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	0.0945 MTPA	• Fly ash will be 100% utilized for pozzolona cement making by the cement plant
Fly ash	0.0756 MTPA	
Bottom ash	0.0189 MTPA	• 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 µg/m^3, 6.4 µg/m^3 and 2.24 µg/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 µg/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.

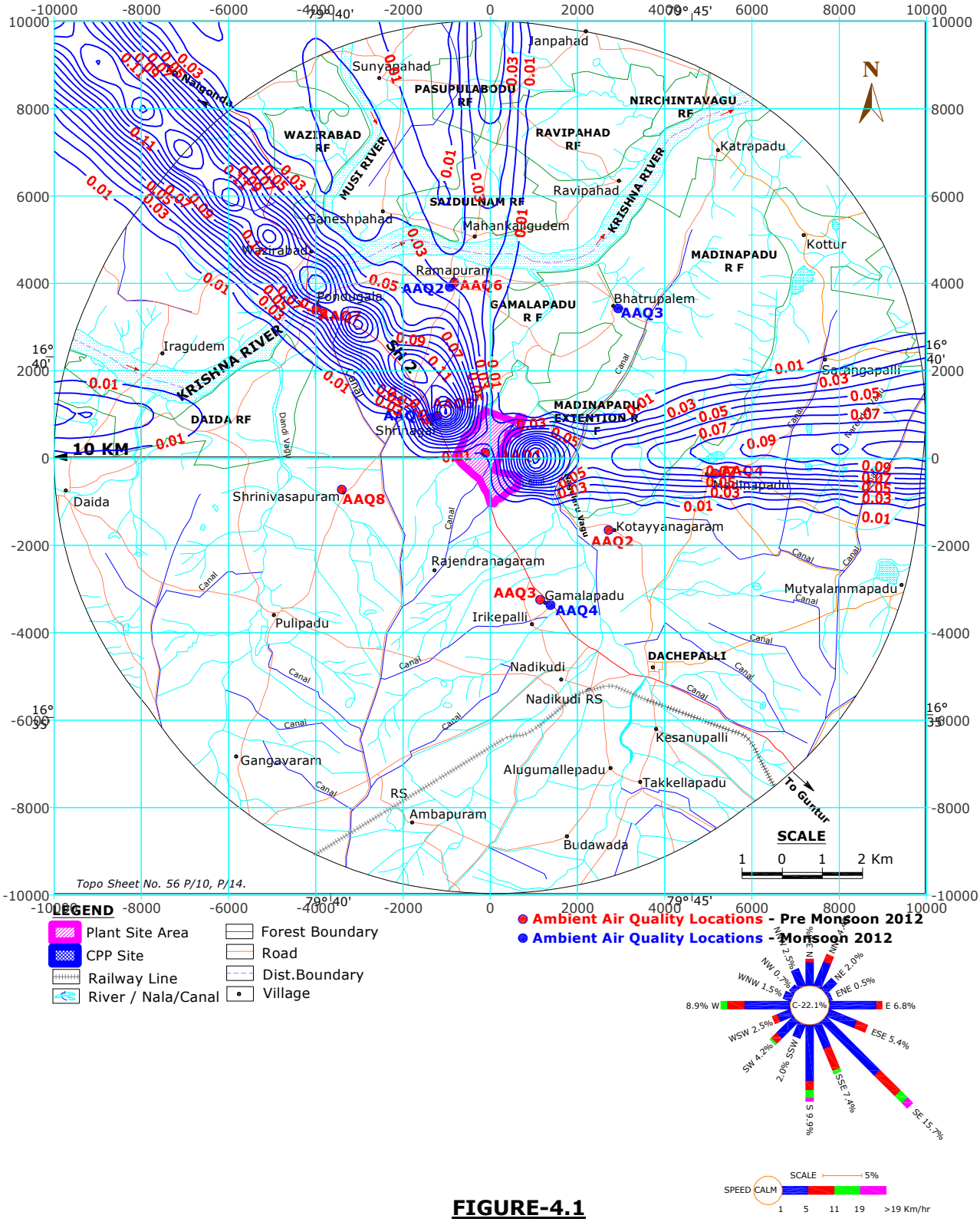

FIGURE-4.1
SHORT TERM GLC CONCENTRATION OF PM_{10}

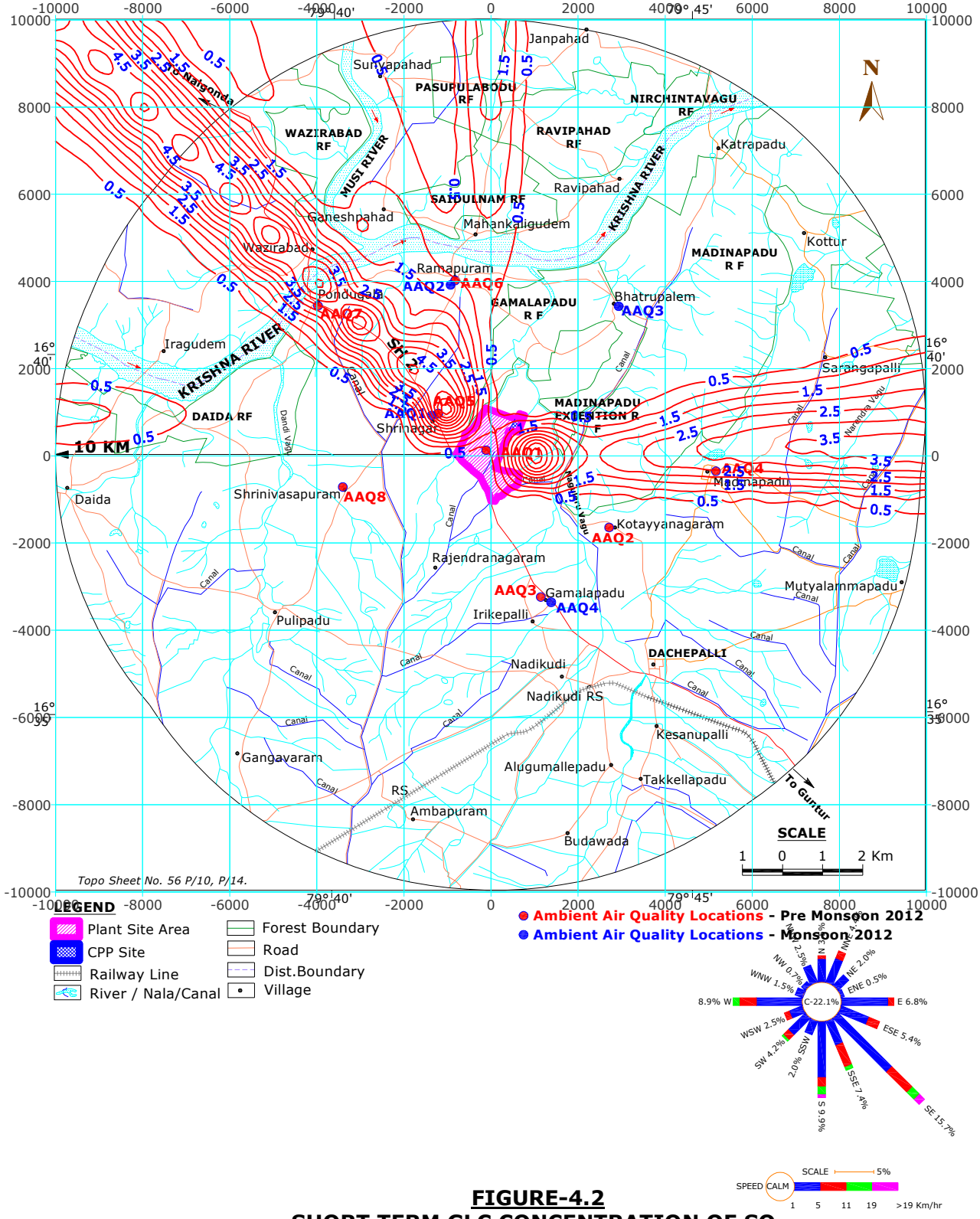

FIGURE-4.2
SHORT TERM GLC CONCENTRATION OF SO_2

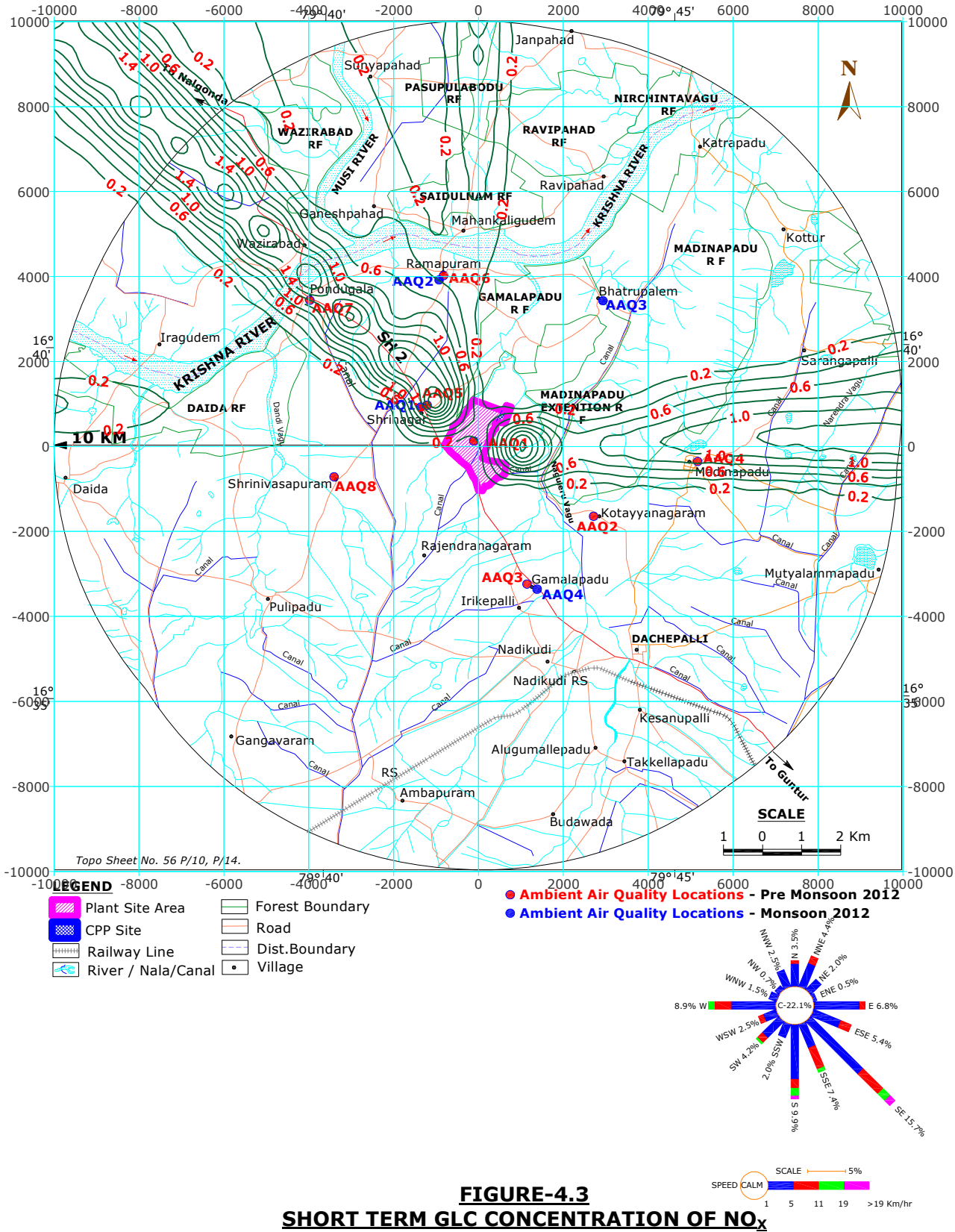

FIGURE-4.3
SHORT TERM GLC CONCENTRATION OF NO_X

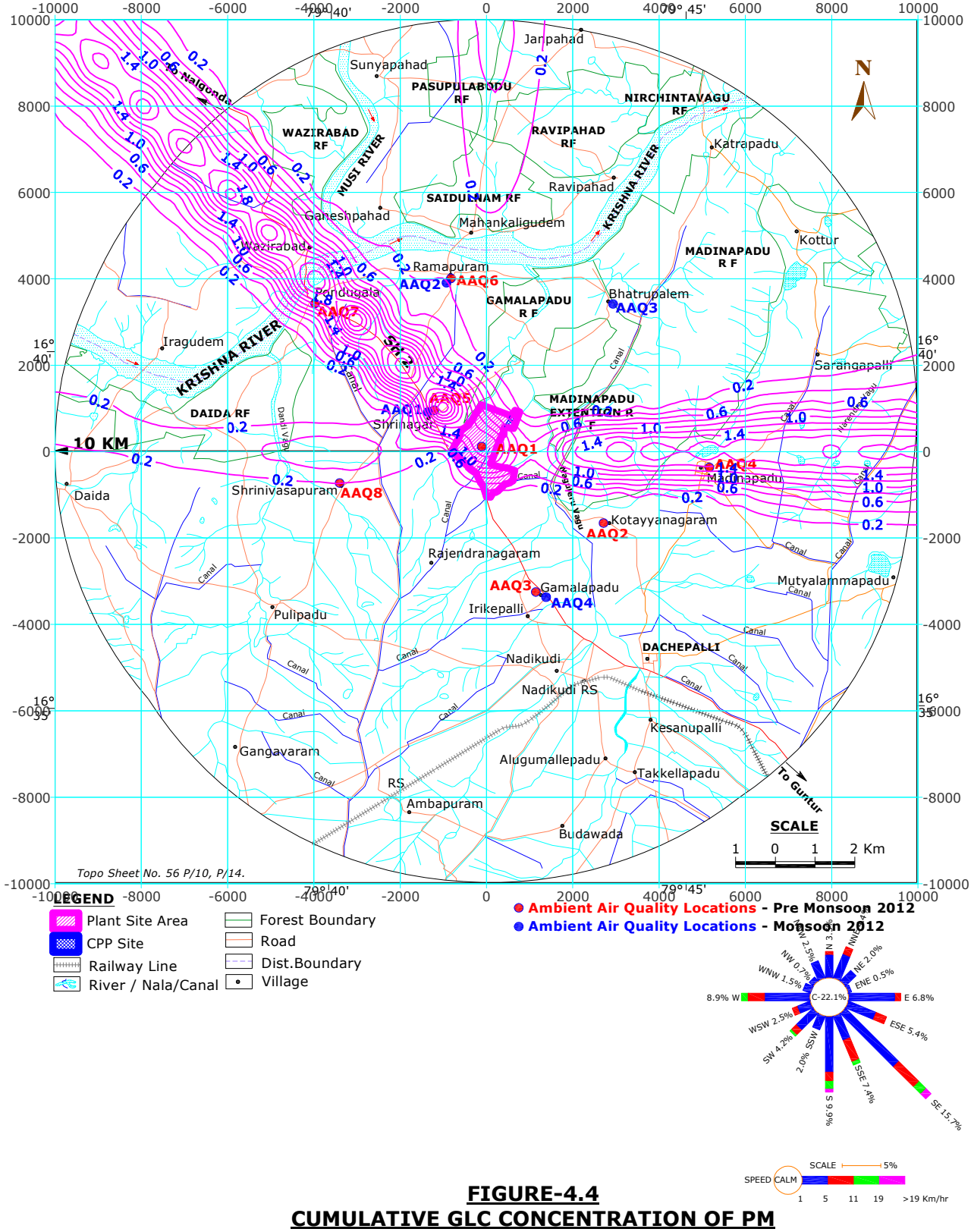

FIGURE-4.4
CUMULATIVE GLC CONCENTRATION OF PM

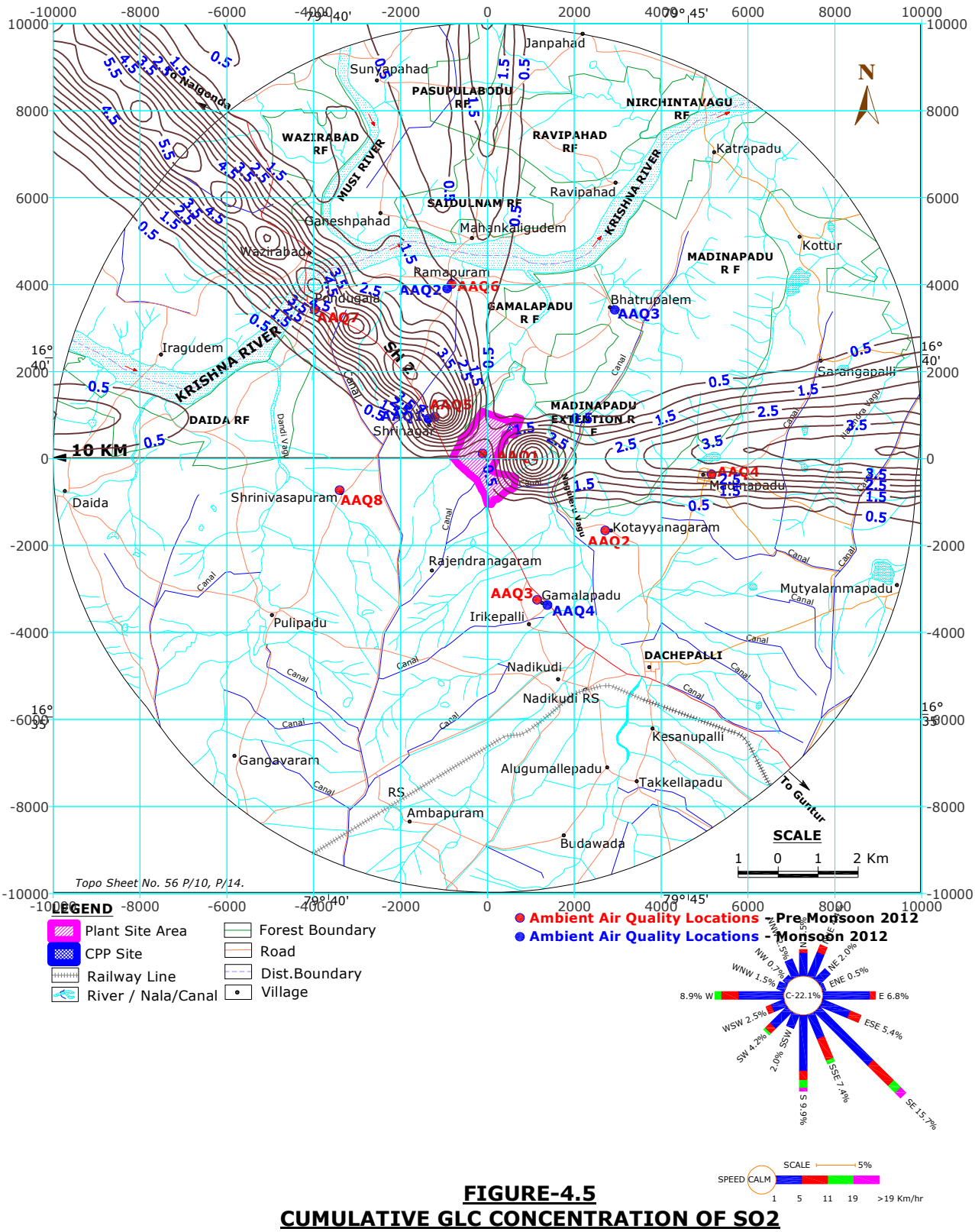

FIGURE-4.5
CUMULATIVE GLC CONCENTRATION OF SO2

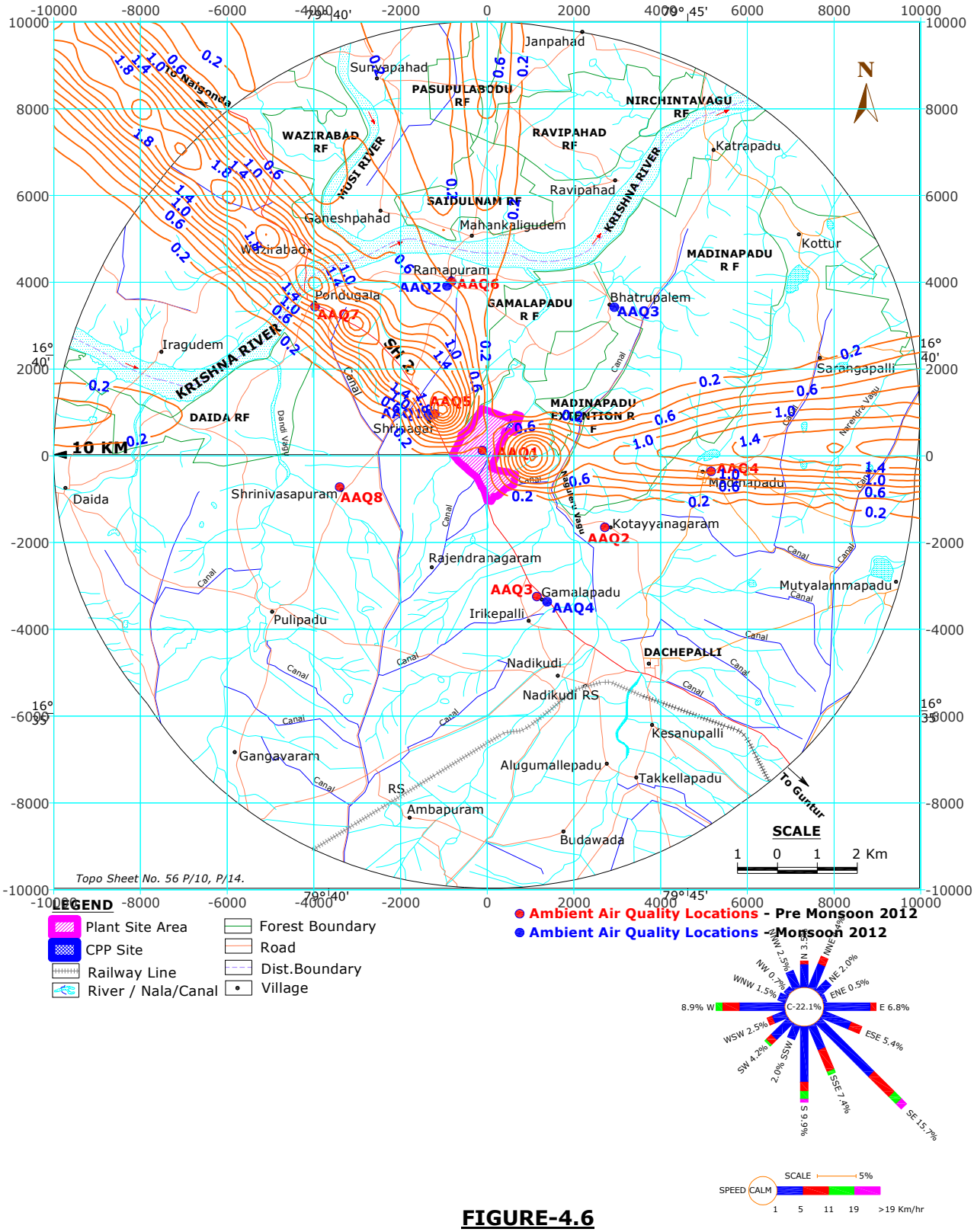

FIGURE-4.6
CUMULATIVE GLC CONCENTRATION OF NO_X

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

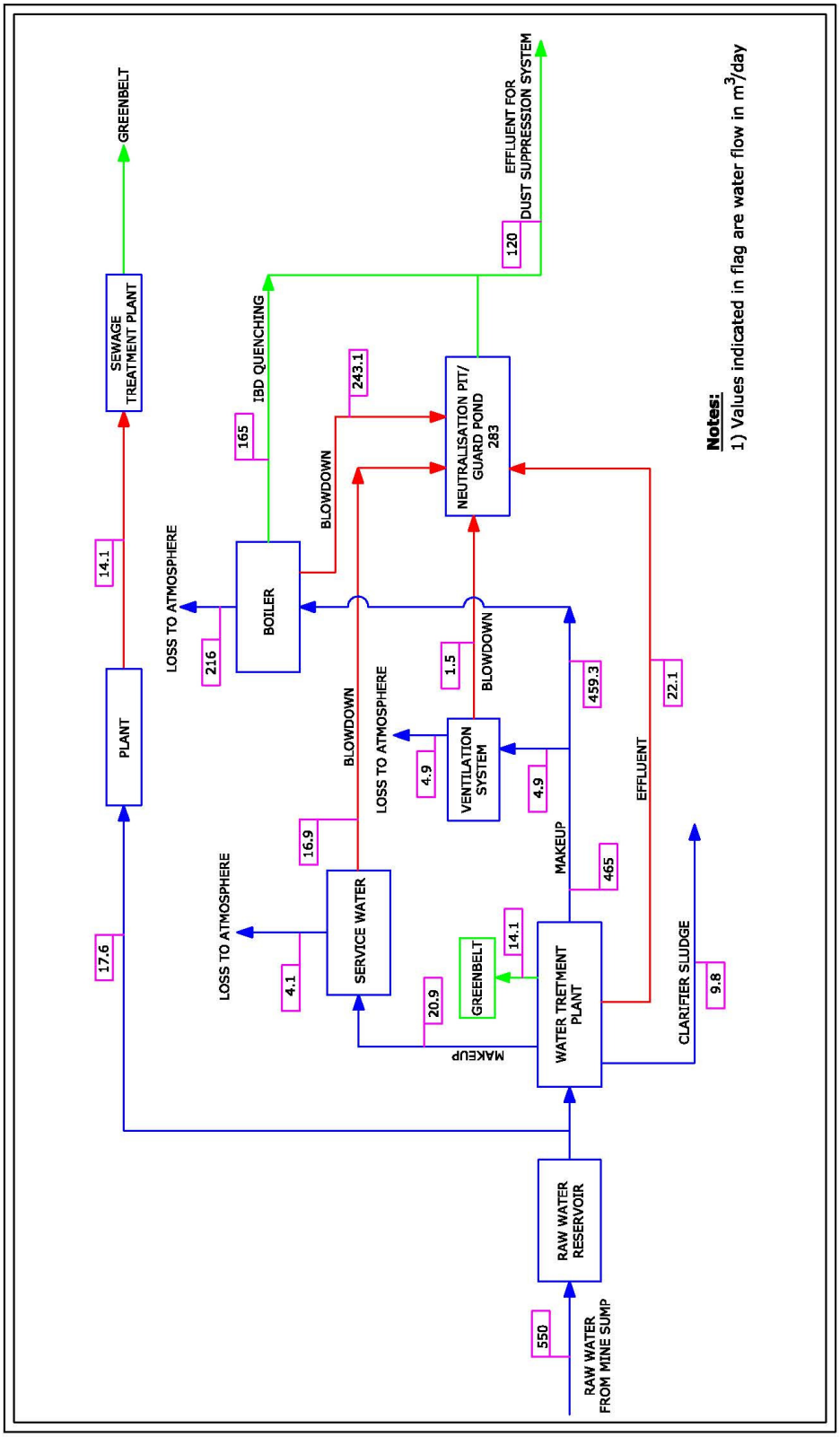

FIGURE-4.7
WATER BALANCE DIAGRAM

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.

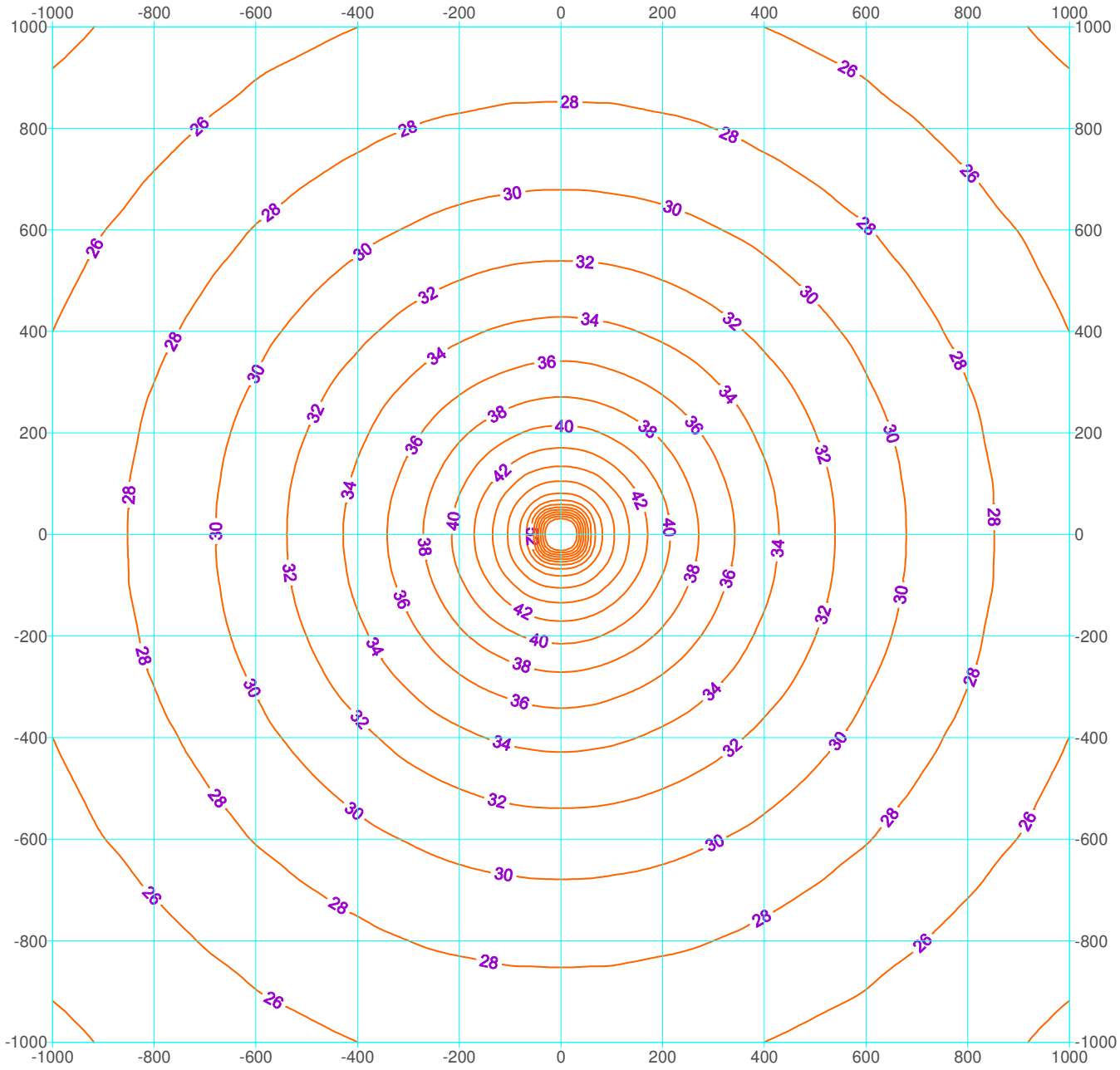

FIGURE-4.8
PREDICTED NOISE LEVELS AROUND THE PLANT

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.