Air Quality Modeling Study

Atmospheric Dispersion of Stack Emissions

In order to estimate the ground level concentrations due to the emissions from the proposed project, EPA approved American Meteorological Society/ Environmental Protection Agency Regulatory Model - AERMOD 9.6.4 dispersion Model has been used. AERMOD dispersion Model provides option to model emissions from a wide range of sources that are present at a typical industrial source complex. The model considers the sources and receptors in undulated terrain as well as plain terrain and the combination of both. The basis of the model is the straight line steady state Gaussian Plume Equation, with modifications to model simple point source emissions from stacks, emissions from stack that experience the effect of aerodynamic down wash due to nearby buildings, isolated vents, multiple vents, storage piles etc.

AERMOD dispersion model with the following options has been used to predict the cumulative ground level concentrations due to the proposed emissions.

Area being rural, rural dispersion parameters is considered as

- Predictions have been carried out to estimate concentration values over radial distance of 10 km around the sources
- A combination of Cartesian and Polar receptor network has been considered
- Emission rates from the sources were considered as constant during the entire period
- The ground level concentrations computed were as is basis without any consideration of decay coefficient
- Calm winds recorded during the study period were also taken into consideration 24-hour mean meteorological data extracted from the meteorological data collected during the study period as per guidelines of IMD/CPCB has been used to compute the mean ground level concentrations to study the impact on study area.

Pollution Sources

Area Sources

Daily waste will be discharged by tipping at the working area on a landfill, within the area demarcated for the cell. Daily/Weekly cover (optional) is primarily

used for prevention windblown dust, litter and odours, deterrence to scavengers, birds, reduction of infiltration (during unseasonal rain) and in improving the sites visual appearance. Soil used as daily / weekly cover shall give a pleasing uniform appearance from the site boundary. To achieve this thickness of about 150mm is usually adequate and shall be adopted.

Point Sources

The point source emissions considered for the proposed project are from DG set and inclinators. The DG set will be used only during power failure for emergency requirements. Hence the impacts from the DG set will be felt only during power failure. The inputs used to run the model are stack details, emissions details are given in **Table 4.1** and twenty four hours mean meteorological data is given in **Table 4.2.** The Predicted maximum Ground level concentration of PM, SO_2 and NO_X concentrations considering 24 hour mean meteorological data of study season are superimposed on the maximum baseline concentrations obtained during the study period to estimate the post project scenario, which would prevail at the post operational phase. The overall scenario with predicted concentrations over the maximum baseline concentrations is shown in the following **Table 4.3** and isopleths are shown in the **Figure 4.1 to Figure 4.4**

Table No. 4.1: Emissions Details

Details	DG	Incinator
Plant capacity	150 KVA	12 T/day
Type of fuel	Diesel	Diesel
Fuel	25 liter/hr	150 liter/hr
Height of the stack (m)	10	30
Temp of flue gas (degree Celsius)	110	40
Internal Dia. of the stack (m)	0.15	0.9
Velocity of flue gas (m/s)	15	15
Flue gas Flow rate (m^3/hr)	250	1200
PM_{10} Emissions (g/s)	**0.338**	**0.373**
$PM_{2.5}$ Emissions (g/s)	**0.178**	**0.140**

SO_2 Emissions (g/s)	**0.59**	**1.492**
NO_X Emissions (g/s)	**0.212**	**2.985**

Table No. 4.2: Mixing Height in Winter Season, Yadgir Karnataka

Hours	Morning Mixing Height (m)	Afternoon Mixing Height (m)
6	42	81
7	80	120
8	235	285
9	400	496
10	769	869
11	1035	1135
12	1208	1308
13	1271	1417
14	1288	1408
15	1204	1304
16	1054	1154
17	848	954
18	600	700

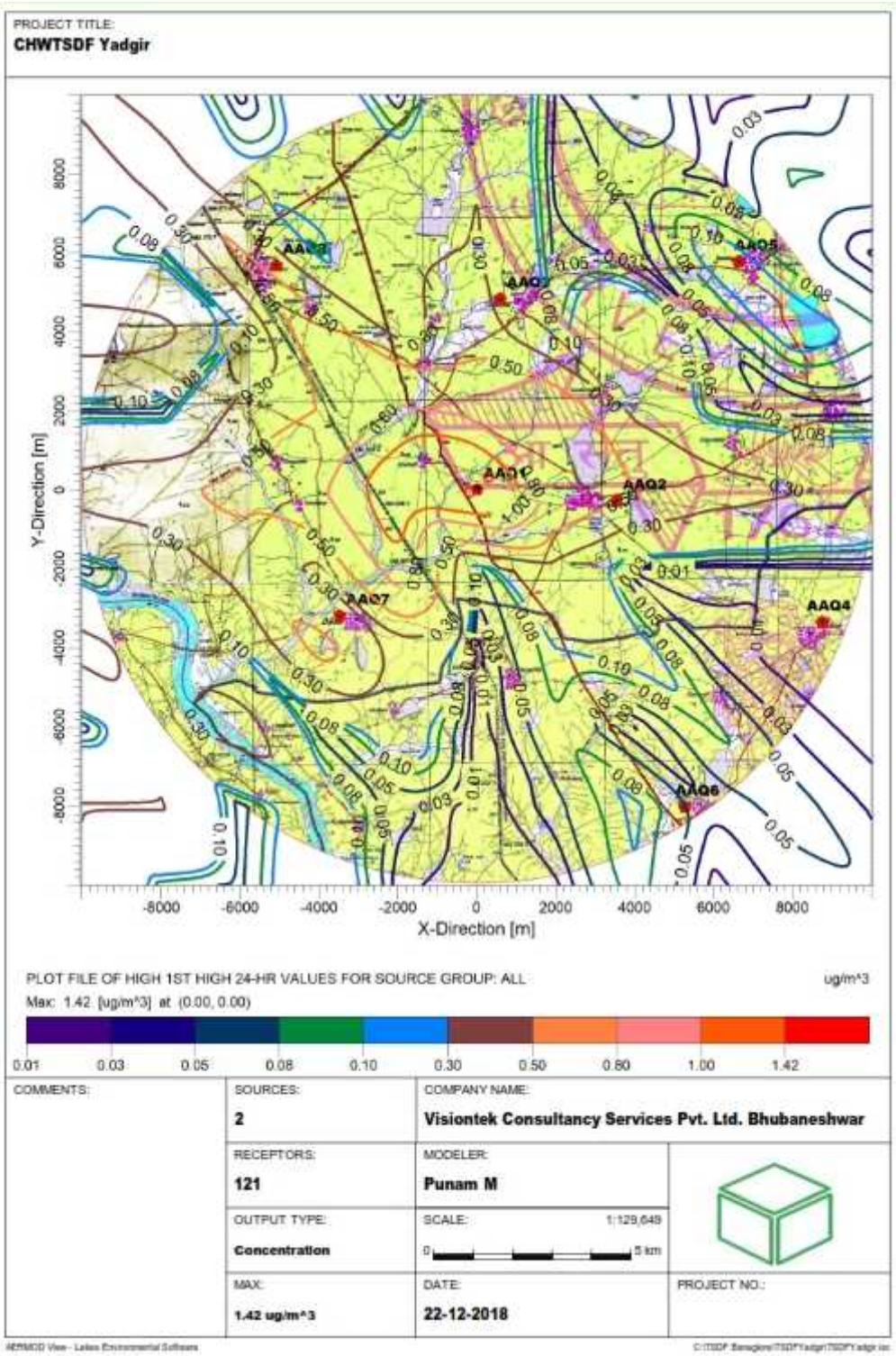

Figure No. 4.1: GLC Concentration for DG Set for PM_{10}

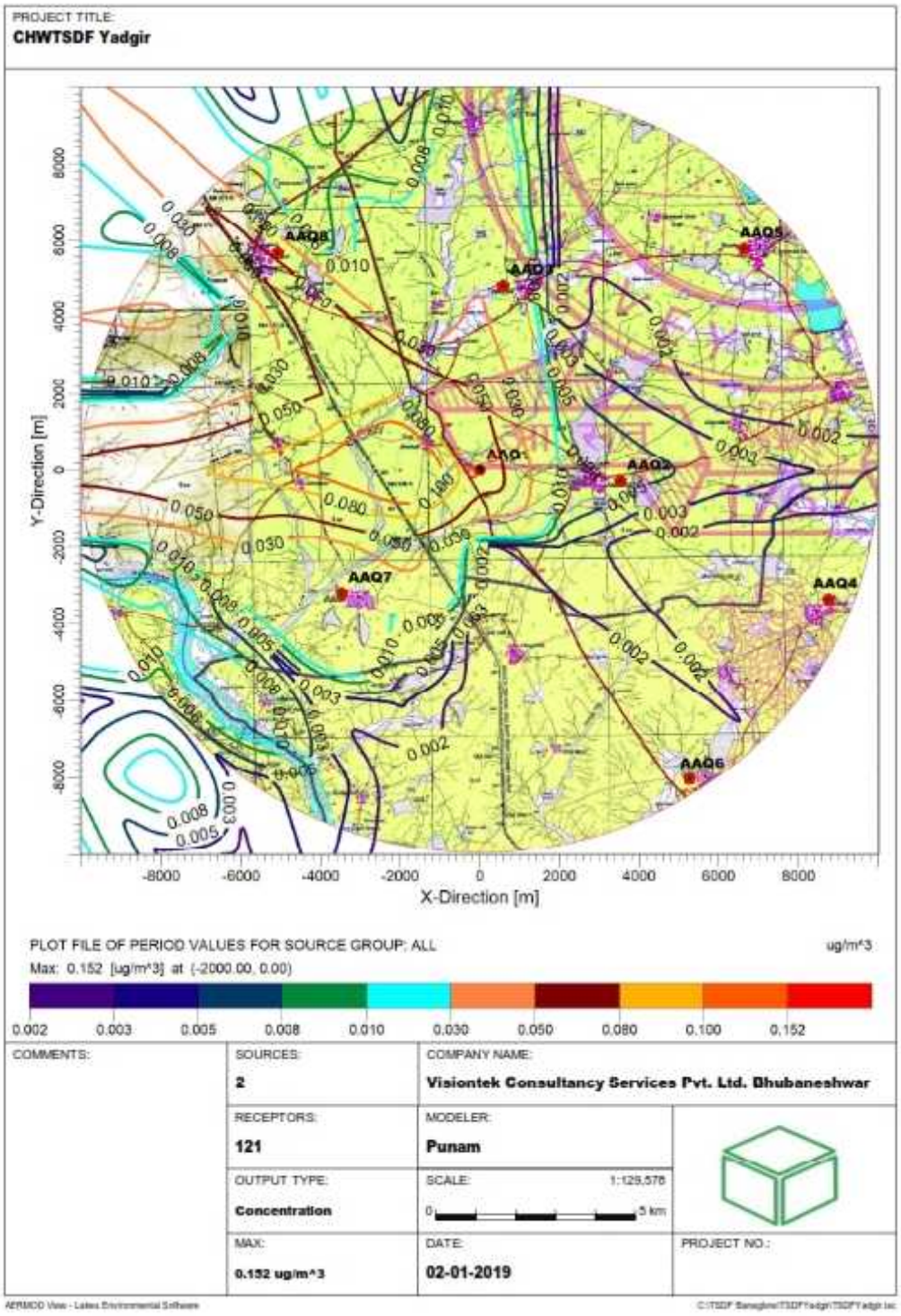

Figure No. 4.2: GLC Concentration for DG Set for $PM_{2.5}$

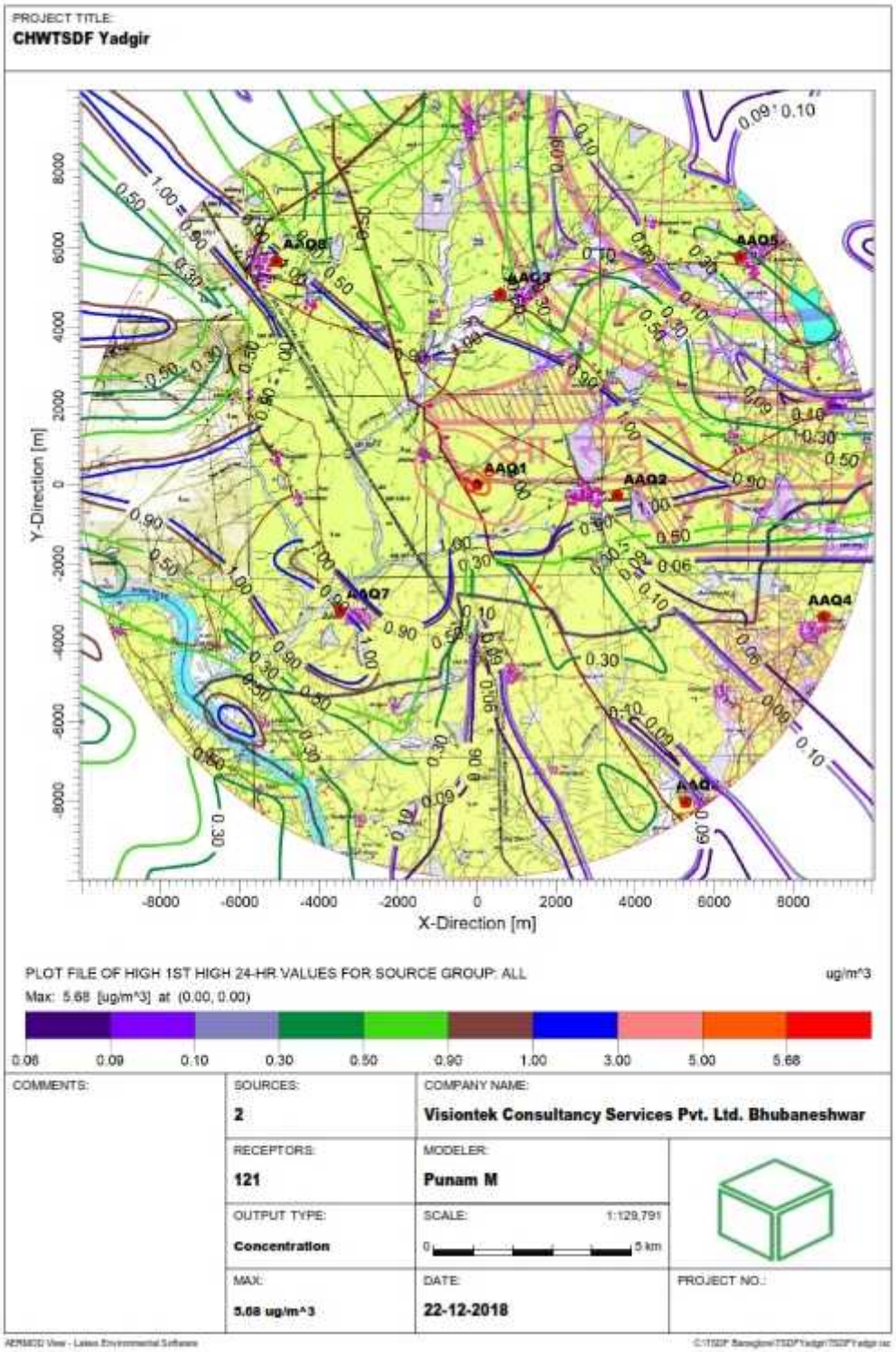

Figure No. 4.3: GLC Concentration for DG Set for SOx

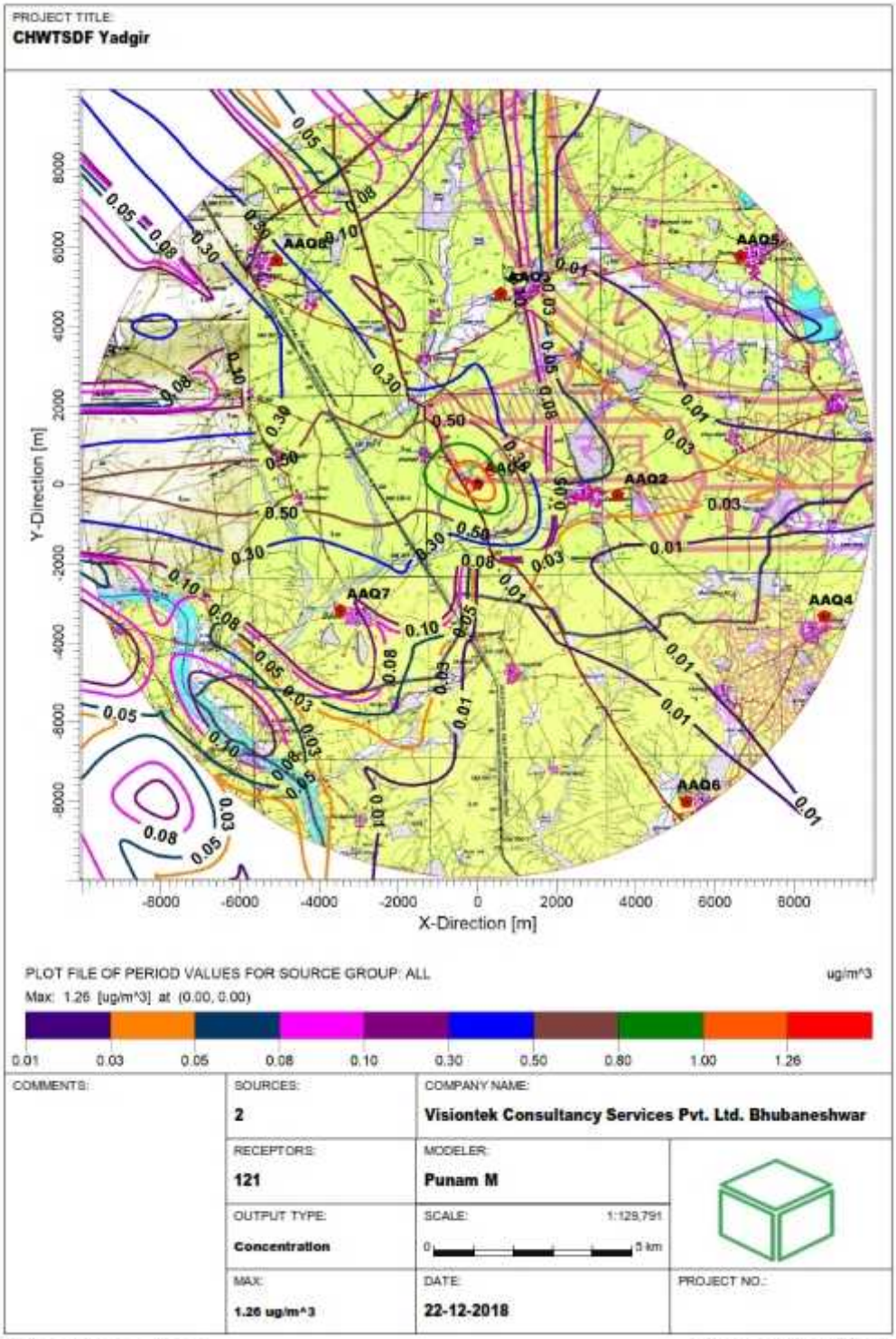

Figure No. 4.4: GLC Concentration for DG Set for NOx

Table No. 4.3: Post Project Scenario – Units: µg/m3

Particulars	PM_{10}	$PM_{2.5}$	SOx	NOx
Predicted GLC (Max)	1.42	0.152	5.68	1.26
NAQQS	**100**	**60**	**80**	**80**