APPENDIX 6.1

Term	Definition
Accuracy	A measure of how well a set of data fits the true value.
Air quality objective	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).
Air quality standard	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).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	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.
AQMA	Air Quality Management Area.
DEFRA	Department for Environment, Food and Rural Affairs.
Exceedence	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
LAQM	Local Air Quality Management.
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
O_3	Ozone.
Percentile	The percentage of results below a given value.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
ppb parts per billion	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion (10^9) units of air, there is one unit of pollutant present.

ppm parts per million	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.
Ratification (Monitoring)	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).
µg/m^3 micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1µg/m^3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UKAS	United Kingdom Accreditation Service.
Uncertainty	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.
USA	Updating and Screening Assessment.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.

APPENDIX 6.2 – SUMMARY OF TRAFFIC DATA

The AADT flows were calculated based on numerous traffic surveys located adjacent to the site to provide peak hour flows. The AADT flows were calculated from the peak hour flows using peak to AADT factors obtained from the ATC.

Table 6.2.1: Traffic Data for 2015 Verification

Road Link	Description	Average Speed (mph)	2015 Verification and Baseline				
			AADT Traffic Flows	HDV (%)	Emission Rate (g/km/s)		
					NO_X	PM_{10}	$PM_{2.5}$
1	A12 north of roundabout with A1214	60	35556	15	0.246084	0.021700	0.013224
2a	A12 south of roundabout with A1214 (reduced speed approaching junction)	30	37318	15	0.310897	0.022772	0.013876
2b	A12 south of roundabout with A1214	60	37318	15	0.258278	0.022776	0.013879
2c	A12 south of roundabout with A1214 (reduced speed approaching roundabout with Anson Road)	25	37318	15	0.348475	0.023209	0.014291
3a	A12 south of roundabout with Anson Road (reduced speed approaching roundabout)	25	37318	15	0.348475	0.023209	0.014291
3b	A12 south of roundabout with Anson Road	60	37318	15	0.258278	0.022776	0.013879
3c	A12 south of roundabout with Anson Road (reduced speed approaching site access)	30	37318	15	0.310897	0.022772	0.013876
4a	A12 south of site access (reduced speed approaching junction)	30	37318	15	0.310897	0.022772	0.013876

4b	A12 south of site access	60	37318	15	0.258278	0.022776	0.013879
4c	A12 south of site access (reduced speed approaching roundabout with Newbourne Road)	30	37318	15	0.310897	0.022772	0.013876
5a	A12 south of roundabout with Newbourne Road (reduced speed approaching roundabout)	30	41174	15	0.343021	0.025125	0.015310
5b	A12 south of roundabout with Newbourne Road	60	41174	15	0.284966	0.025129	0.015313
6a	Main Road (reduced speed approaching roundabout with A12)	20	4678	10	0.040539	0.002636	0.001635
6b	Main Road	30	4678	10	0.031860	0.002528	0.001532
7	Newbourne Road	40	5279	10	0.031280	0.002803	0.001682
8a	A1214 Woodbridge Road (reduced speed approaching roundabout with A12)	20	15667	10	0.135768	0.008829	0.005475
8b	A1214 Woodbridge Road	40	15667	10	0.092832	0.008319	0.004990
10	Foxhall Road East	60	15163	5	0.077203	0.007298	0.004448
11	Foxhall Road West	40	13458	5	0.063508	0.006243	0.003725
12a	Bell Lane (reduced speed approaching junction with A1214)	15	3115	1	0.016956	0.001362	0.000838
12b	Bell Lane	30	3115	1	0.012690	0.001291	0.000771
13	Monument Farm Lane	30	515	0	0.001941	0.000206	0.000123

Table 6.2.2: Traffic Data for 2027 Do Minimum

Road Link	Description	Average Speed (mph)	2027 Do Minimum				
			AADT Traffic Flows	HDV (%)	Emission Rate (g/km/s)		
					NO_X	PM_{10}	$PM_{2.5}$
1	A12 north of roundabout with A1214	60	40356	15	0.079182	0.020344	0.010893
2a	A12 south of roundabout with A1214 (reduced speed approaching junction)	30	42356	15	0.082221	0.021497	0.011569
2b	A12 south of roundabout with A1214	60	42356	15	0.083106	0.021352	0.011432
2c	A12 south of roundabout with A1214 (reduced speed approaching roundabout with Anson Road)	25	42356	15	0.088376	0.021579	0.011648
3a	A12 south of roundabout with Anson Road (reduced speed approaching roundabout)	25	42356	15	0.088376	0.021579	0.011648
3b	A12 south of roundabout with Anson Road	60	42356	15	0.083106	0.021352	0.011432
3c	A12 south of roundabout with Anson Road (reduced speed approaching site access)	30	42356	15	0.082221	0.021497	0.011569
4a	A12 south of site access (reduced speed approaching junction)	30	42356	15	0.082221	0.021497	0.011569
4b	A12 south of site access	60	42356	15	0.083106	0.021352	0.011432
4c	A12 south of site access (reduced speed approaching roundabout with Newbourne Road)	30	42356	15	0.082221	0.021497	0.011569
5a	A12 south of roundabout with Newbourne Road (reduced speed approaching roundabout)	30	46733	15	0.090717	0.023718	0.012765

5b	A12 south of roundabout with Newbourne Road	60	46733	15	0.091694	0.023559	0.012614
6a	Main Road (reduced speed approaching roundabout with A12)	20	5309	10	0.011399	0.002446	0.001331
6b	Main Road	30	5309	10	0.009682	0.002424	0.001310
7	Newbourne Road	40	5992	10	0.010121	0.002723	0.001466
8a	A1214 Woodbridge Road (reduced speed approaching roundabout with A12)	20	17782	10	0.038181	0.008193	0.004457
8b	A1214 Woodbridge Road	40	17782	10	0.030036	0.008082	0.004352
10	Foxhall Road East	60	17210	5	0.031112	0.006939	0.003751
11	Foxhall Road West	40	15274	5	0.024224	0.006168	0.003338
12a	Bell Lane (reduced speed approaching junction with A1214)	15	3535	1	0.007317	0.001310	0.000723
12b	Bell Lane	30	3535	1	0.005700	0.001290	0.000704
13	Monument Farm Lane	30	585	0	0.000930	0.000207	0.000113

Table 6.2.3: Traffic Data for 2027 With Development

Road Link	Description	Average Speed (mph)	2027 Do Minimum				
			AADT Traffic Flows	HDV (%)	Emission Rate (g/km/s)		
					NO_X	PM_{10}	$PM_{2.5}$
1	A12 north of roundabout with A1214	60	41295	15	0.081024	0.020818	0.011146
2a	A12 south of roundabout with A1214 (reduced speed approaching junction)	30	44942	15	0.087241	0.022809	0.012276
2b	A12 south of roundabout with A1214	60	44942	15	0.088180	0.022656	0.012130
2c	A12 south of roundabout with A1214 (reduced speed approaching roundabout with Anson Road)	25	44942	15	0.093772	0.022896	0.012359
3a	A12 south of roundabout with Anson Road (reduced speed approaching roundabout)	25	44942	15	0.093772	0.022896	0.012359
3b	A12 south of roundabout with Anson Road	60	44942	15	0.088180	0.022656	0.012130
3c	A12 south of roundabout with Anson Road (reduced speed approaching site access)	30	44942	15	0.087241	0.022809	0.012276
4a	A12 south of site access (reduced speed approaching junction)	30	44942	15	0.087241	0.022809	0.012276
4b	A12 south of site access	60	44942	15	0.088180	0.022656	0.012130
4c	A12 south of site access (reduced speed approaching roundabout with Newbourne Road)	30	44942	15	0.087241	0.022809	0.012276
5a	A12 south of roundabout with Newbourne Road (reduced speed approaching roundabout)	30	48822	15	0.094772	0.024778	0.013336

5b	A12 south of roundabout with Newbourne Road	60	48822	15	0.095793	0.024612	0.013178
6a	Main Road (reduced speed approaching roundabout with A12)	20	5438	10	0.011676	0.002506	0.001363
6b	Main Road	30	5438	10	0.009918	0.002483	0.001342
7	Newbourne Road	40	8241	10	0.013920	0.003746	0.002017
8a	A1214 Woodbridge Road (reduced speed approaching roundabout with A12)	20	19256	10	0.041346	0.008872	0.004827
8b	A1214 Woodbridge Road	40	19256	10	0.032526	0.008752	0.004713
10	Foxhall Road East	60	19006	5	0.034358	0.007663	0.004142
11	Foxhall Road West	40	16351	5	0.025932	0.006603	0.003574
12a	Bell Lane (reduced speed approaching junction with A1214)	15	4219	1	0.008733	0.001564	0.000863
12b	Bell Lane	30	4219	1	0.006803	0.001539	0.000840
13	Monument Farm Lane	30	585	0	0.000930	0.000207	0.000113

APPENDIX 6.3 – VERIFICATION AND ADJUSTMENT OF MODELLED CONCENTRATIONS

Nitrogen Dioxide (NO_2)

Most nitrogen dioxide (NO_2) 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_x concentrations at a diffusion tube monitoring site (MRT 1).

The model output of road-NOx (i.e. the component of total NO_x coming from road traffic) has been compared to the 'measured' road-NO_x (Table 6.3.1). The 'measured' road NO_x has been calculated from the measured NO_2 concentrations by using the Defra NO_x to NO_2 calculator available on the UK-AIR website.

Table 6.3.1: Comparison of Modelled and Monitored NOx concentrations

Monitoring Location	Total Monitored NO_2	Total Monitored NO_x	Background NO_2	Background NO_x	Monitored Road NO_x	Modelled Road NO_x	Ratio
MRT 1	24	39.2	14.1	19.7	19.5	11.02	1.77

An adjustment factor was determined as the ratio between the measured road-NOx contribution and the modelled road-NOx contribution (1.77). The adjustment factor was applied to the modelled road-NOx contribution prior to conversion to the annual mean NO_2 concentration using the Defra NO_x:NO_2 spread sheet calculation tool.

Particulate Matter (PM_{10} and $PM_{2.5}$)

There was insufficient roadside monitoring data available against which the modelling could be verified. Consequently, the road-PM_{10} and road-$PM_{2.5}$ contributions were adjusted using the factor obtained for NO_x concentrations, consistent with guidance provided in LAQM.TG(16).

APPENDIX 6.4 - AIR QUALITY ASSESSMENT LEVELS

Air Quality Strategy Objective Levels			
Pollutant	**Standard (μg/m^3)**	**Averaging Period**	**No of Permitted Exceedences**
NO_2	200 (a)	1-Hour	18 per annum (99.8th percentile)
	40 (a)	Annual	-
PM_{10}	200 (a)	24-Hour	35 per annum (90.4th percentile)
	50 (a)	Annual	-
$PM_{2.5}$	25 (a)	Annual	-
(a) Air Quality Standards Regulations (2010) (b) EU Directive Limit Value			

Air Quality Strategy Critical Level		
Pollutant	**Standard (μg/m^3)**	**Critical Load (kg/N/ha/hr)**
NO_2	30	Annual

Critical Load		
Pollutant	**Habitat Type**	**Critical Load (kg/N/ha/hr)**
Nitrogen	Acid Grassland	8 to 15