12.03.2012	18.3	50.1	10.8	11.9	278	296	317	111.3
13.03.2012	19.7	45	10.1	11.2	245	251	328	108.4
19.03.2012	20.5	42.3	9.7	10.4	258	270	328	109.5
20.03.2012	21.6	41.3	9.9	11.6	273	280	301	111.2
26.03.2012	18.4	43.7	11.2	12.3	249	266	328	115.6
27.03.2012	16.3	45.6	11.7	12.9	301	330	340	109.8
02.04.2012	15.1	47.6	10.3	11.6	276	350	355	119.4
03.04.2012	14.1	49.4	9.8	11.9	269	276	354	121.3
09.04.2012	16.7	45.3	10.6	12.4	289	307	329	124.3
10.04.2012	15.5	46.6	11.2	12.9	303	331	338	120.7
16.04.2012	18.3	48.3	11.9	13.4	285	317	349	119.5
17.04.2012	16.9	51.6	12.8	14.3	288	314	332	116.1
23.04.2012	17.2	55.2	11.3	12.8	299	326	340	114.2
24.04.2012	19.3	58.5	10.7	12.4	283	327	344	111.3
30.04.2012	20.4	39.4	10.1	11.9	288	333	357	118.3
01.05.2012	18.4	42.6	9.9	11.2	284	334	338	119.7
07.05.2012	16.4	45.1	10.6	12.1	287	335	345	120.4
08.05.2012	17.5	48.2	10.4	11.3	278	340	352	121.3
14.05.2012	15.8	52.1	11.3	12.9	292	326	339	122.7
15.05.2012	16.4	55.3	11.8	12.5	279	344	351	120.4
21.05.2012.	18.2	57.1	10.1	11.7	267	327	340	118.3
22.05.2012	17.2	54.2	11.4	12.3	300	350	362	114.6
28.05.2012	14.9	51.6	10.3	11.9	290	353	355	112.3
29.05.2012	16.9	54.3	9.7	11.2	278	345	354	115.2
Max	**21.6**	**58.5**	**12.8**	**14.3**	**362**			**124.3**
Min	**14.1**	**39.4**	**9.7**	**10.4**	**245**			**108.4**
Average	**17.4**	**48.7**	**10.8**	**12.1**	**313**			**116.3**
98 % tile	**21.1**	**57.8**	**12.4**	**13.9**	**356**			**123.5**

AAQ-8 SRINIVASAPURAM								
Date of Monitoring	PM2.5 (µg/m³)	PM10 (µg/m³)	SO_2 (µg/m³)	Nox (µg/m³)	CO			HC (µg/m³)
01.03.2012	13.8	39.3	8.5	9.5	286	328	351	105.90
07.03.2012	14.5	35.3	10.2	12.1	280	358	372	111.30
08.03.2012	12.7	38.1	9.4	11.5	300	350	355	113.20
14.03.2012	15.6	40.5	8.9	9.9	303	335	351	108.30
15.03.2012	13.2	42.8	10.2	11.8	290	337	350	102.80
21.03.2012	16.5	46.3	9.2	11.1	376	310	325	111.80
22.03.2012	15.3	48.2	9.6	10.6	284	289	321	107.60
28.03.2012	17.4	47.1	10.1	12.1	297	344	352	104.30
29.03.2012	16.9	49.3	9.9	11.6	257	328	350	102.80
04.04.2012	14.2	50.1	9.2	10.7	298	349	362	105.60
05.04.2012	13.6	52.5	8.5	10.1	310	347	358	109.10
11.04.2012	12.7	53.7	8.9	10.6	308	331	349	104.30
12.04.2012	14.1	50.2	9.3	11.3	260	271	321	103.80
18.04.2012	14.9	47.3	9.7	10.7	281	328	341	102.70
19.04.2012	15.6	43.9	10.1	11.3	289	331	351	101.70
25.04.2012	16.8	39.4	8.9	10.5	270	281	354	108.60
26.04.2012	18.2	38.6	9.4	11.4	294	347	360	110.80
02.05.2012	19.1	35.9	8.6	10.6	318	348	362	111.90
03.05.2012	17.5	36.4	9.4	10.9	288	349	359	108.30
09.05.2012	16.4	39.2	10.2	11.3	297	328	345	101.70
16.05.2012	13.2	36.1	9.6	10.7	271	344	364	104.50
17.05.2012	12.7	38.5	8.8	9.9	314	356	364	109.30
23.05.2012	15.5	39.6	9.4	10.5	271	360	375	104.80
24.05.2012	16.2	41.5	9.9	11.3	244	327	369	106.70
30.05.2012	14.1	44.3	10.4	12.1	226	314	345	108.20
31.05.2012	16.9	46.8	11.1	13.5	287	317	327	109.60
Max	**19.1**	**53.7**	**11.1**	**13.5**	**376**			**113.2**
Min	**12.7**	**35.3**	**8.5**	**9.5**	**226**			**101.7**
Average	**15.3**	**43.1**	**9.5**	**11.1**	**323**			**106.9**
98 % tile	**18.7**	**53.1**	**10.8**	**12.8**	**372**			**112.6**

ANNEXURE-VII
AMBIENT AIR QUALITY LEVELS

Date of Monitoring	PM2.5 (µg/m3)	PM10 (µg/m3)	SO2 (µg/m3)	Nox (µg/m3)
AAQ-1 SHRINAGAR				
01.06.2012	15.6	52.1	9.5	10.6
02.06.2012	14.3	54.7	9.9	11.7
08.06.2012	13.9	55.3	8.5	9.6
09.06.2012	13.1	58.6	8.1	10.2
15.06.2012	13.5	60.4	8.7	10.9
16.06.2012	12.9	55.1	9.4	11.4
22.06.2012	12.5	52.4	9.8	12.3
23.06.2012	13.2	49.3	10.3	12.8
29.06.2012	13.9	44.3	11.1	13.4
30.06.2012	14.2	46.8	11.9	14.2
06.07.2012	14.6	47.2	10.2	11.9
07.07.2012	14.1	44.1	9.6	10.6
13.07.2012	13.8	41.9	9.1	11.3
14.07.2012	12.5	40.2	8.3	9.6
20.07.2012	13.7	37.6	8.8	10.8
21.07.2012	12.9	33.7	9.5	11.2
27.07.2012	13.1	38.1	9.9	12.1
28.07.2012	14.8	41.2	10.3	11.9
Max	**15.6**	**60.4**	**11.9**	**14.2**
Min	**12.5**	**33.7**	**8.1**	**9.6**
Average	**13.7**	**47.4**	**9.6**	**11.5**
98 % tile	**15.3**	**59.8**	**11.6**	**13.9**
AAQ-2 RAMAPURAM				
Date of Monitoring	**PM2.5 (µg/m3)**	**PM10 (µg/m3)**	**SO2 (µg/m3)**	**Nox (µg/m3)**
01.06.2012	11.8	51.3	7.2	9.8
02.06.2012	11.2	53.2	7.6	9.4
08.06.2012	10.9	50.7	8.6	9.9
09.06.2012	10.1	48.2	8.1	9.3
15.06.2012	10.6	45.3	7.4	8.9
16.06.2012	11.2	41.2	7.8	9.6
22.06.2012	11.8	39.5	7.2	9.2
23.06.2012	12.1	35.2	6.9	9.5
29.06.2012	12.9	31.7	7.3	8.6
30.06.2012	11.3	29.4	7.7	9.7
06.07.2012	11.8	28.5	8.1	10.2
07.07.2012	10.6	30.3	8.6	9.4
13.07.2012	10.1	33.2	9.7	10.9
14.07.2012	11.8	35.6	8.4	9.9
20.07.2012	10.4	39.4	8.1	9.6
21.07.2012	11.4	41.3	7.3	9.4
27.07.2012	11.9	45.9	7.7	8.6
28.07.2012	10.8	49.2	8.9	9.9
Max	**12.9**	**53.2**	**9.7**	**10.9**
Min	**10.1**	**28.5**	**6.9**	**8.6**
Average	**11.3**	**40.5**	**7.9**	**9.5**
98 % tile	**12.6**	**52.6**	**9.4**	**10.7**

ANNEXURE-VII
AMBIENT AIR QUALITY LEVELS

AAQ-3 BATRUPALEM				
Date of Monitoring	**PM2.5 (µg/m3)**	**PM10 (µg/m3)**	**SO2 (µg/m3)**	**Nox (µg/m3)**
01.06.2012	10.5	31.2	7.2	8.6
02.06.2012	10.1	35.6	7.9	9.4
08.06.2012	11.3	37.2	8.1	9.9
09.06.2012	9.9	39.4	7.5	8.4
15.06.2012	10.7	41.6	8.2	9.7
16.06.2012	9.4	44.8	7.6	9.2
22.06.2012	9.9	45.6	7.1	8.3
23.06.2012	10.3	48.3	6.9	8.4
29.06.2012	10.5	49.3	6.5	8.1
30.06.2012	11.2	50.2	7.1	9.2
06.07.2012	11.8	48.2	7.5	9.9
07.07.2012	10.2	44.1	7.9	10.4
13.07.2012	9.4	40.3	8.2	9.7
14.07.2012	9.9	36.8	7.8	9.2
20.07.2012	10.4	33.4	8.9	9.9
21.07.2012	10.8	29.6	8.1	9.3
27.07.2012	9.4	26.3	7.6	9.1
28.07.2012	9.8	24.4	7.1	8.4
Max	**11.8**	**50.2**	**8.9**	**10.4**
Min	**9.4**	**24.4**	**6.5**	**8.1**
Average	**10.3**	**39.2**	**7.6**	**9.2**
98 % tile	**11.6**	**49.9**	**8.7**	**10.2**
AAQ-4 GAMALAPADU				
Date of Monitoring	**PM2.5 (µg/m3)**	**PM10 (µg/m3)**	**SO2 (µg/m3)**	**Nox (µg/m3)**
01.06.2012	9.2	31.2	8.6	10.6
02.06.2012	9.9	33.6	9.2	11.2
08.06.2012	9.4	36.8	9.6	11.9
09.06.2012	8.9	39.4	10.5	12.5
15.06.2012	9.6	41.3	9.5	10.6
16.06.2012	10.7	42.9	9.1	10.9
22.06.2012	9.7	39.4	8.6	11.1
23.06.2012	9.2	45.8	8.1	10.7
29.06.2012	9.7	41.7	7.4	9.6
30.06.2012	9.1	37.2	7.9	10.4
06.07.2012	8.9	33.2	7.2	9.1
07.07.2012	9.3	30.4	8.3	10.7
13.07.2012	9.6	28.6	8.9	11.2
14.07.2012	9.9	25.3	9.2	10.6
20.07.2012	9.4	24.1	9.6	11.6
21.07.2012	9.7	22.3	8.8	10.7
27.07.2012	9.1	20.2	9.4	10.4
28.07.2012	9.9	23.9	8.6	9.6
Max	**10.7**	**45.8**	**10.5**	**12.5**
Min	**8.9**	**20.2**	**7.2**	**9.1**
Average	**9.5**	**33.2**	**8.8**	**10.7**
98 % tile	**10.4**	**44.8**	**10.2**	**12.3**

Annexure-VIII

Ecological Details

ANNEXURE-VIII
ECOLOGICAL DETAILS

TABLE-1
FLORISTIC COMPOSITION IN STUDY AREA

Sr. No.	Technical Name	Family	Life Form
I. Agricultural Crops			
1	*Sorghum vulgare*	Poaceae	Hemicryptophyte
2	*Triticum vulgare*	Poaceae	Hemicryptophyte
3	*Zea mays*	Poaceae	Hemicryptophyte
4	*Oryza sativa*	Poaceae	Hemicryptophyte
5	*Pennisetum typhoideum*	Poaceae	Hemicryptophyte
II. Commercial Crops (including Vegetables)			
6	*Abelomoschus indicus*	Malvaceae	Therophyte
7	*Allium cepa*	Liliaceae	Geophyte
8	*Allium sativum*	Liliaceae	Geophyte
9	*Annona squamosa*	Annonaceae	Phanerophyte
10	*Arachis hypogia*	Fabaceae	Geophyte
11	*Brassica oleracea var botrydis*	Cruciferae	Therophyte
12	*Brassica oleracea* var capitata	Cruciferae	Therophyte
13	*Cajanus cajan*	Fabaceae	Therophyte
14	*Carica papaya*	Caricaceae	Therophyte
15	*Catharanthes pusillus*	Compositae	Therophyte
16	*Cicer arietinum*	Fabaceae	Hemicryptophyte
17	*Citrus lemon*	Ruataceae	Therophyte
18	*Colacasia esculenta*	Areaceae	Geophyte
19	*Coreandrum sativum*	Umbelliferae	Hemicryptophyte
20	*Daucus carota*	Umbelliferae	Geophyte
21	*Cocos nucifera*	Palamae	phanerophyte
22	*Gossypium sp*	Malvaceae	Therophyte
23	*Lycopersicum esculentus*	Solanaceae	Therophyte
24	*Mangifera indica*	Anacardiaceae	Phanerophyte
25	*Memordia charantia*	Cucurbitaceae	Therophyte
26	*Pisum sativum*	Fabaceae	Therophyte
27	*Psidium guava*	Myrtaceae	Phanerophyte
28	*Raphanus sativa*	Cruciferae	Geophyte
29	*Solanum tuberosum*	Solanaceae	Geophyte
30	*Trichosanthes anguina*	Cucurbitaceae	Therophyte
III. Plantations			
31	*Acacia nilotica*	Mimosaceae	Phanerophyte
32	*Albizia lebbeck*	Mimosaceae	Phanerophyte
33	*Albizia odorattissima*	Mimosaceae	Phanerophyte
34	*Albizia procera*	Mimosaceae	Phanerophyte
35	*Azadirachta indica*	Meliaceae	Phanerophyte
36	*Bauhinia variegate*	Caesalpinaceae	Phanerophyte
37	*Bauhinia purpuria*	Caesalpinaceae	Phanerophyte
38	*Bambusa arundanacea*	Poaceae	Phanerophyte
39	*Butea superba*	Caesalpinaceae	Phanerophyte
40	*Butea frondosa*	Caesalpinaceae	Phanerophyte
41	*Eucalyptus sp*	Myrtaceae	Phanerophyte
42	*Casuarina equisetifolia*	Casuarinaceae	Phanerophyte
43	*Delonix regia*	Caesalpinaceae	Phanerophyte
44	*Leucena leucophloe*	Caesalpinaceae	Phanerophyte
IV. Natural Vegetation/Forest Type			
45	*Abrus precatorius*	Fabaceae	Therophyte
46	*Abutilon indicum*	Malvaceae	Phanerophyte
47	*Acacia nilotica*	Mimosaceae	Phanerophyte
48	*Acacia Arabica*	Mimosaceae	Phanerophyte
49	*Acacia auriculiformis*	Mimosaceae	Phanerophyte
50	*Acacia horrida*	Mimosaceae	Phanerophyte
51	*Acacia leucophloe*	Mimosaceae	Phanerophyte
52	*Acacia Senegal*	Mimosaceae	Phanerophyte
53	*Acalypha ciliate*	Mimosaceae	Phanorophyte
54	*Achyranthes aspera*	Amaranthaceae	Therophyte
55	*Aegle marmelos*	Rutaceae	Phanerophyte

ANNEXURE-VIII
ECOLOGICAL DETAILS

Sr. No.	Technical Name	Family	Life Form
56	*Aerva lanata*	Compositae	Phanerophyte
57	*Agave wightii*	Agavaceae	Phanerophyte
58	*Ageratum conyzoides*	Compositae	Therophyte
59	*Ailanthes excela*	Simaroubaceae	Phanerophyte
60	*Alangium salivus*	Alangiceae	Phanerophyte
61	*Albizia odoratissima*	Caesalpinaceae	Phanerophyte
62	*Albizia procera*	Caesalpinaceae	Phanerophyte
63	*Aloe barbedensis*	Agavaceae	Geophyte
64	*Alternanthera sessilis*	Amaranthaceae	Therophyte
65	*Alysicarpus hamosus*	Fabaceae	Therophyte
66	*Ammania baccafera*	Lytharaceae	Therophyte
67	*Argemone mexicana*	Papevaraceae	Phanerophyte
68	*Asparagaus racemosus*	Liliaceae	Therophyte
69	*Atalantia monophylla*	Rutaceae	Phanerophyte
70	*Atalantia monophylla*	Rutaceae	Therophyte
71	*Balanites aegyptica*	Simaroubaceae	Phanerophyte
72	*Barleria prionoites*	Acanthaceae	Therophyte
73	*Blepharis asperima*	Acanthaceae	Phanerophyte
74	*Blepharis madaraspatens*	Acanthaceae	Therophyte
75	*Blumea lacera*	Compositae	Therophyte
76	*Boerheavia diffusa*	Nyctaginaceae	Therophyte
77	*Bombax ceiba*	Bombacaceae	Phanerophyte
78	*Borreria stricta*	Rubiaceae	Therophyte
79	*Brassica camprestris*	Cruciferae	Therophyte
80	*Caesalpina pulcherima*	Caesalpinaceae	Phanerophyte
81	*Calotropis procera*	Asclipiadaceae	Phanerophyte
82	*Canna indicda*	Cannaceae	Therophyte
83	*Capparis aphylla*	Capparidaceae	Therophyte
84	*Capparis deciduas*	Capparidaceae	Phanerophyte
85	*Capsicum annulatum*	Solanaceae	Therophyte
86	*Careya arborea*	Palmae	Phanerophyte
87	*Carissa carandus*	Apocyanaceae	Phanerophyte
88	*Carissa spinarium*	Apocyanaceae	Phanerophyte
89	*Cassia auriculata*	Caesalpinaceae	Therophyte
90	*Cassia occidentalis*	Caesalpinaceae	Therophyte
91	*Cassia tora*	Caesalpinaceae	Phanerophyte
92	*Ceiba pentandra*	Bombacaceae	Phanerophyte
93	*Cestrum diurnum*	Rubiaceae	Theophyte
94	*Cestrum noctrunum*	Rubiaceae	Therophyte
95	*Chrysanthemum sp*	Compositae	Therophyte
96	*Cissus quadrangularis*	Vitaceae	Therophyte
97	*Citrus media*	Rutaceae	Phanerophyte
98	*Cleome gynandra*	Capparidaceae	Therophyte
99	*Cleome viscose*	Capparidaceae	Therophyte
100	*Commelina benghalensis*	Commelinaceae	Therophyte
101	*Cordia dichotoma*	Rubiaceae	Phanerophyte
102	*Cordia rothri*	Rubiaceae	Phanerophyte
103	*Crataeva adsoni*	Capparidaceae	Phanerophyte
104	*Crotalaria burhia*	Fabaceae	Therophyte
105	*Crotalaria medicagenia*	Fabaceae	Therophyte
106	*Croton bonplandinum*	Amaryllidaceae	Therophyte
107	*Cryptostegia grandiflora*	Orchidaceae	Hemicryptophyte
108	*Cuscuta reflexa*	Cuscutaceae	Epiphyte
109	*Datura alba*	Solanaceae	Therophyte
110	*Datura metal*	Solanaceae	Therophyte
111	*Desmodium triflorum*	Asclepiadaceae	Therophyte
112	*Echinops echinatus*	Compositae	Therophyte
113	*Eclipta alba*	Compositae	Heliophyte
114	*Eclipta prostrate*	Compositae	Hemicryptophyte
115	*Emblica officinale*	Euphorbiaceae	Phanerophyte
116	*Emilia lajerium*	Compositae	Hemicryptophyte
117	*Erythrina indica*	Papillionaceae	Phanerophyte
118	*Euphorbia acaulis*	Euphorbiaceae	Therophyte

ANNEXURE-VIII
ECOLOGICAL DETAILS

Sr. No.	Technical Name	Family	Life Form
119	*Euphorbia antiquorum*	Euphorbiaceae	Phanerophyte
120	*Euphorbia geniculata*	Euphorbiaceae	Therophyte
121	*Euphorbia heyneae*	Euphorbiaceae	Therophyte
122	*Euphorbia hirta*	Euphorbiaceae	Therophyte
123	*Euphorbia nerifolia*	Euphorbiaceae	Phanerophyte
124	*Euphorbia neruri*	Euphorbiaceae	Therophyte
125	*Euphorbia nivula*	Euphorbiaceae	Therophyte
126	*Euphorbia parviflora*	Euphorbiaceae	Therophyte
127	*Euphorbia tricauli*	Euphorbiaceae	Hemicryptophyte
128	*Evolvulus alsinoides*	Convolvulaceae	Therophyte
129	*Fagonia cretica*	Zygophyllaceae	Phanerophyte
130	*Feronia elephantum*	Rutaceae	Phanerophyte
131	*Ficus benghalensis*	Moraceae	Phanerophyte
132	*Ficus carica*	Moraceae	Phanerophyte
133	*Ficus glomerata*	Moraceae	Phanerophyte
134	*Ficus hispida*	Moraceae	Phanerophyte
135	*Ficus racemosus*	Moraceae	Phanerophyte
136	*Ficus relisiosa*	Moraceae	Phanerophyte
137	*Ficvus gibbosa*	Moraceae	Phanerophyte
138	*Flacourtia indica*	Flacourtiaceae	Phanerophyte
139	*Flacourtia latifolia*	Flacourtiaceae	Phanerophyte
140	*Fumaria indica*	Papillionaceae	Hemicryptophyte
141	*Gardenia latifolia*	Rubiaceae	Phanerophyte
142	*Garuga pinnata*	Burseraceae	Phanerophyte
143	*Gloriosa superba*	Liliaceae	Phanerophyte
144	*Gossypium herbaceum*	Malvaceae	Therophyte
145	*Grewia abutifolia*	Tiliaceae	Phanerophyte
146	*Grewia salivifolia*	Tiliaceae	Phanerophyte
147	*Grewia subinaqualis*	Tiliaceae	Phanerophyte
148	*Gynandropis gynandra*	Capparidaceae	Hemicryptophyte
149	*Helictris isora*	Rubiaceae	Phanerophyte
150	*Heliotropium indicum*	Rubiaceae	Hemicryptophyte
151	*Hemidesmus indicus*	Asclepiadaceae	Phanerophyte
152	*Hibiscus gibbosa*	Malvaceae	Therophyte
153	*Hibiscus micronthus*	Malvaceae	Therophyte
154	*Hibiscus ovalifolia*	Malvaceae	Therophyte
155	*Hibiscus rosa-cianensis*	Malvaceae	Therophyte
156	*Ipomea carnea*	Convolvulaceae	Phanerophyte
157	*Ipomea coccinea*	Convolvulaceae	Therophyte
158	*Ipomea tuba*	Convolvulaceae	Hemicryptophyte
159	*Ixora parviflora*	Rubiaceae	Phanerophyte
160	*Ixora singapuriens*	Rubiaceae	Phanerophyte
161	*Jacarandra jacquimontii*	Bignoniaceae	Therophyte
162	*Jasmimum arborens*	Oleaceae	Phanerophyte
163	*Jatropha gossypifolia*	Euphorbiaceae	Therophyte
164	*Justia simplex*	Acanthaceae	Therophyte
165	*Justia diffusa*	Acanthaceae	Therophyte
166	*Justicia diffusa*	Acanthaceae	Therophyte
167	*Lantana camara*	Verbinacaee	Phanerophyte
168	*Lathyrus sativus*	Papillionaceae	Hemicryptophyte
169	*Lawsonia inermis*	Lythraceae	Phanerophyte
170	*Lepidogathis cristata*	Acanthaceae	Therophyte
171	*Leucas aspera*	Labiatae	Therophyte
172	*Leucas longifolia*	Labiatae	Therophyte
173	*Loranthus sp*	Loranthaceae	Epiphyte
174	*Malvastrum coramandalicum*	Malvaceae	Therophyte
175	*Maytenus emerginatus*	Celastraceae	Phanerophyte
176	*Melia azadirachta*	Meliaceae	Phanerophyte
177	*Memordica diocea*	Cucurbitaceae	Therophyte
178	*Mimosa hamata*	Mimosaceae	Therophyte
179	*Mollugo hirta*	Aizoaceae	Therophyte
180	*Moringa oleifera*	Moringaceae	Phanerophyte
181	*Murraya exotica*	Rutaceae	Phanerophyte

ANNEXURE-VIII
ECOLOGICAL DETAILS

Sr. No.	Technical Name	Family	Life Form
182	*Murraya koenigii*	Rutaceae	Phanerophyte
183	*Musa paradisica*	Musaceae	Therophyte
184	*Nerium indicum*	Apocyanaceae	Phanerophyte
185	*Ocimum americanum*	Labiatae	Therophyte
186	*Ocimum basillum*	Labiatae	Therophyte
187	*Ocimum canum*	Labiatae	Therophyte
188	*Ocimum sanctum*	Labiatae	Therophyte
189	*Oldenlandia corymbosa*	Rubiaceae	Therophyte
190	*Opuntia elator*	Cacataceae	Therophyteq
191	*Oxalis corniculata*	Oxalidaceae	Therophyte
192	*Panicum milliria*	Poaceae	Hemicryptophyte
193	*Parkinsonia aculata*	Mimosaceae	Phanerophyte
194	*Parthenium hysterophorus*	Compositae	Therophyte
195	*Passiflora foetida*	Passifloraceae	Phanerophyte
196	*Pavonia zeylanica*	Malvaceae	Phanerophyte
197	*Peltophorum ferrusinum*	Caesalpinaceae	Phanerophyte
198	*Phoenix aculis*	Palmae	Phanerophyte
199	*Phyllanthes emblica*	Euphorbiaceae	Phanerophyte
200	*Phyllanthes nirurii*	Euphorbiaceae	Therophyte
201	*Physalis minima*	Solanaceae	Therophyte
202	*Pithocolobium dulce*	Mimosaceae	Phanerophyte
203	*Polyalthia longifolia*	Annonaceae	Phanerophyte
204	*Pongamia pinnata*	Fabaceae	Phanerophyte
205	*Portulaca oleracea*	Portulaccaceae	Therophyte
206	*Prosopis spicegera*	Mimosaceae	Phanerophyte
207	*Psidium guava*	Myrtaceae	Phanerophyte
208	*Punica granulatum*	Puniaceae	Therophyte
209	*Rhus mysoorensis*	Rosaceae	Phanerophytes
210	*Saccharum munja*	Poaceae	Hemicryptophyte
211	*Saccharum officinarum*	Poaceae	Therophyte
212	*Sapindus emerginatus*	Sapindaceae	Phanerophyte
213	*Sida cordifolia*	Malvaceae	Phanerophyte
214	*Sida vernanifolia*	Malvaceae	Hemicryptophyte
215	*Solanum nigrum*	Solanaceae	Therophyte
216	*Solanum xanthocarpum*	Solanaceae	Therophyte
217	*Sterculia villosa*	Tiliaceae	Therophyte
218	*Sygygium cumini*	Myrtaceae	Phanerophyte
219	*Tagetus sp*	Compositae	Therophyte
220	*Tamarindus indica*	Caesalpinaceae	Phanerophyte
221	*Tectona grandis*	Verbinaceae	Phanreophyte
222	*Tephrosia purpuria*	Fabaceae	Therophyte
223	*Thespesia populanea*	Malvaceae	Phanrophyte
224	*Thespesia lampas*	Malvaceae	Phanerophyte
225	*Tinospora cordifolia*	Rhamnaceae	Therophyte
226	*Tragus biflorus*	Poaceae	Hemicryptophyte
227	*Tribulus terrestris*	Zygophyllaceae	Therophyte
228	*Tridax procumbens*	Compositae	Therophyte
229	*Triumferta pilosa*	Tiliaceae	Therophyte
230	*Vernonia cinera*	Compositae	Therophyte
231	*Vicoa indica*	Compositae	Phanerophyte
232	*Vitex negungo*	Verbinaceae	Therophyte
233	*Vitis vermifera*	Vitaceae	Therophyte
234	*Wrightia tomentosa*	Apocyanaceae	Phanerophyte
235	*Xanthium strumariumk*	Compositae	Therophyte
236	*Yucca gloriosa*	Agavaceae	Therophyte
237	*Zizyphus jujube*	Rhamnaceae	Phanerophyte
238	*Zizyphus nummalaris*	Rhamnaceae	Phanerophyte
239	*Zizyphus oenoplica*	Rhamnaceae	Therophyte
240	*Zizyphus rotundus*	Rhamnaceae	Phanerophyte
241	*Zornia gobbosa*	Compositae	Therophyte
V. Grasslands			
242	*Cenchurus ciliaris*	Poaceae	Hemicryptophyte
243	*Apluda mutica*	Poaceae	Hemicryptophyte

ANNEXURE-VIII
ECOLOGICAL DETAILS

Sr. No.	Technical Name	Family	Life Form
244	*Chloris dolichosta*	Poaceae	Hemicryptophyte
245	*Cyanodactylon sp*	Poaceae	Geophyte
246	*Aristida adscensionsis*	Poaceae	Hemicryptophyte
247	*Cenchrus ciliaris*	Poaceae	Therophyte
248	*Cyperus triceps*	Cyperaceae	Therophyte
249	*Digetaria stricta*	Poaceae	Hemicryptophyte
250	*Eragrostis biferia*	Poaceae	Therophyte
251	*Fibrystylis dichotoma*	Poaceae	Hemicryptophyte
	Endemic species	**No endemic species recorded/reported as per BSI records**	

TABLE-2
FAUNA IN THE STUDY AREA

Technical Name	English Name/ Local Name	Conservation status as per Wild Life Protection Act 1972
Mammals		
Herpestres edwardsinyula	Common Moongoosa	Part-II of Sch-II
Vulpes bengalensis	Indian Fox	Part-II of Sch-II
Lapus nigricollis	Indian Hare	Sch-IV
Felis domisticus	Cat	Sch-IV
Rousettus leschenaulti	Fruit Bat	Sch-V
Bandicota indica	Rat	Sch-V
Funumbuls palmarum	Squirrel	Sch-IV
Mus rattus	Indian rat	Sch-V
Hystrix indica	Porcupine	Sch-IV
Mus musculus	Common Mouse	Sch-V
Birds		
Milyus migrans	Common Kite	Sch-IV
Corvus corvus	Jungle crow	Sch-IV
Corvus splendens	House crow	Sch-V
Aegithina tiphia	Iora	Sch-IV
Pycnonotus cafer	Red vented bulbul	Sch-IV
Pycnonotus jokokus	White browed Bulbul	Sch-IV
Saxicoloides fulicata	Indian robin	Sch-IV
Columbus livibus	Rock Pigeon	Sch-IV
Lalage sykesi	Black headed cochoo Shrike	Sch-IV
Artamus fuscus	Ashy Swallow Shrike	Sch-IV
Dicrurus macrocerus	Black Drongo	Sch-IV
Oriolus oriolus	Indian Oriole	Sch-IV
Oriolus xanthornus	Black Headed Oriole	Sch-IV
Temenuchus pagodarum	Brahmny Myna	Sch-IV
Acridotheres tristicus	Common myna	Sch-IV
Ploceus philippines	Weaver bird	Sch-IV
Uroloncha striata	Spotted munia	Sch-IV
Passer domisticus	House Sparrow	Sch-IV
Cinnyris lotensis	Loten's sunbird	Sch-IV
Cinnyris asiatica	Purple Sunbird	Sch-IV
Megalaima merulinus	Indian Cuckoo	Sch-IV
Eudynamis scolopaceus	Koel	Sch-V
Centropus sinensis	Crow Pheasant	Sch-IV
Psittacula Krammeri	Rose ringed parakeet	Sch-IV
Coryllis vaeralis	Lorikeet	Sch-V
Coracias benghalensis	Indian Roller	Sch-IV
Merops orinetalis	Common Bee Eater	Sch-IV
Alcedo atthis	Common Kingfisher	Sch-IV
Caprimulgus asiaticus	Common Indian jar	Sch-IV
Tylo alba	Barn Owl	Sch-IV
Haliastur indus	Brahmny kite	Sch-IV
Milvus migrans	Pariah kite	Sch-IV
Circus aeruginosus	Marsh harrier	Sch-IV

ANNEXURE-VIII
ECOLOGICAL DETAILS

Technical Name	English Name/ Local Name	Conservation status as per Wild Life Protection Act 1972
Astur badius	Shikra	Sch-IV
Chalcophaps indica	Emerald Dove	Sch-IV
Lobvanella indicus	Redwattled Lapwing	Sch-IV
Lobpluvia malabaraica	Yellow wattled Lapwing	Sch-IV
Bubulcus ibis	Cattle Egret	Sch-IV
Ardeola grayii	Pond Heron	Sch-IV
Anas acuta	Common Teal	Sch-IV
Gallinula chlorpus	Moore hen	Sch-IV
Sterna albifrons	Indian River Tern	Sch-IV
Galerida malabarica	Malabar Crested Lark	Sch-IV
Reptiles		
Hemidactylus sp	House Lizard	Sch-IV
Calotes versicolor	Garden Lizard	Sch-IV
Chameleon zeylanicus	Lizard	Sch-IV
Ptyas mucosus	Rat snake	Sch-III
Naja naja	Cobra	Sch-IV
Bungarus candidus	Krait	Sch-IV
Vipera russeli	Viper	Part-II of Sch-II
Butterflies		Sch-IV
Euploca cora	-	Sch-IV
Euploca crassa	-	Sch-IV
Oeuploca dicciotianua	-	Sch-IV
Graphium agamemnos	Tailed jay	Sch-IV
Papilo polymnstor	Blue mormon	Sch-IV
Junonia atlites	Grey pansey	Sch-IV
Juninia almana	Peacock pansey	Sch-IV
Pelopides assemensis	-	Sch-IV
Polytrema discreta	-	Sch-IV
Amphibians		
Rana hexadactyla	Frog	Sch-IV
Rana tigrina	Bull frog	Sch-IV

Annexure-IX

Demographic Details

ANNEXURE-IX
DEMOGRAPHIC DETAILS

Sr. No.	Name of the Village	No.of House Holds	Total Population	Total Male	Total Female	SC Population	ST Population	Literates	Male Literates	Female Literates	Total Workers	Main Workers	Marginal Workers	Non Workers
0-3 KM DACHEPALLE MANDAL,GUNTUR (DT) ,AP.														
1	Ramapuram	1039	4320	2166	2154	636	153	2106	1252	854	2581	2557	24	1739
2	Gamalapadu	990	4127	2105	2022	277	174	1920	1179	741	2216	2195	21	1911
	Sub total	**2029**	**8447**	**4271**	**4176**	**913**	**327**	**4026**	**2431**	**1595**	**4797**	**4752**	**45**	**3650**
3-7 KM DACHEPALLE MANDAL,GUNTUR (DT) ,AP.														
3	Pondugula	548	2374	1134	1240	204	94	859	509	350	1595	1583	12	779
4	Bhatrupalem	395	2016	1030	986	251	1330	689	463	226	1101	991	110	915
5	Nadikudi	3616	15505	7806	7699	2300	588	8140	4844	3296	7209	6450	759	8296
3-7 KM NEREDICHARLA MANDAL,GUNTUR (DT) ,AP.														
6	Mahankali Gudem	340	1444	712	732	320	17	1034	570	464	456	432	24	988
7	Ravipahad	132	605	309	296	92	0	229	135	94	368	368	0	237
3-7 KM GURAJALA MANDAL,GUNTUR (DT) ,AP.														
8	Pulipadu	1555	6742	3400	3342	1010	152	2888	1826	1062	3989	3914	75	2753
	Sub total	**6586**	**28686**	**14391**	**14295**	**4177**	**2181**	**13839**	**8347**	**5492**	**14718**	**13738**	**980**	**13968**
7-10 KM DACHEPALLE MANDAL,GUNTUR (DT) ,AP.														
9	Mutyalampadu	1013	4368	2239	2129	727	258	2203	1377	826	2294	1739	555	2074
10	Dachepalle	3164	14256	7237	7019	1023	403	6576	4091	2485	7506	6309	1197	6750
11	Alugumallipadu	87	333	174	159	14	0	172	106	66	188	186	2	145
12	Kesanapalle	1310	5963	3073	2890	983	215	2793	1848	945	3312	3284	28	2651
7-10 KM GURAJALA MANDAL,GUNTUR (DT) ,AP.														
13	Daida	683	2839	1389	1450	385	389	1242	768	474	1631	1580	51	1208
14	Gangavaram	636	2709	1370	1339	363	74	1190	793	397	1701	1552	149	1008
7-10 KM DAMARACHARLA MANDAL,GUNTUR (DT) ,AP.														
15	Irkigudem	316	1360	661	699	138	7	579	367	212	768	721	47	592
16	Vadapalle	1646	7062	3556	3506	1031	1096	3608	2161	1447	2583	2211	372	4479
7-10 KM NEREDICHARLA MANDAL,GUNTUR (DT) ,AP.														
17	Sunya Pahad	312	1420	703	717	62	1254	487	353	134	854	352	502	566
18	Janapahad	821	3479	1764	1715	305	1862	1390	911	479	2077	1756	321	1402
	Sub total	**9988**	**43789**	**22166**	**21623**	**5031**	**5558**	**20240**	**12775**	**7465**	**22914**	**19690**	**3224**	**20875**
	Grand total	**18603**	**80922**	**40828**	**40094**	**10121**	**8066**	**38105**	**23553**	**14552**	**42429**	**38180**	**4249**	**38493**

Annexure-X

Emission Calculations

ANNEXURE-X
EMISSION CALCULATIONS

1.0 General Calculations

A. Captive Power Plant

- *Area Calculations*

$$Area(m^2) = \frac{3.14 \quad x \quad (Top\ Stack\ Diameter)^2}{4} = 3.14 \text{ X } (2.0)^2/4 = 3.14 \text{ m}^2$$

- *Temperature Correction*

Temperature correction is calculated based on standard ambient temperature of 25° C.

$$Temperature \quad Correction = \frac{273 \quad + \quad 25^0\ C}{273 \quad + \quad StackTemperature^0\ C} = 298/413 = 0.722$$

- *Volumetric Flow Rate*

$$Volumetric\ flow\ (\frac{Nm^3}{s}) = Area\ (m^2)\ x\ Exit\ Velocity\ (m/s)\ x\ Temperature\ Correction$$

$$= 3.14 \text{ X } 15.96 \text{ X } 0.722 = 36.16 \text{ Nm}^3\text{/s}$$

B. Coal Crusher

- *Area Calculations*

$$Area(m^2) = \frac{3.14 \quad x \quad (Top\ Stack\ Diameter)^2}{4} = 3.14 \text{ X } (1.0)^2/4 = 0.79 \text{ m}^2$$

- *Temperature Correction*

Temperature correction is calculated based on standard ambient temperature of 25° C.

$$Temperature \quad Correction = \frac{273 \quad + \quad 25^0\ C}{273 \quad + \quad StackTemperature^0\ C} = 298/343 = 0.869$$

- *Volumetric Flow Rate*

$$Volumetric\ flow\ (\frac{Nm^3}{s}) = Area\ (m^2)\ x\ Exit\ Velocity\ (m/s)\ x\ Temperature\ Correction$$

$$= 0.79 \text{ X } 12 \text{ X } 0.869 = 8.18 \text{ Nm}^3\text{/s}$$

ANNEXURE-X
EMISSION CALCULATIONS

C. Raw Mill – I & II

- *Area Calculations*

$$Area(m^2) = \frac{3.14 \quad x \quad (Top\ Stack\ Diameter)^2}{4} = 3.14 \cdot X\ (3.5)^2/4 = 9.62\ m^2$$

- *Temperature Correction*

Temperature correction is calculated based on standard ambient temperature of 25° C.

$$Temperature \quad Correction = \frac{273 \quad + \quad 25^0\ C}{273 \quad + \quad StackTemperature^0\ C} = 298/393 = 0.758$$

- *Volumetric Flow Rate*

$$Volumetric\ flow\ (\frac{Nm^3}{s}) = Area\ (m^2)\ x\ Exit\ Velocity\ (m/s)\ x\ Temperature\ Correction$$

$$= 9.62\ X\ 10\ X\ 0.758 = 72.92\ Nm^3/s$$

D. Cooler

- *Area Calculations*

$$Area(m^2) = \frac{3.14 \quad x \quad (Top\ Stack\ Diameter)^2}{4} = 3.14\ X\ (3.0)^2/4 = 7.07\ m^2$$

- *Temperature Correction*

Temperature correction is calculated based on standard ambient temperature of 25° C.

$$Temperature \quad Correction = \frac{273 \quad + \quad 25^0\ C}{273 \quad + \quad StackTemperature^0\ C} = 298/493 = 0.604$$

- *Volumetric Flow Rate*

$$Volumetric\ flow\ (\frac{Nm^3}{s}) = Area\ (m^2)\ x\ Exit\ Velocity\ (m/s)\ x\ Temperature\ Correction$$

$$= 7.07\ X\ 10\ X\ 0.604 = 42.71\ Nm^3/s$$

ANNEXURE-X
EMISSION CALCULATIONS

E. Coal Mill-I

- *Area Calculations*

$$Area(m^2) = \frac{3.14 \quad x \quad (Top\ Stack\ Diameter)^2}{4}$$ = 3.14 X $(1.0)^2/4$ =0.79 m^2

- *Temperature Correction*

Temperature correction is calculated based on standard ambient temperature of 25° C.

$$Temperature \quad Correction = \frac{273 \quad + \quad 25^0\ C}{273 \quad + \quad StackTemperature^0\ C}$$ = 298/353=0.844

- *Volumetric Flow Rate*

$$Volumetric\ flow\,(\frac{Nm^3}{s}) = Area\ (m^2)\ x\ Exit\ Velocity\ (m/s)\ x\ Temperature\ Correction$$

= 0.79 X 14 X 0.844 = 9.28 Nm^3/s

F. Cement Mill-I

- *Area Calculations*

$$Area(m^2) = \frac{3.14 \quad x \quad (Top\ Stack\ Diameter)^2}{4}$$ = 3.14 X $(1.25)^2/4$ =1.23 m^2

- *Temperature Correction*

Temperature correction is calculated based on standard ambient temperature of 25° C.

$$Temperature \quad Correction = \frac{273 \quad + \quad 25^0\ C}{273 \quad + \quad StackTemperature^0\ C}$$ = 298/353=0.844

- *Volumetric Flow Rate*

$$Volumetric\ flow\,(\frac{Nm^3}{s}) = Area\ (m^2)\ x\ Exit\ Velocity\ (m/s)\ x\ Temperature\ Correction$$

= 1.23 X 12 X 0.844 = 12.43 Nm^3/s

ANNEXURE-X
EMISSION CALCULATIONS

G. Cement Mill-II

- *Area Calculations*

$$Area(m^2) = \frac{3.14 \quad x \quad (Top\ Stack\ Diameter)^2}{4} = 3.14 \text{ X } (1.0)^2/4 = 0.79 \text{ m}^2$$

- *Temperature Correction*

Temperature correction is calculated based on standard ambient temperature of 25° C.

$$Temperature \quad Correction = \frac{273 \quad + \quad 25^0\ C}{273 \quad + \quad StackTemperature^0\ C} = 298/353 = 0.844$$

- *Volumetric Flow Rate*

$$Volumetric\ flow\ (\frac{Nm^3}{s}) = Area\ (m^2)\ x\ Exit\ Velocity\ (m/s)\ x\ Temperature\ Correction$$

$$= 0.79 \text{ X } 12 \text{ X } 0.844 = 7.95 \text{ Nm}^3\text{/s}$$

1.1 Particulate Matter Emissions

A. CPP

Emission rate = 50 mg/Nm^3 X 36.16 Nm^3/s X 1/1000 = 1.81 g/s

B. Crusher

Emission rate = 50 mg/Nm^3 X 8.18 Nm^3/s X 1/1000 = 0.41 g/s

C. Raw Mill – I & II

Emission rate = 50 mg/Nm^3 X 72.92 Nm^3/s X 1/1000 = 3.65 g/s

D. Cooler

Emission rate = 50 mg/Nm^3 X 42.71 Nm^3/s X 1/1000 = 2.14 g/s

E. Coal Mill - I

Emission rate = 50 mg/Nm^3 X 9.28 Nm^3/s X 1/1000 = 0.46 g/s

F. Cement Mill - I

Emission rate = 50 mg/Nm^3 X 12.43 Nm^3/s X 1/1000 = 0.62 g/s

G. Cement Mill - II

Emission rate = 50 mg/Nm^3 X 7.95 Nm^3/s X 1/1000 = 0.40 g/s

ANNEXURE-X
EMISSION CALCULATIONS

1.2 Emission Calculations Sulphur dioxide

A. CPP

Coal Consumption	=	23.97 TPH
	=	23972.6 kg/hr
Sulphur content in coal	=	0.5%
Sulphur emission factor	=	(0.5/100) x (64/32) = 0.01
SO_2 emission rate	=	Emission factor x consumption of coal in kg/hr
	=	0.01 x 23972.6 = 239.7 kg/hr
	=	66.59 g/sec

B. Raw Mill – I

Coal Consumption	=	0.04725 TPH
	=	47.25 kg/hr
Sulphur content in coal	=	0.5%
Sulphur emission factor	=	(0.5/100) x (64/32) = 0.01
SO_2 emission rate	=	Emission factor x consumption of coal in kg/hr
	=	0.01 x 47.25 = 0.4725 kg/hr
	=	13.13 g/sec

1.3 NOx Emissions

A. CPP

$260 \times 3200 \times 23.97 \times 4.187/10^6/3.6 = 23.19$ g/s

B. Raw Mill – I & II

$260 \times 3200 \times 0.04725 \times 4.187/10^6/3.6 = 6.09$ g/s

Annexure-XI

Public Hearing Details

ANNEXURE-XI

PUBLIC HEARING PROCEEDINGS

A.P. POLLUTION CONTROL BOARD, REGIONAL OFFICE

FLAT NO. 102, RAGHAVA APARTMENT, BRUNDAVAN GARDENS, GUNTUR-522 006

K.L.P. Kumar
Environmental Engineer

Phone:2215537
e-mail: gtr.ro.ee@pcb.ap.gov.in

Lr. No. G-0041/PCB/RO-GNT/EPH/2013- 904 Dt. 05-02-2013

To

Sri R K Dooda,
Sr. Vice President (Projects)
M/s Andhra Cements Limited (Durga Cement Works)
Durgapuram (V),
Dachepalli (M),
Guntur District -522 426.

Sir,

Sub: APPCB/RO/GUNTUR - M/s. Andhra Cement Ltd.,(M/s. Durga Cement Works), Durgapuram (V), Dachepalli (M), Guntur District - proposed to establish Captive Power Plant with capacity of 30 MW at the existing premises of the unit at Dachepalli (V&M), Guntur District - **Public Hearing** conducted on 30.01.2013 - Communication of Minutes of the Public Hearing – Reg.,

Ref:
1. EIA Notification dt. 14th September' 2006.
2. M/s. Jaypee Groups Management request letter received on 13.12.2012.
3. Endt. of the District Collector on note file Dt. 22.12.2012.
4. APPCB, Board Office, Hyd., E-Mail dt. 27.12.2012.
5. Public Hearing conducted on 30.01.2013.

* * *

With reference to the above, I am here with appending the Minutes of the Public Hearing of M/s. Andhra Cement Ltd., (M/s. Durga Cement Works), Durgapuram (V), Dachepalli (M), Guntur District proposed to establish 30 MW Coal based Captive Power Plant at the existing premises of the cement unit at Durgapuram (V), Dachepalli (M), Guntur District held on 30.01.2013.

You are requested to approach State Level Environment Impact Assessment Authority (SEIAA), A3, Industrial Estate, Sanathnagar, Hyderabad – 500018 for obtaining prior Environmental Clearance as per the procedure indicated under EIA 2006 which was displayed in the web: WWW.envfor.nic.in and also requested to apply to the Board after obtaining Environmental Clearance for issuing CFE of Board under Water & Air Acts.

Yours faithfully,

ENIVORNMENTAL ENGINEER

Encl: 1. Minutes of Public Hearing.
2. DVDs of Proceedings
3. Representations reiceved
4. Attendance sheet

ANNEXURE-XI
PUBLIC HEARING PROCEEDINGS

1. JAYPEE Group is a third largest Cement industrial entity in India with a turn over of Rs. 18,000 Cr., in 2010-11 and a production capacity of 35 MTPA of Cement.
2. This group is taking up several welfare activities with no profit motto through JAYPEE Seva Samithi such as eradication of illiteracy ,providing of educational facilities, imparting vocational training , ensuring health care and potable water, Social & Economical welfare activities etc.
3. He explained that M/s. Andhra Cements Limited have 2 No. of plants in Andhra Pradesh established in 1986 with a produciton capciaty of 2.31 MTPA at Dachepalli and 2.0 MTPA at Visakhapatnam having a total capacity of 4.31 MTPA Cement produciton. Of late , M/s. JAYPEE Group has takenover M/s. Andhra Cements Limited and proposed 30 MW Captive Power Plant.
4. Hitherto, the then management of M/s. Andhra Cements Ltd., has obtained CFE from APPCB and Environmental Clearance from MoEF., for expansion proposal and renaissance of the same is under progress. Now the present management i.e JAYPEE Group proposed 30 MW Captive Power Plant with a project cost of Rs. 136.00 Crores to meet the power requirement of 30 MW for Clinker production and the remaining 13 MW will be procured from Power Grid.
5. He explained the Eco-Friendly nature of the project i.e no acquiring of additional land, Installation of Atmospheric Fluidised Bed Bolier which lowers the pollution by ensuring 100% burning , Installation of Air cooler condensers which ensures lower consumption of water, Establishment of high efficiency ESP to ensure Chimney Particulate Matter < 50 mg/Nm^3, promoting of zero discharge policy besides utilizing 100% Ash generated from power unit in their own cement plant.
6. He explained that the proposed site is nearby State High way No.2 besides Railway station and hence selected this site. The proposed power plant needs 3.0 Ha of land and water consumption will be

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR

around 550 KLD with no utilisation of water resources. The industry expects to meet the water requirements from the mine pit without impact on natural resources.

7. The industry proposed to acquire Coal from Singareni and through imports. The industry proposed to consume coal of about 2.1 MTPA having ash generation of 40 % of coal consumption with 100% of ash utilisation in the process of Cement Manufacture. The proposed activity generates employment for 50 Nos. No sensitive, archelogical monuments with in 10 Kms. radius.
8. The represenstative of the Vimta labs continued that the Environmental Impact Assessment Report was prepared by them by studying in the surrounding area with in 10 Km radius of the cement plant from 01.03.2012 to 31.05.2012 in different issues i.e., Air, Water, Soil, Ecological etc. and explained the nitty-gritties of the report is as follows:

Air Quality:

Coal will be conveyed through closed conveyers and surpress the dust by sprinkling water, development of Greenbelt and other dust suppression measures . Testing will be done by similation models when the industry comes into operation. Coal will contain Low NO_X compounds and also proposed to establish ESP of 99.9% efficiency with a stack height of 77 Mts. Green belt of around 50 mts proposed to be developed to take care of the CO_2 and other Greenhouse Gases.

Water Quality:

No utilisation of ground water by the industry, however they are proposed to use the mine pit water for Boiler, dust suppression and domestic purpose. Waste water from the process will be treated and recycled. Domestic waste water will be treated in STP and used for gardening/plantation.

ENVIRONMENTAL ENGINEER.
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR.

Noise Quality:

Noise /sound will be maintained between 45 dB- 54 dB as per regulatory authority norms.

Risk Assessment : The management will prepare Risk and disaster management plans to meet the emergencies in the event of failure of systems apart from providing water hydrant system around coal yard and diesel stock points.

He promised to maintain Ambient Air Quality as per State Pollution Control Board and MoEF, Govt of India norms. The management proposed to contribute Rs. 16.3 Crores for Pollution control equipment and Rs. 7.2 Crores /Annum for maintanance of operational equipments.

The Joint Collector requested the public to express their views candidly, suggestions and objections if any, on the proposal of M/s. Andhra Cements Limited.

Sri Maasetti Venkateswarlu, Srinagar village stated that he hails from farming community and staying at Srinagar. For the past 30 years they are suffering from pollution problems due to operation of the cement plant without adequate pollution control measures as promised and as such the local farmers have lost their produce to the tune of 90 Crores during these years .He expressed anguish that the managements are failing in implementing the technologies and hence the people are suffering. He apprehended that the proposed coal based power project may further aggrieve their sufferings. If the same is continued by the present management also the villagers will be left in lurch with no option but evacuation. While belching fire and brimstone at managements stated that the earlier managements have not provided adequate

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR

employment to the local people either skilled or unskilled and requested the present management to take local 200 Nos.of labour.

He continued that previously farmers have lost about 25 Acres of land which was given to the company for Mining lease. He apprehended that the shifting of the obsolete power plant equipment from Himachal Pradesh may pose pollution problems in the area and urged the management to instill confidence in the public by explaining the rationale behind the shifting.

He stated that he is not against the project and the people will also favor the project and extend cooperation with the management provided the management ensures the pollution free environment by providing and operating the pollution control equipments efficiently, by providing employment to local people and building credibility and without indulging in Machiavellian machinations failing which it will be detrimental to operation of the industry. And also suggested to explore the possibility of installing the Solar based Power Plant in lieu of Coal.

Sri Prathipati Rosaiah, Narayanapuram village: While welcoming the project he expressed anguish that the present management is not providing employment to the local people and as such recruited 80% of the workers from out of state. He also stated that the cement industry started in 1986 anticipating employment to the local persons and regional development. He requested the management to start the Cement plant along with power generation unit by providing employment to the local persons either skilled or unskilled including contract labour.

Sri. Medara Daniyel, Gamalapadu Village said that they are not in favour of the project and gave a call for boycott of the proceedings.

Sri. Modugula Suresh Reddy Srinagar stated that they are against the establishing of coal based power plant in the Cement plant premises. He argued that there will be CO_2 emissions even though the industry erects 70 Mts height of stack to the Boiler. He called upon the management to explain the rationale behind the choosing of coal based power project instead of opting Solar Power or Wind Power which is a cleaner technology. It is brought to the notice of the public that the management brought the equipment without obtaining permission from concerned departments. He also wants to let the people know as to how much employment was generated, how much income generated to the government from this industry, as to how the absorption of CO_2 will carried by the dust infested greenbelt. Management has not taken up any social / economical welfare measures and also not provided drinking water.

Sri. Sankara Rao, Srinagar Village said that the Public Hearing should have been be arranged either at Srinagar or Gamalapadu village for the convenience of the public and to express their views candidly. There is no drinking water provision and they are suffering for the past 20 years. He requested the management to contemplate the power project only after providing employment to the local people. All the previous managements have sold the industry for their own profits without providing any facilities to the surrounding villages and he gave a call for boycott of the proceedings.

Smt. Vanga Padmavathi said that they are not in favour of the project. Human health and live stock will be affected due to this proposed project and the management is employing outsiders rather than local people, who are with the cement plant for the past 30 years.

Smt. Ramanamma & others, Srinagar village have expressed dissent over the proposed project.

Sri Chiluku Chandra Sekhar, Advocate & AP.Civil Liberties Union requested the gathering that those people who are against the establishment of power plant shall stay and reveal the opinion in the public hearing, otherwise the issue will be same as is the case with "Pulichintala". He opined that the Venue

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR.

of public hearing should have been outside the JAYPEE Group premises, as it may affect on public hearing. Many people attended in the public hearing were the workers & labour of the factory. The management indulged in hocus-pocus and employed about 700 No. of workers from other. state. The earlier managements also deserted the local villagers in providing of employment. He lamented that if this state of affairs continuous with other cement units operating in Palnadu area there will be air pollution resulting in deterioration of environment in this area. Alternative sources such as Solar Power, Wind Power etc., may also be explored and arranged in lieu of coal based project. The management is proposing to develop green belt within the plant premises only and there is no proposal for outside green belt in surrounding villages. The public in general is veered against the establishment of thermal power plants in the state. He also pointed out, that proper assessment has not been done regarding monuments. He opined that the industry can go for expansion in the existing cement plant and not the power plant duly providing employment to the local people. And also contemplate the change of venue of the public hearing in future.

Sri. K. Nava Jyothi, Paryavarana Parirakshana Samithi, Nadikudi village said that lime stone deposits in Dachepalli area of palnadu is a boon at one point of time and the same has become bane after commissioning of this type of units. About 1500 Acres are fertile land and new industries vide Chettinadu Cements, Himani Cements, Maha Cements etc., are on the pipe line requiring 100's of Acres of lands. About 400 Acres of cultivated lands is under Andhra Cements management only. Bio-Diversity may be damaged. He wondered as to how the Ministry of Environment is according permissions concentrating the cement plants in a single place. Cement industries are making syndicate business. He emphasized the Right to Live peacefully. He requested to not to consider the Captive Power Plant.

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR.

The Joint Collector, then, requested the management to offer comments on the issues raised in the public hearing by the villagers along with clarification & explanation.

Sri.BMK Sarma from JAYPEE Groups welcomed the gathering and clarified the following.

1. The JAYPEE Group has taken all the existing on roll employees of Andhra Cements Ltd., as it is without any changes.
2. There are several contract workers working presently. Civil & mechanical workers were inducted in a phased manner, from local eligible only.
3. They have purchased the sick unit and running the same.
4. It is also promised that they will take the loading & unloading contract workers also as per requirement after commencement of production shortly.
5. To run the plant continuously, Captive Power Plant is imperative.

Sri TGV Krishna Reddy, MLC special invitee of the Public Hearing welcomed the gathering and said that the incidents that were happened for the past 30 years are bothering the villagers. The present management is not having good public relations. He requested the management to take the existing employees & contract workers in the plant on company rolls. He objected to recruiting of the outside manpower instead of local people. He stressed that providing of employment, taking over loading & unloading labour issues, allotment of 25 Acres of patta land for mining lease are are not linked with this hearing. He informed that AD., Mines Department mistakenly has given permission to the 25 Acres of Patta Lands to the industry which has been referred to the Government for cancellation. These issues have to be discussed by the management for maintaining good relations ship.

He continued, that it is compulsory to develop tall growing trees to arrest the dust problems as this Coal based power plant affects in a radius of 1.5 KM., He suggested the management to take precautions on surrounding environment

ENVIRONMENTAL ENGINEER.
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE. GUNTUR.

after discussion with technical people as some of the villages and cultivation lands are located in the radius of 1.5 KM. The revenue Department has to ascertain factual status. There is a every need to check the air pollution control measures continuously, whether equipments were having sufficient capcacity or not to control the pollution by the authorities.

He reqested the management to provide water sprinkling systems at Coal loading & unloading points at Pondugala and in plant, transfer points to suppress the dust nuisance by laying cement road from Pondugala Railway station to Factory. Water treatment plant should be provided for treating the waste water. The management should think about Solar Energy system also. It will be a cost of around Rs. 8-9 Crores/ 1 MW & 270 Crores /30 MW. He suggested to go for solar power which is clean and an Environment Friendly with out pollution and also extend power supply to the surrounding villages. He demanded the management for providing of employment to the local people and expressed solidarity with the vox populi on the project.

Jangala Singaraya Yadav said that he is interested in the establishment of Power plant and the exiting cement plant. The management is giving only Rs.300/-per day per labor and at the end expressed solidarity with the opinion of not in favor of the project.

An irascible crowd attended the hearing with Placards and boycotted the proceedings shouting slogans against the project.

About 205 No. of written representations were received expressing their opinions out of which 191 representations in favor of the project and the following 14 nos. against the establishment of the industry in the area. All the representations are enclosed.

1. Sri B. Ramakrishna Reddy – Ramapuram
2. Sri G.Koti Reddy- Srinagar.
3. Sri G.Venkateswarulu-Pondugala.

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR.

4. Sri M.Suresh Reddy –Srinagar
5. Sri. V. Ramana, & Others, Ex-Sarpanch Ramapuram
6. Sri. K. Srinivasa Rao – General Secretary, PDM Party, Guntur
7. Sri. B. Konda Reddy, General Secretary, PKS Party
8. Sri. S. Subba Rao & Others, Gamalapadu
9. Sri. Venkateswarlu, Ramapuram
10. Sri. B. Kalana Nayak, Bhatrupalem Tanda Villagers
11. Sri. A. Vengala Reddy, Ramapuram
12. Sri. G. Vedamani, President M/s. Chips & Pulverisers Union
13. Sri. C. Chandrapal, Ramapuram
14. Sri. P. Sambaiah, Ramapuram

The Joint Collector informed the public that apart from public hearing related petitions some general petitions are also received which will be dealt with concerned departments and concluded the proceedings of the Environmental Public Hearing announcing that all the views, opinions and suggestions expressed by the villagers are recorded and will be submitted to the Ministry for perusal and taking further necessary action.

04/2/13

Environmental Engineer & Member Convener, APPCB, Regional Office, Guntur.	Joint Collector Guntur District and Chairman of the Public Hearing Committee

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR

ANNEXURE-XI
PUBLIC HEARING PROCEEDINGS

ప్రజాభిప్రాయ సేకరణ వివరములు - తెలుగు అనువాదము

ఆంధ్ర సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్) వారు దాచేపల్లి మండలం, గుంటూరు జిల్లా లోని దుర్గాపురం నందు, రాష్ట్రీయ రహదారి-2 ని అనుకుని వున్న శ్రీ దుర్గా దేవాలయం సమీపమున తమ సిమెంట్ ఫ్యాక్టరీ ప్రాంగణములో 30 మెగావాట్ల బొగ్గు ఆధారిత పవర్‌ప్లాంటు నిర్మాణము తలపెట్టినారు. కావున పర్యావరణ ప్రజాభిప్రాయసేకరణ ది.30.01.2013 న ఉదయం 11.00 గంటలకు దుర్గా మందిరం దగ్గర, రాష్ట్ర రహదారి -2కు అనుకుని దుర్గాపురము గ్రామము, దాచేపల్లి మండలము, గుంటూరు జిల్లా నందు జరిగినది.

దీని వివరములు :-

ఈ క్రింద తెలిపిన ప్యానెల్ సభ్యులు మరియు కంపెనీ ప్రతినిధులు పాల్గొంటిరి.

ప్యానల్ సభ్యులు :-

1.	శ్రీమతి కె.శారదాదేవి., ఐ.ఎ.ఎస్	జాయింట్ కలెక్టర్ & అడిషనల్ డిస్ట్రిక్ట్ మెజిస్ట్రేట్, గుంటూరు జిల్లా & చైర్‌పర్సన్, పర్యావరణ ప్రజాభిప్రాయసేకరణ కమిటీ.
2.	శ్రీ కె.ఎల్.పి కుమార్	మెంబర్ కన్వీనర్, పర్యావరణ ఇంజనీరు, ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి ప్రాంతీయ కార్యాలయం,గుంటూరు.

ప్రత్యేక అతిధి :-

1. శ్రీ టి.జి.వి.క్రిష్ణారెడ్డి ఎం.ఎల్.సి

ఆంధ్ర సిమెంట్స్ లిమిటెడ్ యాజమాన్య ప్రతినిధులు

1. శ్రీ పంకజ్ గౌర్ (డైరెక్టర్)
2. శ్రీ నవీన్‌కుమార్ సింగ్ (డైరెక్టర్)

ముందుగా పర్యావరణ ఇంజనీరు, ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి, గుంటూరు పర్యావరణ ప్రజాభిప్రాయ సేకరణకు విచ్చేసిన ప్రజలను మరియు అధికారులను ఆహ్వానిస్తూ, ప్రజాభిప్రాయసేకరణ యొక్క ముఖ్యాంశాలు మరియు కారణములను తెలియజేసెను. భారతప్రభుత్వము యొక్క పర్యావరణము మరియు అడవుల మంత్రిత్వశాఖ విడుదల చేసిన

ENVIRONMENTAL ENGINEER.
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR.

ANNEXURE-XI
PUBLIC HEARING PROCEEDINGS

నోటిఫికేషన్ యొక్క ముఖ్యోద్దేశాలను వివరించెను. ఆంధ్రసిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్సు) వారు దుర్గాపురము గ్రామము, దాచేపల్లి మండలము, గుంటూరు జిల్లాలోని తమ సిమెంట్ కర్మాగారము ప్రాంగణములో 30 మెగావాట్స్ బొగ్గు ఆధారిత క్యాప్టివ్ పవర్‌ప్లాంట్‌ని రూ.136 కోట్ల వ్యయముతో నిర్మించుటకు ప్రతిపాదనను భారతప్రభుత్వము, పర్యావరణము మరియు అడవుల మంత్రిత్వ శాఖ వారి నోటిఫికేషన్ ఎస్.ఓ.నెం.1533 తేది.14.09.2006 ప్రకారము పంపినారు. ఆంధ్ర సిమెంట్స్ లిమిటెడ్ వారి అభ్యర్ధన మరియు పర్యావరణ ఇంజనీరు, ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి ప్రాంతీయ కార్యాలయము, గుంటూరు తేది.28.12.2012 ప్రముఖ దినపత్రికలలో ఆంధ్రసిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్సు) వారు దుర్గాపురము గ్రామము, గామలపాడు పంచాయితి, దాచేపల్లి మండలము, గుంటూరు జిల్లాలోని తమ సిమెంట్ కర్మాగారము ఆవరణలో 30 మెగావాట్ల బొగ్గు ఆధారిత క్యాప్టివ్ పవర్ ప్లాంట్ నిర్మాణము తలపెట్టినారు గావున ప్రజలయొక్క అభిప్రాయములు, సూచనలు మరియు అభ్యంతరాలు తెలిసికొనుటకు 30.01.2013 తేదినాడు దుర్గామందిరము ఆవరణ, రాష్ట్ర రహదారి నెం.-2 ప్రక్కన, ఆంధ్ర సిమెంట్స్ లిమిటెడ్ (దుర్గాసిమెంట్ వర్క్సు) దగ్గర, దుర్గాపురము గ్రామము, దాచేపల్లి మండలము, గుంటూరు జిల్లాలో ఏర్పాటు చేయటమైనదని నోటిఫికేషన్ జారీచేసినారు. తరువాత పర్యావరణ ఇంజనీరు జాయింట్ కలెక్టరు గారిని కార్యక్రమానికి అధ్యక్షత వహించి మిగతా కార్యక్రమములు నిర్వహించవలసినదిగా ఆహ్వానించారు.

జాయింట్ కలెక్టరుగారు ప్రజలను సభకు ఆహ్వానిస్తూ ఆంధ్రసిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్సు) వారి అభ్యర్ధనను క్లుప్తంగా వివరించారు. ప్రస్తుత పరిస్థితులలో విద్యుత్ యొక్క వినియోగం, అవసరాలు మరియు విద్యుత్ ఉత్పాదన అవసారల గురించి వివరించారు. తగినంత విధ్యుత్ సరఫరా లేని కారణంగా ప్రస్తుతము పెద్ద పరిశ్రమలు నెలకు 21 రోజులు మాత్రమే పనిచేస్తున్నాయి. కావున ప్రభుత్వము కూడా పెద్ద పరిశ్రమలు తమ సొంత పవర్‌ప్లాంట్‌లని నిర్మించుకోవాలని ప్రోత్సాహపరుస్తుంది. అందువల్ల ప్రభుత్వ విద్యుత్ వినియోగం తగ్గుతుందని చెప్పారు. ఈ విధంగా పవర్‌ప్లాంట్‌లని నెలకొల్పే సంస్థలు పర్యావరణ, కాలుష్య కర్మాగారాముల పట్టిక పరిధిలోకి వచ్చును కావున ప్రజాభిప్రాయ సేకరణ అవసరము. జాయింట్ కలెక్టరు ప్రజలను తమ పర్యావరణ, కాలుష్య సంబంధిత అభిప్రాయములు, సూచనలు మరియు అభ్యంతరములను నిర్భయముగా ప్రాజెక్ట్ గురించి కర్మాగారము వారు చెప్పిన తరువాత చెప్పవలసినదిగా కోరినారు.

ENVIRONMENTAL ENGINEER

ANNEXURE-XI
PUBLIC HEARING PROCEEDINGS

కర్మాగారము తరుపున వారి కన్సల్టెంట్ అయిన విమ్టా లాబ్స్ ప్రతినిధి సభికులను స్వాగతిస్తూ ఈ క్రింది విధముగా వివరించారు.

1. జె.పి గ్రూప్ దేశములో మూడవ అతి పెద్ద సిమెంట్ ఉత్పత్తి సంస్థ, సుమారు 35 ఎం.టి.పి.ఎ సిమెంట్ ఉత్పత్తిని 2010-11 సంవత్సరములో చేయటం జరిగింది. దాదాపు సంవత్సరమునకు రూ.18,000/- కోట్ల వ్యాపార లావాదేవీలు గల కంపెనీ అని తెలియచేసారు.

2. ఈ జెపి గ్రూప్ జేపి స్వయం సేవాసంస్థ ద్వారా లాభాలు దృష్టితో కాకుండా సేవా ధృక్పదంతో చాలా సంక్షేమ కార్యక్రమాలు నిర్వహిస్తుంది. అందులో నిరుద్యోగ నిర్మూలన, విద్యాకార్యక్రమాలు, ఒకేషనల్ ట్రైనింగ్, వైద్యసదుపాయాలు, తాగునీటి వ్యవస్థ మరియు మిగతా సోషల్ & ఎకనమికల్ సంక్షేమకార్యక్రమములను నిర్వహించుచున్నారు.

3. 1986లో నిర్మించబడిన ఆంధ్ర సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్) వారికి రెండు కర్మాగారములు వున్నవి. 2.31 ఎం.టి.పి.ఎ సామర్ధ్యంతో దాచేపల్లిలో మరియు 2.0 ఎం.టి.పి.ఎ సామర్ధ్యంతో విశాఖపట్టణంలో, మొత్తం 4.31 ఎం.టి.పి.ఎ సామర్ధ్యం కలది ఈ మధ్యనే ఆంధ్రసిమెంట్స్ని జేపి గ్రూప్వారు తీసుకుని 30 మెగావాట్ల క్యాపిటివ్ పవర్ ప్లాంట్ నిర్మాణము తలపెట్టినారు.

4. ఇంతకు ముందు ఆంధ్ర సిమెంట్స్ లిమిటెడ్ వారు తమ కర్మాగార సామర్ధ్య విస్తరణకు సంబంధించిన అనుమతులను (సి.ఎఫ్.ఇ) ఆంధ్రప్రదేశ్ పొల్యూషన్ కంట్రోల్ బోర్డు నుంచి మరియు ఎం.ఓ.ఇ.ఎఫ్ వారి దగ్గర నుండి పొంది ఉన్నదని, విస్తరణ కార్యక్రమాలు ప్రగతిశీలంలో ఉన్నాయని తెలియపరిచారు. ప్రస్తుత యాజమాన్యమైన జేపి గ్రూప్ వారు 30 మెగావాట్ల సామర్ధ్యము గల క్యాప్టివ్ పవర్ప్లాంట్ను సుమారు రూ.136 కోట్ల వ్యయంతో తమ విధ్యుత్ అవసరాల నిమిత్తమై నిర్మించదలచారని ఇంకా మిగులు అవసరమైన 13 మెగావాట్లు పవర్గ్రిడ్ నుంచి వినియోగించుకుంటారని తెలియచేశారు.

5. ఈ ప్రాజెక్ట్కు గల పర్యావరణ స్నేహపూర్వక వివరములను వివరించారు. దీనికొరకు అదనపు భూసేకరణ అవసరం లేదని, ఎట్మాస్పియరిక్ ఫ్లూయిడైజ్డ్ బెడ్ బాయిలర్ను ఇన్స్టాల్ చేయడం ద్వారా పర్యావరణ కాలుష్యమును నియంత్రించటం జరుగుతుందని, ఎయిర్కూలర్ కండెన్సర్స్ వినియోగం ద్వారా నీటి వినియోగం తగ్గించవచ్చని, అతి ఎక్కువ సామర్ధ్యం గల ఇ.యస్.పిలను వినియోగించటం ద్వారా పొగ గొట్టంలోని వాయు కణాలను 50 ఎం.జి/ఎన్.ఎమ్^{3} కంటే

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR.

తగ్గించవచ్చని, తద్వారా వాయు ప్రధ్యూషణం దాదాపు శూన్యంకు తేవచ్చని, మరియు ఈ ప్లాంటులో ఉత్పత్తి కాబడే బూడిదను 100% ఇక్కడే సిమెంట్ ఉత్పత్తిలో వినియోగించటం జరుగుతుందని వివరించారు.

6. ప్రస్తుత క్యాప్టివ్ పవర్ ప్లాంట్ ప్రతిపాదిత ప్రాంతము రాష్ట్ర రహదారి నెం.2 మరియు రైల్వే స్టేషన్‌కి దగ్గరగా ఉండటం వలన ఈ ప్లాంట్ స్థాపనకు అవసరమైన 3.0 హెక్టారుల భూమికై అధనపు భూసేకరణ అవసరం లేదని మరియు 550 కె.ఎల్.డి నీరు అవసరము కాగా తమ పిట్స్‌లో గల నీటితోనే ఈ నీటి అవసరము తమకు తీరుతుందని, బయట వనరుల నీటి వినియోగం తమకు అవసరం ఉండకపోవచ్చునని అంచనావేయటం జరిగిందని తెలిపారు.

7. ఈ ప్లాంట్‌కి కావలసిన బొగ్గుని సింగరేణి బొగ్గు గనుల నుంచి మరియు బయట దేశాల నుంచి దిగుమతి చేసుకొందురు. 2.1 ఎం.టి.పి.ఎ బొగ్గు ఉపయోగించెదరు. అందులో 40% బూడిద ఉత్పత్తి అవుతుంది. దానిని తిరిగి సిమెంట్ తయారు చేయుటకు ఉపయోగించెదరు. ఈ ప్లాంటువల్ల 50 మందికి ఉద్యోగములు లభించును. ఈ ప్లాంటుకు 10 కిలోమీటర్ల వృత్తములో నాజుకైన మరియు పురాతన కట్టడములు లేవని తెలిపారు.

8. విమ్టా లాబ్స్ ప్రతినిధి బృందం వారు ది.01.03.2012 నుండి 31.05.2012 వరకు 10 కిలోమీటర్ల వరకు చుట్టుప్రక్కల ప్రదేశాలను తనిఖీ చేసి పర్యావరణ సంబంధిత రిపోర్ట్ గాలి, నీరు మరియు ధ్వనిని దృష్టిలో పెట్టుకుని తయారు చేసినట్లు చెప్పారు.

గాలి నాణ్యత :-

బొగ్గును మూసిన కన్వేయర్ ద్వారా పంపుట, నీళ్ళు చల్లటం ద్వారా ధూళిని నియంత్రించటం మరియు హరితవనం ఏర్పాటు చేయటం ద్వారా నియంత్రించటం జరుగుతుంది. ప్లాంటు మొదలు అయినతరువాత సిమిలేషన్ పద్ధతి ద్వారా పరీక్షిస్తారు. 99.9% సామర్థ్యంగల ఇ.ఎస్.పి ఏర్పాటు చేయడం 77మీటర్ల ఎత్తులో ఒకస్టాక్‌ని ఏర్పాటు చేయడం ద్వారా వాయు వ్యర్థాలని నియంత్రించడం. 50 మీటర్ల హరితవనము ఏర్పాటుచేసి CO_2 మరియు మిగతా వ్యర్థ వాయువును నియంత్రించడం జరుగుతుంది.

నీటినాణ్యత :-

భూగర్భ జలాలను వాడరు, గనుల గుంటలలో వున్న నటిని బాయిలర్, ధూళిని నియంత్రించడానికి వాడుదురు. డొమెస్టిక్ వ్యర్థ నీటిని ఎస్.టి.పి ద్వారా శుద్ధిచేసి హరితవనముల

అవసరాలకు ఉపయోగించెదరు.

ధ్వని నాణ్యత :-

శబ్ద నాణ్యత రెగ్యులేటరీ అధారిటీ వారిచే ఉద్దేశించబడిన 45 డి.బి – 54 డి.బికి లోబడి వుంటుంది.

ప్రమాద పరిశీలన :-

మేనేజ్‌మెంట్ వారు రిస్క్ అసెస్‌మెంట్ మరియు డిజాస్టర్ మేనేజ్‌మెంట్ ప్లాన్ ద్వారా నీటిని పూర్తిస్థాయిలో చిమ్మే పరికరాలని బొగ్గునిల్వవుంచే చోట అమర్చి, ఏమన్నా ప్రమాదాలు జరిగినప్పుడు తక్షణ చర్యలు తీసుకుంటారు.

యం.వో.ఇ.ఎఫ్ మరియు కాలుష్య నియంత్రణ మండలివారు నిర్దేశించిన ప్రకారము ఏంబియంట& ఎయిర్ నాణ్యత (ఎ.ఎ.క్యూ) పాటిస్తారు. మేనేజ్‌మెంట్ వారు రూ.16.3 కోట్లు కాలుష్య యంత్రాలకు, రూ.7.2 కోట్లు సంవత్సరానికి యంత్రాల మరమ్మత్తులు మరియు రక్షణ కోసం ఉపయోగించెదరు.

జాయింట్ కలెక్టరు ప్రజలని తమ సలహాలు మరియు అభ్యంతరాలను నిర్భయంగా చెప్పమని ఆహ్వానించారు.

శ్రీ మాశెట్టి వెంకటేశ్వర్లు, శ్రీనగర్ గ్రామము, తను ఒక వ్యవసాయ కుటుంబీకుడనని మాట్లాడుతూ గత 30 సంవత్సరములుగా ఈ ప్రాంతములో ఈ సిమెంట్ ప్లాంట్ల వల్ల వచ్చిన వాతావరణ కలుషితము వలన గ్రామ ప్రజలు చాలా ఇబ్బందులు పడ్డారు. ఎందుకంటే కంపెనీలు ముందు చెప్పిన విధముగా కలుషిత నివారణ చర్యలు తీసుకోకపోవటం వలన ఈ ప్రాంత ప్రజలు పంటదిగుబడి సరిగా రాక సుమారు రూ.90 కోట్లు నష్టపోయినారు. మేనేజ్‌మెంటు వారు చెప్పిన విధముగా పనులు నిర్వర్తించలేకపోతున్నారు. అందువల్ల ఇక్కడి ప్రజలు చాలా ఇబ్బందులు పడుతున్నారని ఆవేదన వ్యక్తం చేశాడు. ప్రస్తుత ప్రతిపాదించిన బొగ్గుతో నడిచే పవర్‌ప్లాంటు వల్ల వారి ఇబ్బందులు ఇంకా ఎక్కువ అవుతాయని తెలియచేశారు. ప్రస్తుత మేనేజ్‌మెంట్ కూడా గతంలోని యాజమాన్యాలలాగే చెప్పిన వాగ్దానాలు నెరవేర్చకపోతే వాళ్ళు గ్రామాలు ఖాళీచేయటం తప్ప వేరే మార్గంలేదని తెలియచేశారు. మేనేజ్‌మెంటు మీద నిప్పులు వెళ్ళగక్కుచూ స్థానికులైన అనుభవమున్న మరియు అనుభవము లేని వారికి ఉద్యోగ అవకాశాలు కల్పించలేదన్నారు. అందుకని ఇప్పుడు కనీసం 200 మంది కార్మికులను పనిలో పెట్టుకోవాలన్నారు.

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR

ఇంతకు ముందు రైతులు 25 ఎకరాల భూమిని కంపెనీకి గనులకు లీజు ఇవ్వటం వల్లపోగొట్టుకున్నారు. హిమాచల్‌ప్రదేశ్ నుంచి పాత యంత్రసామాగ్రి ఇక్కడికి తెప్పించటం ఇంకా కాలుష్య తీవ్రత పెంచడమేనన్నారు. అందుకని ఇక్కడి స్థానికులతో హిమాచల్‌ప్రదేశ్ నుంచి ఇక్కడికి యంత్రపరికరాలను తీసుకురావలసిన కారణాలు విడమర్చి చెప్పాలన్నారు.

తాను ఈ ప్రాజెక్టుకు వ్యతిరేకం కాదు అని, గ్రామ ప్రజలుకూడా తమవంతు సహాయ సహకారం అందచేస్తారని చెప్పారు. కాని కంపెనీ వాళ్ళు కాలుష్యత లేని పర్యావరణము అందించాలని, కాలుష్య నివారణ యంత్రాలు సరిగ్గా పనిచేయాలని, స్థానికులకి ఉద్యోగఅవకాశాలను కల్పించాలని అందువలన స్థానికులలో కంపెనీమీద మంచి అభిప్రాయము కలుగునని వివరించారు. ఎటువంటి అనాచార కార్యక్రమములు కంపెనీ చేయరాదు. కంపెనీ బొగ్గు ఆధారిత పవర్‌ప్లాంటు కాకుండా వీలుంటే సూర్యరశ్మి ఆధారిత ఎనర్జీప్లాంటు పెట్టుకోవలసినదిగా కోరుచున్నాము అని తెలియచేశారు.

శ్రీ ప్రత్తిపాటి రోశయ్య, నారాయణపురం గ్రామము మాట్లాడుతూ ఈ ప్రాజెక్టును స్వాగతిస్తూ, స్థానికేతర వారికి 80% ఉద్యోగములు కల్పించి స్థానికులకు ఉద్యోగములు కల్పించకపోవడాన్ని గురించి తీవ్ర ఆవేదన వ్యక్తం చేశారు. 1986లో సిమెంట్ కర్మాగారము స్థాపించినప్పుడు మేమందరము స్థానికులకు ఉద్యోగ అవకాశాలు వస్తాయి మరియు స్థానికంగా వృద్ధి చెందుతుందని ఆశించాము. స్థానికులైన వారికి స్కిల్డ్, అన్‌స్కిల్డ్ మరియు కాంట్రాక్ట్ లేబరు ఇచ్చి సిమెంట్ మరియు పవర్ ప్లాంట్ స్టార్ట్ చేసుకోవలసినదిగా కోరినారు.

శ్రీ మేదర డానియల్, గామలపాడు గ్రామము మాట్లాడుతూ వారు ఈ పవర్‌ప్లాంట్ పెట్టుటకు సుముఖంగా లేమని చెప్పి ప్రజాసేకరణ సభ నుంచి వెళ్ళిపోయారు.

శ్రీ మోదుగల సురేష్‌రెడ్డి, శ్రీనగర్ గ్రామము మాట్లాడుతూ వాళ్ళు బొగ్గు ఆధారిత పవర్‌ప్లాంట్ సిమెంట్ కంపెనీ ఆవరణలో పెట్టుటకు సుముఖంగా లేమని చెప్పారు. 70 మీటర్ల ఎత్తుగల స్టాక్ బాయిలర్ అమర్చినప్పటికి కార్బన్‌డైఆక్సైడ్ వ్యర్థాలు వస్తాయని చెప్పారు. ఆయన మేనేజ్‌మెంటు వారిని కలుషితము చేయని సోలార్ ఎనర్జీ లేక గాలి (విండ్) ఆధారిత పవర్‌ప్లాంట్ కాకుండా బొగ్గు ఆధారిత పవర్‌ప్లాంట్ పెట్టుకొనుటకు గల కారణాలని విశదీకరించాలని అన్నారు. మేనేజ్‌మెంట్‌వారు కావలసిన అనుమతులు లేకుండా పవర్‌ప్లాంటుకి కావలసిన యంత్రసామాగ్రిని తరలించినట్లు ప్రజల దగ్గర సమాచారము వుందని చెప్పారు. మేనేజ్‌మెంట్ వారు ఈ పవర్

ప్లాంట్ వల్ల ఎంతమందికి ఉద్యోగములు వచ్చును, ప్రభుత్వము వారికి ఎంత ఆర్థిక సహాయము సమకూరునని అడిగారు, అలాగే కార్బన్‌డైఆక్సైడ్ వ్యర్థాలను ఎంతవరకు హరిత వనాలు నివారించగలవో చెప్పాలన్నారు. మేనేజ్‌మెంటు ఎటువంటి సోషల్ మరియు ఎకనామిక్ సంక్షేమ కార్యక్రమాలు చేయడం లేదని చెప్పారు. అలాగే త్రాగునీటిని సమకూర్చటంలేదని చెప్పారు.

శ్రీ శంకరరావు, శ్రీనగరు మాట్లాడుతూ ప్రజాభిప్రాయ వేదిక శ్రీనగరు లేదా గామాలపాడు గ్రామ పరిధిలో నిర్వహిస్తే అక్కడి ప్రజలు ఎక్కువ మొత్తములో పాల్గొని తమ అభిప్రాయాలను నిరభ్యంతరముగా తెలియచేసే వారని చెప్పారు. వారి గ్రామానికి ఎటువంటి త్రాగునీటి సౌకర్యము లేదని వారు గత 20 సంవత్సరములుగా అవస్థలు పడుతున్నామని చెప్పారు. మేనేజ్‌మెంట్ వారు స్థానికులకు ఉద్యోగఅవకాశములు కల్పించిన తరువాత మాత్రమే పవర్‌ప్లాంట్ మొదలు పెట్టాలని కోరారు. ఇంతకు ముందు మేనేజ్‌మెంట్ వాళ్ళు వాళ్ళ లాభాలకోసం కంపెనీని అమ్మారని వాళ్ళు చుట్టు పక్కల గ్రామాల వాళ్ళకి ఎటువంటి ఉపయోగ కరమైన కార్యక్రమాలను చేయలేదని చెప్పి సభనుంచి వెళ్ళిపోయారు.

శ్రీమతి వంగా పద్మావతి మాట్లాడుతూ ఆమె ఈ ప్రాజెక్టుకు అనుకూలం కాదని, దీని వలన ప్రజల మరియు జీవాల ఆరోగ్యం దెబ్బతింటుందని చెప్పారు మరియు గత 30 సంవత్సరాలుగా ఈ ఫ్యాక్టరీని నడుపుతున్న యాజమాన్యం స్థానికులను అశ్రద్ధ చేస్తూ బయట వారికి ఉద్యోగాలు కల్పిస్తున్నారని చెప్పారు.

శ్రీమతి రమణమ్మ మరియు ఇతరులు మాట్లాడుతూ పవర్ ప్లాంటు నిర్మాణానికి సుముఖంగా లేమని చెప్పారు.

శ్రీ చిలుక చంద్రశేఖర్, ఎడ్వకేట్ మరియు ఏ.పి.సివిల్ లిబర్టీస్ యూనియన్ ప్రజాభిప్రాయ సేకరణకు విచ్చేసిన వారిని ప్రార్థిస్తూ ఎవరయితే పవర్ ప్లాంటు నిర్మాణానికి సుముఖంగాలేరో వారు ధైర్యంగా నుంచుని తమ అభిప్రాయాన్ని వెల్లడించాలని చెప్పారు. లేకపోతే ఇక్కడ కూడా పులిచింతల ప్రాజెక్టు దగ్గర జరిగినట్లే జరుగుతుందని చెప్పారు. ప్రజాభిప్రాయ వేదిక జేపి గ్రూప్ ఆవరణలో కాకుండా బయటపెట్టినట్లయితే బాగుండేది. అనే అభిప్రాయాన్ని వెలిబుచ్చారు. ప్రజాభిప్రాయ సేకరణకి విచ్చేసిన వారిలో చాలామంది కంపెనీ ఉద్యోగులు మరియు కంపెనీ కార్మికులు అని వాపోయారు. మేనేజ్‌మెంట్ లాలుచీ చేసి 700 మంది బయట రాష్ట్రాల వారికి ఉద్యోగాలు ఇచ్చారని చెప్పారు. ఇంతకు ముందు మేనేజ్‌మెంట్‌లు కూడా స్థానికులకు ఉద్యోగ

ENVIRONMENTAL ENGINEER.
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR.

అవకాశాలు ఇవ్వకుండా వెళ్ళిపోయాయన్నారు. ప్రస్తుతమున్న పరిస్థితిలో పల్నాడులోని మిగతా సిమెంట్ కర్మాగారాల వల్ల గాలి కాలుష్యం బాగాపెరిగి పర్యావరణ ముప్పు ఏర్పడుతుందని చెప్పారు. ప్రత్యామ్నాయాలు అయిన సోలార్ ఎనర్జీ మరియు విండ్ ఎనర్జీ ప్రాజెక్టుల ఏర్పాటు పరిశీలించి బొగ్గు ఆధారిత పవర్ ప్లాంటు స్థానములో ఏర్పాటు చేయవలసినదిగా కోరారు. మేనేజ్‌మెంట్ వారు హరిత వనాన్ని ప్లాంటు ప్రాంగణములోపల మాత్రమే ఏర్పాటు చేస్తున్నారు కాని చుట్టు ప్రక్కల గ్రామాలలో ఏర్పాటు గురించి ఏమాత్రము చెప్పటం లేదు. ప్రజలు బొగ్గు ఆధారిత పవర్‌ప్లాంట్ నిర్మాణాన్ని ఈ రాష్ట్రంలో వ్యతిరేకిస్తున్నారు. పురాతన మాన్యుమెంట్స్ గురించి కూడా సరైన అధ్యయనం చేయలేదు. కంపెనీ వారు తమ సిమెంట్ ప్లాంట్ విస్తరణకి తమకి అభ్యంతరం లేదని చెప్పారు. స్థానికులకి ఉద్యోగాలు ఇచ్చినతరువాత పవర్ ప్లాంట్‌కి అనుమతి ఇవ్వాలి. ఇక ముందు ప్రజాభిప్రాయ వేదిక మార్పును కూడా దృష్టిలో పెట్టుకోవాలన్నారు.

శ్రీ కె.నవజ్యోతి, పర్యావరణ పరిరక్షణ సమితి, నడికుడి గ్రామము వారు మాట్లాడుతూ మేము ఇంతకు ముందు దాచేపల్లి పరిసరప్రాంతాలలోని సున్నపుగనులు తమకు వరంగా భావించేవాళ్ళమని కాని అవి ఈనాడు మాకు శాపంగా మారిందని చెప్పారు. ప్రస్తుతము 1500 ఎకరాల పంట భూమి వుంది. దాని కోసం కొత్త కంపెనీలు చెట్టినాడు సిమెంట్స్, హిమాని సిమెంట్స్, మహాసిమెంట్స్ మొదలైన వారు 100 ఎకరాల భూమికోసం ఎదురు చూస్తున్నారు అని చెప్పారు. 400 ఎకరాల సాగుభూమి ఒక్క ఆంధ్రసిమెంట్స్ వారి అధీనములో వుందని చెప్పారు. వాతావరణం కలుషితం వలన జీవరాశులకి ముప్పు ఏర్పడుతుందని చెప్పారు. మాకు చాలా ఆశ్చర్యంగా వుంది. పర్యావరణ మంత్రిత్వశాఖ ఒక్కచోటే సిమెంట్ కర్మాగారాల స్థాపనకి ఎలా తమ సంసిద్ధత వ్యక్తం చేస్తుందని అడిగారు. సిమెంట్ పరిశ్రమలు సిండికేట్ ఏర్పాటుచేసుకున్నాయి. ప్రశాంతముగా జీవించడం ఒక ధర్మమన్నారు, కాబట్టి బొగ్గు ఆధారిత పవర్‌ప్లాంటు నిర్మాణము వద్దన్నారు.

జాయింట్ కలెక్టరు గారు మాట్లాడుతూ ప్రజలు వ్యక్తం చేసిన అభ్యంతరాలకు మేనేజ్‌మెంట్ నుంచి ఎవరైనా సమాధానాలు చెప్పాలని సూచించారు.

శ్రీ బి.యమ్.కె.శర్మ, డిప్యూటి జనరల్ మేనేజర్, జేపి గ్రూప్, సభికులను స్వాగతించి ఈ క్రింది విధంగా వివరణ ఇచ్చారు.

1. జెపి గ్రూప్ యాజమాన్యంతో బాధ్యతలు చేపట్టిన తరువాత అప్పటి ఆంధ్రసిమెంట్స్ కర్మాగార

జాబితాలో ఉండిన అందరు ఉద్యోగులను, కార్మికులను ఎటువంటి మార్పులు లేకుండా తీసుకోవటం జరిగిందని

2. ప్రస్తుతము ఎంతోమంది కాంట్రాక్ట్ పనివారు పనిచేయుచున్నారని, అర్హతగల ప్రాంతీయులైన సివిల్ మరియు మెకానికల్ కాంట్రాక్ట్ పనివారిని అందరిని అవసరమైనంతమేరకు దశలవారీగా తీసుకోవటం జరిగిందని తెలిపారు.

3. ఉత్పాదన నిలిపివేసి యున్న సిక్ యూనిట్‌ను తాము తీసుకుని ఉత్పాదన దిశగా నడుపుతున్నామని తెలిపారు.

4. అతి త్వరలోనే ఉత్పాదన ప్రారంభమైన తరువాత లోడింగ్ మరియు అన్‌లోడింగ్ కాంట్రాక్ట్ కార్మికులను కూడా అవసరమైనంత మేరకు పనిలోనికి తీసుకుంటామని వాగ్దానం చేశారు.

5. నిరంతరముగా కర్మాగారము నడుపుటకు క్యాప్టివ్ పవర్‌ప్లాంట్ ఎంతో అవసరమని నొక్కి ఒక్కాణించారు.

శ్రీ టి.జి.వి.కృష్ణారెడ్డి, ఎం.ఎల్.సి, ప్రత్యేక ఆహ్వానితులు: ప్రజాభిప్రాయ సేకరణకు విచ్చేసిన వారిని స్వాగతిస్తూ, గత 30 సంవత్సరముల నుంచి జరుగుతున్న సంఘటనల వలన ఇక్కడి ప్రజలు భయపడుతున్నారు అన్నారు. ప్రస్తుత మనేజ్‌మెంట్ వారికి ప్రజలతో సత్‌సంబంధాలు లేవు. మేనేజ్‌మెంటు వారిని ప్రస్తుత ఉద్యోగులను మరియు కాంట్రాక్ట్ ఉద్యోగులను కంపెనీ రోల్స్‌లో తీసుకోవలసినదిగా అభ్యర్థించారు. స్థానికులను కాకుండా పొరుగు రాష్ట్రాల వారిని ఉద్యోగములలో చేర్చుకొనుటను విభేదించారు. ఉద్యోగ విషయములు, 25 ఎకరముల పట్టాభూమి మరియు లోడింగ్, అన్‌లోడింగ్ కాంట్రాక్ట్ కార్మికుల విషయములు ప్రజాభిప్రాయ సభకు సంబంధించినవి కావని నొక్కి ఒక్కాణించారు. అసిస్టెంట్ డైరెక్టర్, మైనింగ్ డిపార్టుమెంట్ వారు పొరపాటున 25 ఎకరాల పట్టాభూమిని మైనింగ్ కార్యాకలాపాలకు నిమిత్తం కంపెనీకి ఇచ్చారని, రైతుల ఫిర్యాదులను పరిశీలించిన తరువాత దాని రద్దు కొరకు ప్రభుత్వానికి నివేదిక సమర్పించారాని చెప్పినారు. ఈ అంశాలు అన్ని మేనేజ్‌మెంట్ వాళ్ళు దృష్టిలో పెట్టుకొని స్థానిక ప్రజలతో మంచి రిలేషన్స్‌ని పెంపొందించడానికి కృషిచేయాలి.

కర్మాగారానికి చుట్టూ ఎత్తుగా పెరిగే చెట్లను పెంచడం ద్వారా ప్రద్యూషణను చాలా వరకు నియంత్రించవచ్చని తెలిపారు. పరిసరాలలో 1.5 కిలోమీటర్ల వృత్తం లోపలవున్న వ్యవసాయ పంటలకు నష్టం వాట్లికుండా తగిన నిపుణుల సలహాలు తీసుకోమని సూచించారు.

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR

రెవిన్యూశాఖాధికారులు తగిన వాస్తవ వివరాలను తెలుసుకొని, కాలుష్యనివారణ చర్యలు తీసుకుని, తగిన పరికరాలను వినియోగించి వాటిని నిరంతరం పర్యవేక్షించే ఏర్పాట్లు చేయడం ద్వారా కాలుష్యాన్ని నివారించవచ్చని చెప్పారు.

నీరు చల్లే యంత్రములను బొగ్గు లోడింగ్, అన్‌లోడింగ్ స్థానాలలో వినియోగించడం ద్వారా దుమ్ము, ధూళి కాలుష్యాన్ని నివారించవచ్చని, బొగ్గు తరలించే మార్గమున పొందుగల రైల్వే స్టేషన్ నుండి కర్మాగారం వరకు సిమెంట్ రోడ్డు నిర్మాణం చేపట్టడం ద్వారా కూడా చాలావరకు కాలుష్యం నివారించవచ్చని కంపెనీ యాజమాన్యాన్ని కోరడం జరిగింది. వ్యర్థ నీరు శుద్దీకరణ పరికరాలను కూడా వినియోగించాలని సూచించారు. యాజమాన్యం సూర్యరశ్మి ఆధారిత విద్యుత్ వుత్పాదన దిశగా కూడా ఆలోచించాలని సూచించారు. ఒక మెగా వాట్ సోలార్ విద్యుత్ ఉత్పాదనకు 8 నుండి 9 కోట్లు ఖర్చుగా అంచనావేశారు. 30 మెగావాట్లకు రూ.270 కోట్లు ఖర్చు కాగలవని సూచించారు. దాని ద్వారా కాలుష్యం పూర్తిగా ఉండదని అభిప్రాయపడ్డారు. ప్రాంతీయులకు ఉపాధి కల్పన చేయాలని యాజమాన్యాన్ని డిమాండ్ చేశారు. కర్మాగార స్థాపనకు ప్రజల అభిప్రాయంతో తాను ఏకీభవిస్తున్నట్లు తెలియచేశారు.

జంగల సింగరాయ యాదవ్ మాట్లాడుతూ ప్రస్తుతం వున్న సిమెంట్ కర్మాగార ఆవరణలోనే విద్యుత్ కర్మాగారస్థాపన తనకు సమ్మతమేనని కాని యాజమాన్యం కార్మికులకు రోజుకు రూ.300/- మాత్రమే కూలి చెల్లించుచుండటం వలన కర్మాగార స్థాపనను వ్యతిరేకిస్తున్నాట్లు చివరిలో చెప్పారు.

కోపము మరియు అనిశ్చితిగా వున్న కొంత మంది ప్రజలు కర్మాగారమునకు వ్యతిరేకముగా ప్లే కార్డ్సు మీద శ్లోగన్స్ వ్రాసుకొని ప్రజాభిప్రాయసభ నుంచి అరుచుకుంటూ వెళ్ళిపోయారు.

మొత్తం **205** వ్రాత పూర్వక వినతి పత్రములు స్వీకరించటం జరిగింది.

అందులో **191** పత్రాలు కర్మాగార స్థాపనకు సానుకూలంగాను, **14** వ్యతిరేకంగాను ఉన్నాయి. వినతి పత్రాలను జతచేయటం జరిగింది. వ్యతిరేక పత్రాలు ఈ క్రింది వారు సమర్పించినారు.

1. శ్రీ బి.రామకృష్ణారెడ్డి, రామాపురము.
2. శ్రీ జి.కోటిరెడ్డి, శ్రీనగరు
3. శ్రీ జి.వెంకటేశ్వర్లు, పొందుగల.
4. శ్రీ యమ్.సురేష్‌రెడ్డి, శ్రీనగరు

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR.

5. శ్రీ వి.రమణ మరియు ఇతరులు, మాజీ సర్పంచ్, రామాపురము.
6. శ్రీ.కె.శ్రీనివాసరావు, జనరల్ సెక్రటరీ, పి.డి.యమ్ పార్టీ, గుంటూరు.
7. శ్రీ బి.కొండారెడ్డి, జనరల్ సెక్రటరీ, పి.కె.ఎస్.పార్టీ
8. శ్రీ ఎస్.సుబ్బారావు మరియు ఇతరులు, గామాలపాడు.
9. శ్రీ వెంకటేశ్వర్లు, రామాపురము.
10. శ్రీ బి.కలన నాయక్, భట్రుపాలెము తండా గ్రామము.
11. శ్రీ ఎ.వెంగళారెడ్డి, రామాపురము
12. శ్రీ జి.వేదముని, ప్రెసిడెంట్, ఎం/ఎస్ చిప్స్ & పల్వరైసర్స్ యూనియన్
13. శ్రీ సి.చంద్రపాల్, రామాపురం
14. శ్రీ పి.సాంబయ్య, రామాపురము.

జాయింట్ కలెక్టరుగారు సభ ముగింపు ఉపన్యాసం ఇస్తూ ప్రజాభిప్రాయసేకరణ సభలో ఇందుకు సంబంధించినవే కాక దీనికి సంబంధించని సాధారణ సమస్యలతో కూడిన విన్నపాలు కూడా వచ్చాయని వాటిని సంబంధిత అధికారులకు పంపుతామని ఈ సభకార్యక్రమమునంతా దృశ్య నిక్షిప్తం చేయటం జరిగిందని (వీడియో గ్రఫీ), అన్ని దస్తావేజులను పొందుపరచి సంబంధిత మంత్రిత్వశాఖలకు తదుపరి చర్యల నిమిత్తము పంపటం జరుగుతుందని చెపుతూ ముగింపు పలికారు.

4/2/13

పర్యావరణ ఇంజనీరు &
మెంబరు కన్వీనర్,
ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి,
రీజనల్ కార్యాలయం, గుంటూరు.

జాయింట్ కలెక్టర్, గుంటూరు జిల్లా మరియు
చైర్‌పర్సన్, ప్రజాభిప్రాయ సేకరణ కమిటి.

ENVIRONMENTAL ENGINEER.
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR.

Attendance at
The Environmental Public Hearing of
M/S. JAYPEE CEMENTS (ANDHRA CEMENTS)
Durgapuram(V) Dachepalli(M) Guntur Dt
conducted on 30.01.2013 for the
30 MW CAPTIVE POWER PLANT

Sl. No	Name and Designation of official	Signature
1.	K. Sarada Devi, J.C.	[illegible]
2.	K. L. P. Kumar, EE	[illegible] 30/1/13
3.	B. M. K. SARMA. (DGM)	[illegible] 30/1/13.
4.	M. PRABHAKAR RAO (DGM)	[illegible] 30/1/13.
5.	R. K. DOODA (Sr. V.P)	[illegible] 30.1.13
6.	R.K. NARULA V.P. (Admn.)	[illegible] 30/1/13
7.	Binod Kumar Addl G.M (Civil)	[illegible] 30/1/13.
8.	Amarendra Kamat	[illegible] 30.1.13
9.	AKURI VENKAT REDDY (RAMAPURAM)	A. Venkata Reddy.
10.	VEERALA CHINNA PULLAIAH (RAMAPURAM)	V. ch. Pullaiah
11.	N. HAZAGARVALI (SRINAGAR)	[illegible]
12.	E. [illegible] ([illegible])	E. Anjaneya Reddy
13.	N KOTESWARA RAO	[illegible]
14.	K [illegible] Bornagar	K [illegible] K Carl

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR

Sl. No	Name and Designation of official	Signature
15.	N. S. Reddy N.G.O.	[illegible]
16.	V. Sanandа Reddy. Dharithri : NGO	V.S.A [illegible]
17.	M. VENKAT REDDY NGO.	[illegible]
18.	[illegible] — NGO [illegible]	G. J[illegible]
19.	G. Vijay Reddy READS. — NGO.	[illegible]
20.	MD. Nazeer Ahmed - NGO	[illegible]
21.	P. Kiran Kumar MRPS	P. Kir[illegible]
22.	K. Vijaya Gandhi	[illegible]
23.	P [illegible]	
24.	P Raju - NGO - Hyd.	[illegible]
25.	P. [illegible], రామపురం	
26.	K-satishkumar - NGO - WGL.	[illegible]
27.	B. Shekar - NGO - Hyd	[illegible]
28.	T. Ramakrishna - [illegible]	T. Ra[illegible]
29.	V. [illegible]	[illegible]
30.	K - SAIDA REDDY SRINAGAR	K. S. Reddy
31.	K. Venkata Reddy (SRINAGAR)	[illegible]
32.	K. VENKAT RAO (NARAYANPURAM DACHEPALLI	[illegible] 30.1.2013
33.	N. NAGABHUSHANAM SRINAGAR	నాగభూషణం
34.	V. [illegible]	V. [illegible]

ANNEXURE-XI
PUBLIC HEARING PROCEEDINGS

Sl.No	Name and address of the person	Signature
35	B. Krishna Prasad (Nadi kudi)	B. Krishna Prasad
36	[illegible]	[illegible]
37	Chi Lunula Durga Rao ([illegible])	[illegible]
38	Toteti Viswanath (Nadikudi)	T. Viswanath
39	Y [illegible] ([illegible])	Narasi-Rao
40	[illegible]	[illegible]
41	[illegible]	K Venu
42	O. Nagesware Rao — S. A. P.	[illegible]
43	[illegible]	
44	Gurram. Venkateswarlu Rama puram	G. Venkateswarlu
45	A. Kumar NGO HYD.	[illegible]
46	K. MURALI KRISHNA NDKD	K. Murali Krishna
47	[illegible]	[illegible]
48	CH. [illegible]	
49	[illegible]	[illegible]
50	T.V. [illegible]	T.V. [illegible]
51	[illegible]	[illegible]
52	B. Rami Reddy.	Srinagar.
53	K - [illegible], [illegible]	[illegible]

ENVIRONMENTAL ENGINEER
A.P. POLLUTION CONTROL BOARD
REGIONAL OFFICE, GUNTUR.

Sl No	Name and address of the person	Signature
54	T వెంకట రెడ్డి గ్రా॥ [illegible]	T వెంకట రెడ్డి
55	Ch. Sridhar Goud R. [illegible] (గొల్లపూడి)	[signature]
56	B.SRINIVASA RAO (Durgapuram)	B.S.Rao
57	K. Seshi Reddy Srinagar	K.S.R
58	వేముల వెంకట రెడ్డి (రామాపురం)	V. Venkata Reddy
59	N. Chandra Sekhar (Ramapuram)	N. Chandra Sekhar
60	V. వేముల నర్సిరెడ్డి (రామపురం)	V. నర్సిరెడ్డి
61	S. Ranjith Kumar (Ramapuram)	S. Ranjith Kumar
62	V. Linga Reddy [Ramapuram]	[signature]
63	A వెంకటరెడ్డి (రామాపురం)	A వెంకటరెడ్డి
64	వేముల ప్రతాప రెడ్డి (రామాపురం)	వేముల ప్రతాప రెడ్డి
65	[illegible]	[illegible]
66	Y. [illegible] గ్రా॥ [illegible]	Y. [illegible] 30/1/13
67	J. Rajesh Kumar [illegible]	[signature]
68	J. Parameswara Rao [illegible]	[signature]
69	[illegible] (పొందుగల)	[signature]
70	J. [illegible] ([illegible])	J. [illegible]
71	E. prasad Damarachorla	E. prasad
72	R. [illegible] (పొందుగల)	R. [signature]
73	[illegible]	B [illegible]

ENVIRONMENTAL ENGINEER
POLLUTION CONTROL BOARD
REGIONAL OFFICE GUNTUR.

Annexure-XII

Particulars of Coal

ANNEXURE-XII
PARTICULARS OF COAL

1.0 Source of Coal

Coal requirement will be 0.21 MTPA and is proposed to be sourced from Singareni Collieries. Application for the long terms indigenous coal linkage has been submitted and is in process. Alternatively, it is also proposed to use the indigenous coal to be procured through e-auction which would be of E and F grade quality. The quality of the coal to procure either from Singareni Collieries or through e-auction is expected to be:

TABLE-1
INDIGINEOUS COAL QUALITY

Sr. No.	Parameter	Worst Quality
1	GCV, Kcal/kg	< 3000
2	Ash, %	45.0
3	Volatile matter, %	21
4	Moisture, %	15
5	Sulphur content, %	0.5

However, as an interim arrangement to meet the coal requirement for the proposed 30 MW CPP, an MoU has been signed with M/s Rawmet Commodities Pvt. Limited, Kolkata who is a coal import trader would be supplying 0.21 MTPA imported coal from Indonesia and from its associates in various coal producing countries. As per the MoU, the coal is expected to have a GCV of 5000 kcals/ kg and the coal requirement would be 0.146 MTPA (at worst operating conditions). The coal quality is given below:

TABLE-1A
IMPORTED COAL QUALITY

Sr. No.	Parameter	Coal Quality
1	GCV, Kcal/kg	>5000
2	Ash, %	8-12
3	Volatile matter, %	42
4	Moisture, %	39
5	Sulphur content, %	0.6

2.0 IMPACT ASSESSMENT

Impact prediction has been carried out for use of above imported coal for the proposed 30 MW power plant. Also solid waste and gaseous emissions are calculated based on coal requirement of 0.146 MTPA.

2.1 Impact on Air Quality

The major source of emission from the proposed power plant is stack attached to boiler. Particulate Matter (PM), Sulphur dioxide (SO_2) and Oxides of Nitrogen (NO_x) are the major pollutants from the proposed power plant. The expected stack emissions and emission loads have been computed based on Imported Coal. The details are given in **Table-2.**

ANNEXURE-XII
PARTICULARS OF COAL

TABLE-2
EXPECTED STACK EMISSION DETAILS

Sr. No	Stack Dimensions	CPP
1	Stack height (m)	77
2	Diameter (m)	2.0
3	Velocity (m/s)	15.96
4	Temperature (deg C)	140
5	Flow rate (Nm^3/sec)	36.15
6	Coal Quantity, TPH	16.62
7	Particulate Matter (g/s) (50 mg/Nm^3)	1.80
8	Sulphur dioxide (g/s) 0.6 % S	55.40
9	Oxides of Nitrogen (g/s) 260 ng/kjoules	26.64

Prediction of impacts on air environment has been carried out by employing **Industrial Source Complex Short Term [ISCST3]** mathematical model based on a steady state Gaussian plume dispersion model designed for multiple point sources for short term.

Air pollution modeling has been carried out by estimating GLCs at about 1200 receptors to obtain an optimum description of variations in concentrations over the site in 10-km radius covering 16 directions. The incremental ground level concentrations for PM_{10}, SO_2 and NOx are given in **Table-3**. The incremental GLCs with imported coal have been compared with incremental GLCs with indigenous coal from Singareni collieries (as shown in Section-4.3.5 of Chapter-4).

TABLE-3
INCREMETNAL GLC's (WORST CASE SCENARIO)

Pollutant	Due to Domestic Coal (0.5% Sulphur) ($\mu g/m^3$)	Due to Imported Coal (0.6% Sulphur) (Worst Coal) ($\mu g/m^3$)
PM_{10}	0.17	0.17
SO_2	6.4	5.3
NOx	2.24	2.58

The resultant GLCs for PM_{10}, SO_2 and NO_X are given in **Table-4**.

TABLE-4
RESULTANT CONCENTRATIONS DUE TO INCREMENTAL GLC's (WORST CASE SCENARIO)

Pollutant	Maximum Baseline Concentration ($\mu g/m^3$)	Incremental Concentrations due to Proposed Project (Imported coal with 0.6% Sulphur) ($\mu g/m^3$)	Resultant Concentrati on ($\mu g/m^3$)	NAAQ Limits specified by CPCB
PM_{10}	56.8	0.17	57.0	100
SO_2	11.6	6.4	18.0	80
NO_X	14.2	2.24	16.4	80

The above table shows that the resultant concentration of SO_2 of the proposed 30 MW thermal power plant with imported coal is less than with indigenous coal and is well within the prescribed NAAQ limits.

There will not be any significant air impacts due to Imported Coal in place of Domestic Coal.

2.2 Impact of Solid Waste

The details of ash generated due to use of imported coal are given in **Table-5.**

TABLE-5
EXPECTED GENERATION OF SOLID WASTE

Type of Solid Waste	Quantity of Generation (MTPA)		Mode of Disposal
	Domestic Coal	Imported Coal	
Ash	0.0945	0.0175	Entire ash will be 100% utilized for pozzolona cement making by the cement plant
Bottom ash	0.0756	0.0140	
Fly ash	0.0189	0.0035	

Ash generation will be reduced significantly with the use of Imported Coal as the ash content in the imported coal will be maximum 12%. However, as the entire ash generated will be used in the cement manufacturing in the 3.5 MTPA operating cement located adjacent to the proposed 30 MW CPP and no on-land storage is proposed, ash generation will not have any impacts on the environment and surroundings whether imported or indigenous coal are used.

2.3 Emission Calculations

2.3.1 Particulate Matter

- *Area Calculations*

$$Area(m^2) = \frac{3.14 \quad x \quad (Top\ Stack\ Diameter)^2}{4} = 3.14 \text{ X } (2.0)^2/4 = 3.14 \text{ m}^2$$

- *Temperature Correction*

Temperature correction is calculated based on standard ambient temperature of 25° C.

$$Temperature \quad Correction = \frac{273 \quad + \quad 25^0\ C}{273 \quad + \quad StackTemperature^0\ C} = 298/413 = 0.722$$

- *Volumetric Flow Rate*

$$Volumetric\ flow\ (\frac{Nm^3}{s}) = Area\ (m^2)\ x\ Exit\ Velocity\ (m/s)\ x\ Temperature\ Correction$$

$$= 3.14 \text{ X } 15.96 \text{ X } 0.722 = 36.16 \text{ Nm}^3/\text{s}$$

ANNEXURE-XII
PARTICULARS OF COAL

2.3.2 Sulphur dioxide

Coal Consumption	=	16.62 TPH
	=	16620 kg/hr
Sulphur content in coal	=	0.6%
Sulphur emission factor	=	(0.6/100) x (64/32) = 0.012
SO_2 emission rate	=	Emission factor x consumption of coal in kg/hr
	=	0.01 x 16620 = 199.44 kg/hr
	=	55.40 g/sec

2.3.3 NOx Emissions

$260 \times 5300 \times 16.62 \times 4.187/10^6/3.6 = 26.64$ g/s

Annexure-XII(A)

Fuel Supply Agreement

ANNEXURE-XIIA
FUEL SUPPLY AGREEMENT

भारतीय गैर न्यायिक

एक सौ रुपये

Rs. 100

रु. 100

ONE HUNDRED RUPEES

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

उत्तर प्रदेश UTTAR PRADESH

BL 237360

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") made and entered on 26th February, 2013 by and between:-

Durga Cement Works (A Unit of Andhra Cements Ltd), a company incorporated in accordance with the Companies Act, 1956 and having its registered office at Village Durgapuram, Dachepalli, Dist Guntur, Andhra Pradesh-522414 (hereinafter referred to as the "Buyer" which expression shall, unless repugnant to the contest or meaning thereof, include its successors and permitted assigns) of the ONE PART, and

Rawmet Commodities Pvt Ltd a company registered under the Companies Act, 1956 having its registered office at 40/7 Ballygunge Circular Road, Kolkata 700019, West Bengal, India hereinafter called the "Seller, which term shall, unless repugnant to the subject or context, include its successors and permitted assigns, of the OTHER PART.

Andhra Cements Limited

Rawmet Commodities Pvt Ltd

Authorised Signator

AXIIA-1

ANNEXURE-XIIA
FUEL SUPPLY AGREEMENT

ANNEXURE-XIIA
FUEL SUPPLY AGREEMENT

Whereas Buyer is setting up a 30 MW Coal based Captive Thermal Project at Village Durgapuram, Dachepalli, Dist Guntur, Andhra Pradesh-522414 to provide electric power within the premises of its Cement Plant.

AND whereas Buyer is desirous of making an arrangement for coal supply of the required quality and in requisite quantity to meet the operational requirement of the Captive Power Project.

AND Whereas Seller is a large importer of Coal to India sourced from Indonesia and from its associates in various coal producing countries.

AND WHEREAS both Parties with intent of exploring opportunities for the purpose of entering into a Fuel Supply Agreement in near future have agreed to enter into a Memorandum of Understanding (MOU) at the following terms and conditions.

NOW, THEREFORE, IN RECOGNITION OF AGREEMENT IN PRINCIPLE, THE PARTIES RECORD THEIR UNDERSTANDING AS FOLLOWS:-

1) Seller shall source Coal from Indonesia to meet the Coal requirement of Buyer's 30 MW Captive Power Plant, upon commissioning of the Power Plant for a period of 7 to 10 years.

2) Seller shall supply coal to Buyer's Power Plant of the specification as given below:-

Coal sourced from Indonesia:	GCV	: 5300 Kcal/kg
	Ash content	: 8-12%
	Moisture content	: 39% (max)
	Volatile Mater	: 42%
	Sulphur	: 0.6% (max)

3) Seller shall supply approx 2,10,000 MT per annum Coal.

Andhra Cements Limited

Rawmet Commodities Pvt. Ltd.

Authorised Signatory

4) Both parties should use Platt's coal Index for the purpose of fixing price for supply of Coal.

5) They key specification of Coal will be:

Fuel	Ash%	Moisture%	Volatile matter%	Fixed Carbon%	GCV Kcal/Kg
Imported Coal (Indonesia)	8-12% Avg.10%	IM:14% TM:30-39%	30-42%	30% 48%	5300

6) This MOU shall remain in effect until the first to occur of the following events:

(i) Twelve months or any mutually agreed extended period following the date of execution of this MOU; or

(ii) The execution by Parties of a detailed Fuel Supply Agreement; or

(iii) Agreement of all Parties to terminate or otherwise withdraw from this MOU.

7) This MOU shall be framework for possible future negotiations and agreements between the Parties which shall govern the rights and obligations of the Parties.

8) This MOU shall be governed and interpreted by, and construed in accordance with the laws of India.

9) Any dispute or question arising between the Parties touching the meaning, construction or effect of this MOU or of any clause or thing herein contained or regarding the respective liabilities and rights under this MOU, which cannot be settled amicably by the Parties, by mutual negotiation within 30 (thirty) days of issue of a notice by either Party, then every such dispute or question shall be referred to and finally resolved by Arbitration to be held in accordance with the provisions of Arbitration and Conciliation Act , 1996. For the purpose of arbitration, each Party will appoint one arbitrator and thereafter the appointed arbitrators shall nominate a presiding arbitrator. The place of arbitration or sitting shall be at Delhi in India alone.

Andhra Cements Limited

Rawmet Commodities Pvt. Ltd.

Authorised Signatory

10) For the purpose of disputes under this MOU, the jurisdiction shall lie at Delhi court competent under law.

In witness whereof the parties have executed this MoU through their authorized representative on the 26th day of February month and 2013 year as mentioned at the beginning of this document in Presence of:

On behalf of	On behalf of
Durga Cement Works	**M/s. Rawmet Commodities Pvt Ltd.**
Andhra Cements Limited	Rawmet Commodities Pvt. Ltd.
26/2/13	Authorised Signatory
Witness	
1. MUNISH KAPUR JA ANNEXE SEC-134	1.
2. SEEMANT YADAV JA ANNEXE SEC-134	2. Mudit Bedi