

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.

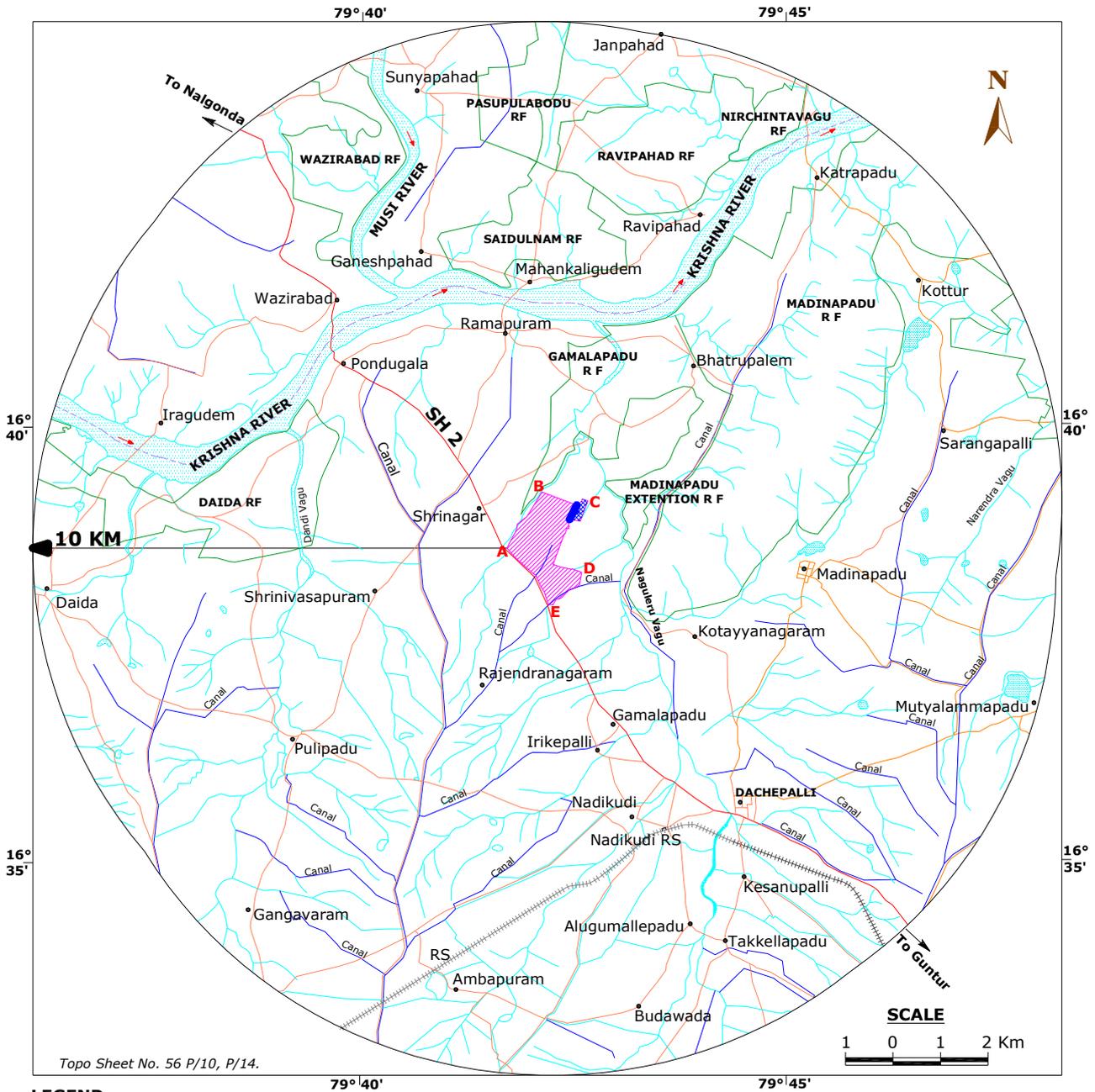
10.5 Cost of the Project

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^o 38' 2.83" N to 79^o 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;



LEGEND

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

Plant Boundary Co-ordinates

- A** : 16°38'37.36" N; 79°41'41.15" E
- B** : 16°39'16.05" N; 79°42'07.93" E
- C** : 16°39'09.94" N; 79°42'38.29" E
- D** : 16°38'20.69" N; 79°42'34.28" E
- E** : 16°37'58.20" N; 79°42'15.62" E

CPP Site Co-ordinates

- *** : 16°39'02.83" N; 79°42'32.53" E

**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^oC 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 m³/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/Nm³ as per norms specified by State Pollution Control Board. A part from dust, gaseous pollutants like SO₂, 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 $\mu\text{mhos/cm}$ to 466 $\mu\text{mhos/cm}$. 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}, PM₁₀, SO₂ and NO_x. 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 ($\mu\text{g}/\text{m}^3$)	
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	NO _x	<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 $\mu\text{S}/\text{cm}$ 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 ($\mu\text{g}/\text{m}^3$)	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 m³/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/Nm³.

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 SO₂. Low NO_x burners will be installed to control the NO_x 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.