Gravity

Smart Campus

Gravity LDO Environmental Statement

Volume 2 – Appendices

Appendix 11.3 Model Input and Results Processing

Appendix 11.3 Model Input and Results Processing

Table A11.3.1 Summary of Model Inputs

Meteorological Data	2018 hourly meteorological data from Yeovilton station has been used in the model. The wind rose is shown in Figure A11.4.1.
Traffic Data	As provided by Stantec as presented in Table A11.4.4
ADMS	Version 5.0.0.1
Time Varying Emission Factors	Based on Department for Transport statistics. Table TRA0307. Motor vehicle traffic distribution by time of day and day of the week on all roads, Great Britain: 2018.
Latitude	51°
Minimum Monin-Obukhov length	A value of 10 for 'small towns <50,000' was used to represent the Study Area and meteorological station site.
Emission Factor Toolkit (EFT)	V10.1, August 2020.
NO_x to NO_2 Conversion	NO_x to NO_2 calculator version 8.1, August 2020
Background Maps	2018 reference year background maps
Terrain	Elevations not applied as 'flat'

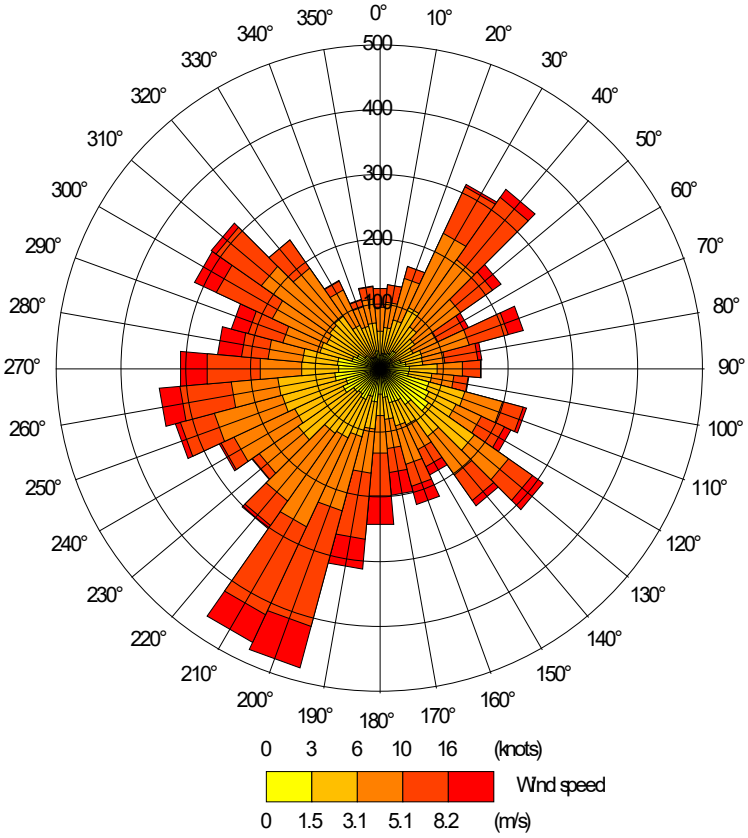

Figure A11.3.1: 2018 Windrose for Yeovilton met station

Plant Exhaust Emissions

The AERMOD model has been applied for the atmospheric dispersion modelling assessment of the exhaust gases from the stacks serving the Proposed Development as summarised in the following sections. The modelling has been undertaken to calculate an emission ceiling for the Proposed Development.

Table A11.3.2 provides the physical emission discharge characteristics for the energy and industrial plant.

Table A11.3.2 Emission Sources – Physical Discharge Characteristics

Parameter	**Flue**		
	Energy Plant 1	**Energy Plant 2**	**Industrial**
Stack height (m)	3m, 10m, 25m	3m, 10m, 25m	10m, 25m
Internal Stack Diameter (m)	0.35	0.35	1
Flue gas velocity (m/s)	15	6	10
Temperature (Degree Kelvin)	423	423	303

The onsite buildings in which the energy plant and industrial plant are located have been represented by a single building with the dimensions 1150m x 590m and 35m height centred on grid reference 333,480, 142,325 taken from the parameter plans.

Table A11.3.3 Traffic Data Used in the Assessment

Link Description	**Speed (kph)**	**2018 Base**		**2032 Future Baseline**		**2032 With Development**	
		AADT	**%HDV**	**AADT**	**%HDV**	**AADT**	**%HDV**
Link Road between Site and Entrance Rbt	48	34	5.6%	928	8.2%	896	7.0%
Link Road between Entrance Rbt and Hillside	48	535	0.0%	925	10.1%	894	8.2%
Link Road between Hillside and A39	48	1748	0.8%	942	8.9%	911	7.4%
Woolavington Road East between Entrance Rbt and Proposed Resi Access	96	2255	4.4%	118	2.5%	118	2.5%
Woolavington Road East between Proposed Resi Access and Woolavington School	96	2485	3.6%	105	2.1%	105	2.1%
Woolavington Road East between Woolavington School and B3141 Crossroads	48	2485	3.6%	105	2.1%	105	2.1%
B3139 Causeway	48	3505	2.8%	116	2.3%	116	2.5%
B3141 Woolavington Hill	48	7007	2.5%	208	2.2%	208	2.1%
Woolavington Road West , west of Entrance Rbt	96	2237	4.9%	129	3.9%	129	4.2%
A39 East of Puriton Hill Link Road Rbt	64	13896	4.7%	821	4.8%	819	4.8%
A39 between Puriton Hill Link Road Rbt and M5 Jct 23	64	15503	7.2%	2205	8.4%	2176	7.8%
M5 Motorway mainline north of Jct 23	112	82432	11.2%	12323	11.2%	12486	11.2%
M5 Motorway mainline south of Jct 23	112	71465	10.4%	9905	10.5%	9714	10.2%
A38 between Jct 23 and Dunball Rbt	80	21295	9.3%	2393	8.6%	2391	8.5%
A38 North of Dunball Rbt	96	9426	5.9%	655	5.8%	655	5.8%
A38 South of Dunball Rbt	80	24708	9.2%	2729	8.7%	2727	8.6%

Model Verification

NO_2

Most NO_2 is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emission of nitrogen oxides (NOx = NO + NO_2). The model has been run to predict the 2018 annual mean road-NOx contribution at the Bristol Road, Dunball diffusion tube (DT33), which is the closest to, and most representative of the proposed development.

The model output of road-NOx has been compared with the 'measured' road-NOx, which was determined from the measured NO_2 concentration using the NOx from NO_2 calculator (DEFRA, 2020d) and the adjusted background NO_2 concentrations from the DEFRA background map (DEFRA, 2020b).

An adjustment factor was determined as follows:

- Measured NO_2: 29.4 µg/m^3
- Measured road-NOx: 29.3 µg/m^3
- Modelled road-NOx: 10.6 µg/m^3
- Road-NOx adjustment factor: 29.3 / 10.6 = **2.8***

*Based on unrounded numbers.

This factor implies that the model is under-predicting the road-NOx contribution. This is a common experience with this and most other models.

PM_{10} and $PM_{2.5}$

SDC do not undertake monitoring of PM_{10} or $PM_{2.5}$ within the study area, therefore the adjustment factor calculated of NO_2 has been applied to the modelled road-PM_{10} and road-$PM_{2.5}$ concentrations.