



## APPENDIX 8.1

Term	Definition
<b>Accuracy</b>	A measure of how well a set of data fits the true value.
<b>Air quality objective</b>	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard).
<b>Air quality standard</b>	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
<b>Ambient air</b>	Outdoor air in the troposphere, excluding workplace air.
<b>Annual mean</b>	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
<b>AQMA</b>	Air Quality Management Area.
<b>DEFRA</b>	Department for Environment, Food and Rural Affairs.
<b>Exceedence</b>	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
<b>Fugitive emissions</b>	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
<b>LAQM</b>	Local Air Quality Management.
<b>NO</b>	Nitrogen monoxide, a.k.a. nitric oxide.
<b>NO<sub>2</sub></b>	Nitrogen dioxide.
<b>NO<sub>x</sub></b>	Nitrogen oxides.
<b>O<sub>3</sub></b>	Ozone.
<b>Percentile</b>	The percentage of results below a given value.
<b>PM<sub>10</sub></b>	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
<b>ppb parts per billion</b>	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion (10 <sup>9</sup> ) units of air, there is one unit of pollutant present.



<b>Term</b>	<b>Definition</b>
<b>ppm parts per million</b>	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppm means that for every billion ( $10^6$ ) units of air, there is one unit of pollutant present.
<b>Ratification (Monitoring)</b>	Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation).
<b><math>\mu\text{g}/\text{m}^3</math> micrograms per cubic metre</b>	A measure of concentration in terms of mass per unit volume. A concentration of $1\mu\text{g}/\text{m}^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
<b>UKAS</b>	United Kingdom Accreditation Service.
<b>Uncertainty</b>	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.
<b>USA</b>	Updating and Screening Assessment.
<b>Validation (modelling)</b>	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
<b>Validation (monitoring)</b>	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
<b>Verification (modelling)</b>	Comparison of modelled results versus any local monitoring data at relevant locations.



## APPENDIX 8.2 – SUMMARY OF TRAFFIC DATA

Table 8.2.1: Traffic Data used in Modelling

Description	Average Speed (kph)	2018 Base & Verification		2025 Future Base plus committed devs		2025 With Development	
		Total Vehicle Flow (24hr AADT)	% HDV	Total Vehicle Flow (24hr AADT)	% HDV	Total Vehicle Flow (24hr AADT)	% HDV
1a Bridge Road West, west of site entrance	56.2	14851	5	15747	5.0	15996	5.0
1b Bridge Road West, west of site entrance (section approaching entrance)	16.1	14851	5	15747	5.0	15996	5.0
2 Bridge Road West, east of site entrance	16.1	14851	5	15747	5.0	18593	5.0
3a Bridge Road East (section approaching junction)	16.1	12184	6.7	13196	6.7	18593	5.0
3b Bridge Road East	56.2	12184	6.7	13196	6.7	13722	6.7
4a Bessemer Road (section approaching junction)	16.1	11742	3	13361	3.0	14851	3.0
4b Bessemer Road	40.3	11742	3	13361	3.0	14851	3.0
5a Broadwater Road, north of Hydeway (section approaching junction with Bridge Road)	16.1	12807	3	15318	3.0	17533	3.0



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		Total Vehicle Flow (24hr AADT)	% HDV	Total Vehicle Flow (24hr AADT)	% HDV	Total Vehicle Flow (24hr AADT)	% HDV
5b Broadwater Road, north of Hydeway	40.3	12807	3	15318	3.0	17533	3.0
6 Broadwater Road, south of Hydeway	40.3	12807	3	15307	3.0	17500	3.0
7 Broadwater Road, south of Site	40.3	13123	3	15611	3.0	17805	3.0



## APPENDIX 8.3 – VERIFICATION AND ADJUSTMENT OF MODELLED CONCENTRATIONS

### Nitrogen Dioxide (NO<sub>2</sub>)

Most nitrogen dioxide (NO<sub>2</sub>) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. Verification of concentrations predicted by the ADMS model has followed the methodology presented in LAQM.TG(16).

The model has been run to predict annual mean road-NO<sub>x</sub> concentrations at a diffusion tube site located close to the Site.

The model output of road-NO<sub>x</sub> (i.e. the component of total NO<sub>x</sub> coming from road traffic) has been compared to the 'measured' road-NO<sub>x</sub> (Table 8.3.1). The 'measured' road NO<sub>x</sub> has been calculated from the measured NO<sub>2</sub> concentrations by using the Defra NO<sub>x</sub> from NO<sub>2</sub> calculator available on the UK-AIR website.

**Table 8.3.1: Comparison of Modelled and Monitored NO<sub>x</sub> concentrations**

Monitoring Location	Total Monitored NO <sub>2</sub>	Background NO <sub>2</sub>	Monitored Road NO <sub>x</sub>	Modelled Road NO <sub>x</sub>	Ratio
WH18	35	17	36.04	11.80	3.05

Table 8.3.1 shows that the ADMS model under-predicted the road NO<sub>x</sub> concentrations at the selected monitoring site. An adjustment factor was therefore determined as the ratio between the measured road-NO<sub>x</sub> contribution and the modelled road-NO<sub>x</sub> contribution (3.05). This factor has then been applied to the modelled road-NO<sub>x</sub> concentration for each location to provide an adjusted modelled road-NO<sub>x</sub> concentration.

The annual mean road-NO<sub>2</sub> concentration was determined using the Defra NO<sub>x</sub>:NO<sub>2</sub> spreadsheet calculation tool and added to the background NO<sub>2</sub> concentration to produce a total adjusted NO<sub>2</sub> concentration.

### Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>)

There was insufficient roadside monitoring data available against which the modelling could be verified. Consequently, the verification factor determined above for adjusting the road-NO<sub>x</sub>



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contribution has been applied to the predicted road-PM<sub>10</sub> and road-PM<sub>2.5</sub> contributions, consistent with guidance provided in LAQM.TG(16).



## APPENDIX 8.4 - AIR QUALITY ASSESSMENT LEVELS

Air Quality Strategy Objective Levels			
Pollutant	Standard ( $\mu\text{g}/\text{m}^3$ )	Averaging Period	No. of Permitted Exceedances
NO <sub>2</sub>	200 (a)	1-Hour	18 per annum (99.8 <sup>th</sup> percentile)
	40 (a)	Annual	-
PM <sub>10</sub>	200 (a)	24-Hour	35 per annum (90.4 <sup>th</sup> percentile)
	50 (a)	Annual	-
PM <sub>2.5</sub>	25 (a)	Annual	-
CO	10000 (a)	8-hour	-
(a) Air Quality Standards Regulations (2010)			
(b) EU Directive Limit Value			



## APPENDIX 8.5 – BLM MODEL INPUT DATA

Source ID	A10	A11
Stack Height (m)	31.65	31.65
Temperature of Release (C)	24.5	24.5
Emission velocity at stack exit (m/s)	21.5	201.
<b>Emission Concentration (mg/Nm<sup>3</sup>)</b>		
Total Particulate Matter	0.11	0.26
Lead	0.005	0.045
Antimony	0.0003	0.001
Arsenic	0.0003	0.0004
Cadmium	0.0002	0.0004
Dioxins & Furans	0.0004	0.001
Total VOCs (as Carbon)	0.0001	0.0002
<b>Emission Rate g/s</b>		
Total Particulate Matter	1.33E-03	2.33E-03
Lead	6.11E-05	4.17E-04
Antimony	2.78E-06	5.56E-06
Arsenic	2.78E-06	2.78E-06
Cadmium	2.78E-06	2.78E-06
Dioxins & Furans	5.56E-06	1.39E-05
Total VOCs (as Carbon)	1.11E-11	2.78E-11
<i>Reference conditions: 273K, dry, actual O<sub>2</sub>%</i>		