Gatwick Airport Northern Runway Project

Environmental Statement

Appendix 13.6.1: Air Quality Data and Model Verification

Book 5

Table of Contents

Tables

Figures

1 Introduction

1.1.1 This document forms Appendix 13.6.1 of the Environmental Statement (ES) prepared on behalf of Gatwick Airport Limited (GAL) for the proposal to make best use of Gatwick Airport's existing runways and infrastructure (referred to within this report as 'the Project').

1.1.2 This appendix provides the results of the baseline assessment including local authority and Gatwick monitoring, and background Nitrogen deposition data for the Habitat Regulation Assessment (HRA). The results of the model verification process are also included.

2 Baseline Environment

2.1.1 Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, traffic and natural sources.

2.2 Sources of Air Pollution

Industrial Processes

2.2.1 Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A or Part B processes and are regulated through the Environmental Permitting system. The larger more polluting processes (Part A) are regulated by the Environment Agency (EA), and the smaller less polluting ones (Part A2 and Part B) by the local authorities. Local authorities also regulate only for emissions to air, whereas the EA regulates emissions to air, water and land.

2.2.2 There are 5 Part A processed with emissions to air listed on the EA website within 10km of Gatwick Airport, in addition to Gatwick Airport itself presented in Table 2.2.1.

Table 2.2.1: Part A processes within 10km of Gatwick Airport

Name of Operator	Permit Number	OS Coordinates	Type of Industry	Distance and Direction from Gatwick
ITM Motive Limited	GP3034YJ	527811. 142047	Inorganic Chemicals, Gases eg Ammonia	< 1km Northeast
Thames Water Utilities	JP3503BG	528940, 140250	Tranche B Specified Generator (SG)	< 1km Southeast
Salfords Rail Yard	EP3735QM	528440, 146190	Recovery or a mix of recovery and disposal of > 50 tonnes/day non-hazardous waste involving treatment of slags and ashes	4 km North
Island Gas Limited	VP3632ZJ	534720, 147970	Loading/ storage/ treatment etc of crude oil	9 km Northeast
Biffa Waste Services	BU8126IY	529590, 151150	Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes/day involving biological treatment; Waste landfilling > 10 tonnes/day with capacity > 25,000 tonnes excluding inert waste associated press	9.5 km North

2.2.3 There are a large number of Part A2 and Part B processes within 10km of the Proposed Development, across Crawley, Tandridge and Reigate and Banstead. Emissions from these Part A2 and

Part B process are assumed to be included in the Defra background concentrations, in monitored concentrations, and in the NAEI (National Atmospheric Emissions Inventory) gridded emissions.

2.3 Monitoring Data

2.3.1 Monitoring data for the 10km x 11km study area is presented in Table 2.3.1 to Table 2.3.4. The data has been presented for all years between 2015-2021 for NO_2, PM_{10} and $PM_{2.5}$. The baseline data for the wider study area which covers the full Affected Road Network (ARN) and has been used to understand the wider baseline conditions and for model verification, is provided in Table 2.3.4.

Automatic Monitoring

2.3.2 Automatic monitoring of pollutants is undertaken by GAL at one location, by Crawley Borough Council (CBC) at one location and Reigate and Banstead Borough Council at three locations. The details of the monitoring locations are shown in Table 2.3.1 to Table 2.3.3. No exceedances of the annual mean standard were recorded for NO_2, PM_{10} or $PM_{2.5}$ between 2015 and 2021 at any of the monitoring sites.

Table 2.3.1: Continuous nitrogen dioxide (NO$_2$) Monitoring Data for 2015-2021

LA ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)						
				2015	2016	2017	2018	2019	2020	2021
CA2	529417	141496	Industrial	22.0	29.0	28.0	25.0	25.0	17.0	18.0
LGW3	528583	140825	Industrial	30.0	30.0	29.0	30.0	29.0	17.0	18.0
RG1	528208	142337	Suburban	21.1	20.3	20.4	18.8	19.1	13.1	15.4
RG2	528553	141857	Suburban	26.4	28.7	NA	NA	NA	NA	NA
RG3	526421	139639	Rural	14.0	16.7	13.9	15.5	15.1	14.6	13.8
RG6	528592	141831	Suburban	NA	28.3	26.7	24.9	24.2	9.7	9.7
Annual mean standard (µg/m^3)			40							

Exceedance of the air quality standard (40 µg/m3) are shown in **bold**

NA: Monitoring site not operational for year of monitoring.

Table 2.3.2: Continuous Particulate Matter (PM$_{10}$) Monitoring Data for 2015-2021

LA ID	X	Y	Location type	Annual Mean PM$_{10}$ (µg/m^3)						
				2015	2016	2017	2018	2019	2020	2021
CA2	529417	141496	Industrial	15.0	18.0	18.0	18.0	21.0	15.0	NA
LGW3	528583	140825	Industrial	22.0	17.0	19.0	19.0	14.0	14.0	NA
RG1	528208	142337	Suburban	19.2	16.5	16.2	17.1	15.9	NA	NA
RG2	528553	141857	Suburban	NA	NA	NA	NA	NA	NA	NA
RG3	526421	139639	Rural	NA	NA	NA	NA	NA	NA	NA
RG6	528592	141831	Suburban	NA	NA	NA	NA	NA	NA	NA

NA: Monitoring site not operational for year of monitoring.

Table 2.3.3: Continuous Particulate Matter (PM$_{2.5}$) Monitoring Data for 2015-2021

LA ID	X	Y	Location type	Annual Mean PM$_{2.5}$ (µg/m^3)						
				2015	2016	2017	2018	2019	2020	2021
CA2	529417	141496	Industrial	NA	NA	NA	NA	8.0	8.0	NA
LGW3	528583	140825	Industrial	NA	NA	NA	8.0	9.0	8.0	NA
RG1	528208	142337	Suburban	NA	NA	NA	NA	NA	NA	NA
RG2	528553	141857	Suburban	NA	NA	NA	NA	NA	NA	NA
RG3	526421	139639	Rural	NA	NA	NA	NA	NA	NA	NA
RG6	528592	141831	Suburban	NA	NA	NA	NA	NA	NA	NA

NA: Monitoring site not operational for year of monitoring.

Diffusion Tube Monitoring

2.3.3   There are 506 diffusion tube NO$_2$ monitoring locations across the study area operated by a number of local authorities. The locations of these monitoring sites have been verified with the respective local authority and the X and Y coordinates have been updated accordingly for modelling purposes. The modelled locations of the monitoring sites are presented in ES Appendix 13.6.1 Figure 2.3.1 to Figure 2.3.3. Diffusion tube measurements of NO$_2$ concentrations at roadside locations operated by the local authorities along the A23 Brighton Road and around Hazelwick roundabout have exceeded the NO$_2$ air quality standard of 40 µg/m^3 over the past few years. Exceedances of the air quality standard were also recorded in 2018 during the air quality monitoring survey undertaken at these locations on behalf of GAL.

2.3.4   The highest recorded NO$_2$ concentration in 2021 was recorded at 42.2 µg/m^3 at monitoring locations CR63 and CR93. These are both at roadside locations and have consistently exceeded the NO$_2$ air quality standard of 40 µg/m^3 since 2015.

Table 2.3.4: Diffusion Tube NO$_2$ Monitoring Data for 2015-2021

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)						
				2015	2016	2017	2018	2019	2020	2021
Gatwick Airport Monitoring										
RG1	528204	142330	Urban background	NA	22.8	20.9	20.2	20.5	NA	NA
RG2/RG6 (co-located)	528597	141833	Urban background	NA	29.8	26.4	25.2	26.1	NA	NA
RG3	526444	139625	Urban background	NA	14.4	13.3	14.9	13.4	NA	NA
BR1	527881	142766	Roadside	NA	33.0	35.5	30.4	30.1	NA	NA
BR2	527799	142759	Kerbside	NA	**41.5**	**40.4**	36.9	34.1	NA	NA
BR3	527797	142798	Roadside	NA	**46.1**	**49.6**	**41.5**	38.1	NA	NA
BR4	527787	142758	Kerbside	NA	**46.6**	**44.6**	**41.5**	37.7	NA	NA
BR5	527778	142766	Kerbside	NA	**51.2**	**53.4**	**46.0**	**42.0**	NA	NA

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)						
				2015	2016	2017	2018	2019	2020	2021
BR6	527752	142748	Roadside	NA	**41.6**	**42.9**	38.0	36.5	NA	NA
BR7	527724	142715	Roadside	NA	**45.2**	**42.8**	39.1	37.0	NA	NA
BR8	527697	142684	Roadside	NA	**40.1**	**40.1**	36.9	33.8	NA	NA
BR9	527672	142657	Roadside	NA	**45.3**	**41.8**	**41.6**	38.5	NA	NA
BR10	527629	142607	Kerbside	NA	**41.1**	38.8	38.6	33.8	NA	NA
BR11	527570	142563	Roadside	NA	36.4	34.6	34.7	33.2	NA	NA
BR12	527583	142549	Roadside	NA	**44.7**	**41.5**	39.2	35.6	NA	NA
BR13	527636	142599	Roadside	NA	**43.9**	**41.6**	40.0	38.1	NA	NA
BR14	527657	142614	Roadside	NA	38.9	36.8	35.6	32.8	NA	NA
BR15	527690	142641	Roadside	NA	29.7	29.9	30.2	29.3	NA	NA
BR16	527685	142646	Roadside	NA	35.7	35.8	33.6	32.4	NA	NA
BR17	527708	142675	Roadside	NA	**47.7**	**47.9**	**47.1**	**45.4**	NA	NA
BR18	527719	142684	Roadside	NA	**44.6**	**41.0**	**41.2**	**41.2**	NA	NA
BR19	527736	142705	Roadside	NA	**52.5**	**49.4**	**49.0**	**47.8**	NA	NA
BR20	527764	142735	Roadside	NA	**52.0**	**50.9**	**45.1**	**42.4**	NA	NA
HR1	528073	137821	Roadside	NA	28.2	32.5	28.8	30.7	NA	NA
HR2	528113	137821	Roadside	NA	30.8	28.2	30.2	30.4	NA	NA
HR3	528147	137821	Roadside	NA	34.5	32.4	31.4	33.8	NA	NA
HR4	528153	137871	Roadside	NA	**40.7**	**40.3**	36.7	38.9	NA	NA
HR5	528153	137912	Roadside	NA	**52.6**	**51.0**	**45.7**	**48.6**	NA	NA
HR6	528068	137806	Roadside	NA	24.9	23.9	23.0	24.3	NA	NA
HR7	528151	137808	Roadside	NA	34.2	31.9	34.2	33.8	NA	NA
HR8	528173	137838	Roadside	NA	**42.6**	**44.8**	**41.4**	38.1	NA	NA
HR9	528193	137805	Urban background	NA	25.4	26.4	23.7	29.4	NA	NA
HR10	528211	137807	Urban background	NA	23.9	23.6	21.9	22.5	NA	NA
HR11	528249	137794	Roadside	NA	24.5	24.5	22.5	21.3	NA	NA
HR12	528261	137810	Roadside	NA	29.3	28.8	28.1	26.7	NA	NA
HR13	528255	137818	Kerbside	NA	25.9	26.7	25.9	26.3	NA	NA
HR14	528369	137779	Urban background	NA	22.7	22.7	21.0	20.1	NA	NA
HR15	528288	137829	Roadside	NA	**40.3**	35.3	32.5	32.0	NA	NA
HR16	528276	137861	Roadside	NA	33.3	34.4	30.3	32.1	NA	NA
HR17	528308	138013	Urban background	NA	35.9	38.1	36.3	35.8	NA	NA
HR18	528240	138015	Roadside	NA	**43.3**	**44.2**	**42.0**	**41.0**	NA	NA
HR19	528316	138050	Urban background	NA	28.6	28.9	27.3	28.4	NA	NA
HR20	528276	137854	Roadside	NA	**41.5**	39.4	37.3	36.5	NA	NA
Crawley Borough Council										
CR1	526799	136785	Roadside	30.0	40.0	33.0	33.0	35.0	26.3	27.7
CR3	528438	138392	Urban background	20.0	24.0	22.0	20.0	21.0	16.1	17.3

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)						
				2015	2016	2017	2018	2019	2020	2021
CR4	529864	138204	Urban background	21.0	25.0	23.0	21.0	23.0	17.5	17.8
CR48	527110	139530	Urban background	24.0	28.0	27.0	25.0	25.0	19.2	19.2
CR49	526320	139860	Urban background	16.0	19.0	18.0	18.0	17.0	10.3	12.0
CR50	527810	139929	Urban background	19.0	25.0	21.0	21.0	21.0	16.6	17.7
CR51	529490	141460	Urban background	21.0	25.0	24.0	22.0	22.0	16.0	15.2
CR52, CR53, CR54 (co-located)	529417	141496	Industrial	25.0	30.0	30.0	24.0	26.0	17.6	18.0
CR55	528446	138085	Roadside	39.0	**42.0**	**41.0**	**41.0**	**42.0**	36.2	35.0
CR60	526740	136934	Roadside	31.0	38.0	35.0	33.0	32.0	25.1	26.2
CR62	528438	138088	Urban background	31.0	40.0	40.0	38.0	40.0	33.5	33.8
CR63	528153	137912	Roadside	**44.0**	53.0	52.0	52.0	49.0	**42.2**	**42.2**
CR64	528150	137825	Roadside	37.0	**41.0**	**41.0**	**40.0**	38.0	30.4	30.6
CR66	526743	136346	Roadside	27.0	35.0	34.0	29.0	30.0	26.9	26.1
CR69	528443	138082	Urban background	36.0	**43.0**	**42.0**	40.0	**44.0**	35.8	36.3
CR72	525530	138472	Urban background	13.0	16.0	15.0	15.0	13.0	11.0	10.9
CR74	528978	139599	Urban background	26.0	37.0	37.0	34.0	33.0	25.5	26.3
CR75	529335	139589	Urban background	20.0	25.0	23.0	21.0	23.0	17.0	18.8
CR76	528303	137800	Roadside	36.0	**43.0**	40.0	35.0	35.0	27.6	30.7
CR77	528362	137812	Roadside	36.0	**42.0**	39.0	35.0	35.0	28.3	30.9
CR78	530037	138553	Urban background	NA	29.0	26.0	24.0	22.0	17.0	19.3
CR79	529312	138534	Urban background	NA	30.0	27.0	25.0	25.0	20.4	21.2
CR80	530424	136521	Urban background	NA	32.0	27.0	28.0	27.0	19.5	22.4
CR85	528286	138019	Urban background	NA	NA	27.0	30.0	30.0	30.5	28.3
CR86	526876	136819	Roadside	NA	NA	22.0	26.0	27.0	23.5	21.2
CR87	526908	136754	Roadside	NA	NA	38.0	38.0	39.0	29.0	31.3
CR88	525489	136573	Urban background	NA	NA	18.0	26.0	25.0	21.1	21.6
CR89	527715	137893	Urban background	NA	NA	19.0	22.0	22.0	17.1	19.0
CR90	526953	138658	Roadside	NA	NA	25.0	26.0	NA	NA	NA
CR91	528681	137177	Roadside	NA	NA	39.0	34.0	32.0	28.0	29.7
CR93	528895	137115	Roadside	NA	NA	**65.0**	**48.0**	**53.0**	39.3	**42.2**
CR94	528841	137069	Roadside	NA	NA	NA	26.0	27.0	18.2	25.0
CR95	528882	137086	Roadside	NA	NA	NA	31.0	32.0	24.4	25.7
CR96	529125	137196	Roadside	NA	NA	NA	30.0	27.0	21.6	21.7
CR97	528615	136960	Roadside	NA	NA	NA	41.0	37.0	27.7	29.1
CR98	528515	139275	Roadside	NA	NA	NA	35.0	34.0	27.7	29.2
CR100	526326	136487	Roadside	NA	NA	NA	30.0	27.0	22.7	25.6
CR103	528848	137802	Urban background	NA	NA	NA	NA	21.0	13.0	16.4
CR105	526940	137831	Roadside	NA	NA	NA	NA	**44.0**	35.8	36.4
CR106	527000	138357	Roadside	NA	NA	NA	NA	**46.0**	32.6	36.0

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)						
				2015	2016	2017	2018	2019	2020	2021
CR107	524806	136822	Urban background	NA	NA	NA	NA	NA	14.3	15.8
CR108	526901	136381	Roadside	NA	NA	NA	NA	NA	19.3	26.0
CR109	527174	136357	Urban background	NA	NA	NA	NA	NA	20.1	23.7
CR110	526928	136356	Roadside	NA	NA	NA	NA	NA	16.7	18.3
CR111	526804	136375	Roadside	NA	NA	NA	NA	NA	22.3	22.7
Mid Sussex District Council										
MSAQ7	530440	137280	Kerbside	25.3	26.5	23.6	22.5	NA	NA	NA
MSAQ25	531176	138829	Kerbside	29.1	30.0	28.8	26.9	26.8	18.4	18.8
Mole Valley District Council										
MV8	523412	140582	Suburban	9.4	15.4	18.1	14.6	15.7	11.6	12.1
MV9	526913	142369	Suburban	14.4	15.5	10.9	10.3	11.0	8.1	8.5
MV19	524909	140231	Kerbside	NA	NA	NA	NA	NA	NA	14.0
Reigate and Banstead Borough Council										
RB11	528104	142226	Suburban	22.0	24.2	22.8	23.9	21.3	14.6	15.0
RB12	528424	142934	Roadside	23.2	26.8	28.3	25.3	25.8	20.7	19.7
RB13	528362	142983	Other	20.0	22.9	19.9	23.1	19.8	13.3	14.6
RB24	528208	142337	Urban background	21.9	21.0	21.1	19.8	21.8	14.2	13.7
RB25	528208	142337	Urban background	20.8	21.4	21.8	21.6	21.2	13.4	14.0
RB26	528208	142337	Urban background	20.3	21.4	20.9	21.6	21.7	15.0	13.8
RB51	527873	142606	Suburban	20.6	21.7	20.8	20.8	20.7	13.1	15.1
RB52	527892	142463	Suburban	36.0	24.7	24.7	25.0	24.6	16.1	16.4
RB53	528030	142373	Suburban	26.7	23.8	25.3	24.4	25.6	16.3	16.5
RB54	528112	142321	Suburban	22.9	22.7	23.4	24.5	22.9	15.0	16.0
RB55	528254	142196	Suburban	23.6	24.7	22.8	24.8	23.6	16.0	16.0
RB56	528386	142080	Suburban	22.0	24.5	24.0	22.2	24.7	14.6	15.0
RB57	528499	141953	Suburban	23.4	25.0	26.2	24.2	24.6	15.2	14.5
RB58	528538	141897	Suburban	24.4	26.0	26.8	24.7	25.9	15.6	15.8
RB59	528602	141789	Suburban	25.0	28.6	27.8	26.5	26.0	15.3	15.1
RB60	528607	141910	Suburban	26.4	27.2	27.3	24.9	26.1	15.0	14.4
RB61	528578	142006	Suburban	21.3	24.8	22.6	21.3	23.1	15.6	13.8
RB64	528608	142432	Suburban	22.8	23.6	22.1	21.6	23.1	15.0	15.5
RB65	528581	142635	Suburban	24.3	24.6	22.4	22.8	23.1	16.4	17.5
RB66	528499	142512	Suburban	20.8	22.7	21.8	22.5	21.6	14.4	15.3
RB68	528505	142246	Suburban	21.0	25.9	24.0	21.7	24.0	14.8	14.6
RB69	528335	142224	Suburban	23.0	24.3	26.5	24.7	25.2	16.2	16.0
RB70	528360	142384	Suburban	22.6	23.8	24.3	23.3	23.7	14.2	15.4

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)						
				2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
RB72	528220	142583	Suburban	22.4	25.4	22.2	25.1	23.6	15.7	15.3
RB73	528172	142679	Suburban	20.8	24.0	22.0	22.0	21.5	15.4	15.3
RB74	529149	141953	Suburban	20.6	24.7	22.5	22.3	21.2	14.3	13.3
RB75	529203	142192	Suburban	21.6	23.6	23.9	21.9	22.3	14.5	14.2
RB76	528958	142468	Suburban	19.6	20.6	20.1	19.6	19.9	13.4	12.9
RB77	528789	142570	Suburban	19.2	21.0	20.9	19.8	19.7	13.7	13.4
RB78	528553	141857	Suburban	26.1	27.0	27.0	25.5	25.0	15.9	14.9
RB79	528553	141857	Suburban	25.5	28.5	30.9	NA	NA	NA	NA
RB80	528553	141857	Suburban	25.1	26.5	33.8	NA	NA	NA	NA
RB98	527931	142231	Suburban	24.0	25.1	25.8	24.7	24.2	15.9	17.1
RB99	526421	139639	Rural	13.8	16.3	14.1	15.0	13.8	9.3	10.0
RB100	526421	139639	Rural	13.4	17.3	13.7	15.8	13.8	9.0	10.6
RB101	526421	139639	Rural	13.5	15.6	14.0	15.3	14.9	9.2	10.1
RB102	530936	144278	Rural	22.0	22.4	20.9	23.4	19.3	13.6	15.9
RB149	527737	142710	Roadside	**45.0**	**49.8**	**46.0**	**43.4**	**43.5**	30.9	33.0
RB151	528502	142952	Roadside	31.2	31.7	33.3	29.4	33.5	22.7	26.3
RB174	527852	142841	Roadside	NA	30.4	31.1	30.3	29.1	19.1	21.4
RB175	527955	142999	Roadside	NA	26.7	30.6	27.5	29.8	22.2	22.5
RB176	527765	142777	Roadside	NA	23.1	25.4	25.5	25.4	17.3	19.3
RB177	527754	142762	Roadside	NA	23.9	24.9	23.8	25.1	16.6	18.4
RB178	528592	141831	Suburban	NA	NA	25.6	23.0	24.0	13.6	13.7
RB179	528592	141831	Suburban	NA	NA	25.3	23.4	23.2	13.4	13.8
RB180	528592	141831	Suburban	NA	NA	25.9	23.4	23.1	13.8	14.0
Tandridge District Council										
TD19	531134	143585	Urban background	21.0	20.4	20.9	19.2	20.7	14.1	14.2
TD26	531105	142939	Urban background	25.0	21.5	23.4	21.1	19.3	14.1	14.6
TD27	531932	142226	Kerbside	33.0	32.1	28.7	30.2	27.9	22.8	23.7

Exceedance of the air quality standard (40 µg/m3) are shown in **bold**

NA: Monitoring site not operational for year of monitoring.

2.4   Background Pollutant Concentrations

The Defra website (Defra, 2021c) includes estimated background air pollution data for each 1km by 1km OS grid square in the UK. Baseline concentrations for 2019 have been taken from the latest Defra maps and are presented in Table 2.4.1 for the grid squares that cover the Traffic Reliability Area (TRA). Baseline concentrations have not been gathered for NO$_x$, PM$_{10}$ and PM$_{2.5}$ for 2025 as this year is not used for roads modelling but has been used for modelling of the CARE point source emissions. Defra's estimated background concentrations are well below the air quality standards for annual mean NO$_2$ and PM$_{10}$ (40µg/m^3) and for PM$_{2.5}$ backgrounds in the study area fall to 12µg/m^3 which is in line with the interim target of 12µg/m^3 by 2028, however they remain above the final target of 10 µg/m^3 based on current data.

Table 2.4.1: Range of Background Pollutant Concentrations for Oxides of Nitrogen (NO$_x$), Particulate Matter (PM$_{10}$ and PM$_{2.5}$), Sulphur Dioxide (SO$_2$), Carbon Monoxide (CO), and Benzene

Pollutant	Background Concentrations (µg/m³)			
	2018	2025	2029	2030
Within 11 km by 10 km domain				
Annual mean NO$_x$	10.8 to 33.2	-	8.0 to 25.5	7.9 to 25.3
Annual mean PM$_{10}$	13.5 to 16.4	-	12.2 to 15.1	9.1 to 17.3
Annual mean PM$_{2.5}$	9.2 to 11.0	-	8.2 to 10.0	8.2 to 10.0
Annual mean SO$_2$	-	2.6 to 15.9	-	-
Annual mean CO	-	100 to 200	-	-
Annual mean benzene	-	0.1 to 0.5	-	-
Outside 11 km by 10 km domain				
Annual mean NO$_x$	10.4 to 34.7	-	7.5 to 24.2	7.4 to 23.9
Annual mean PM$_{10}$	13.4 to 19.2	-	12.1 to 17.4	8.4 to 21.3
Annual mean PM$_{2.5}$	8.9 to 13.2	-	7.9 to 12.0	7.9 to 12.0
Annual mean SO$_2$	-	1.8 to 15.9	-	-
Annual mean CO	-	100 to 200	-	-
Annual mean benzene	-	0.1 to 0.5	-	-

2.4.1　A comparison against monitoring background concentrations has also been undertaken for four sites deemed rural within the TRA with the monitored concentration from each monitoring site taken from the Annual Status Reports (ASR) of each Local Authority. The chosen monitoring sites for comparison in Table 2.3.4 have not been included in Table 2.4.2 as they are over 200m from modelled roads in the ARN, they are however considered representative of background concentrations and can be used for comparison purposes. The comparison has been undertaken for the latest year of available Defra modelled data (2018). Table 2.4.2 presents the comparison of the monitored NO$_2$ in 2018 against the Defra backgrounds for the same year. There is good agreement between the Defra modelled and monitored concentrations, with the differences ranging from - 3.0 - + 3.2 %. For the four monitoring sites listed below, no PM$_{10}$ or PM$_{2.5}$ data was available for monitored concentrations.

Table 2.4.2: Comparison between Defra and monitored background NO$_2$ (µg/m³)

Monitoring site	OS Grid Square		Defra mapped background concentration (µg/m³)	Monitored concentration (µg/m³)	Difference between mapped and monitored (%)
	X	Y	NO$_2$	NO$_2$	
MSAQ9	525500	125500	9.3	9.0	3.2%
MSAQ20	528500	114500	9.6	9.3	2.9%
CY50	535500	163500	14.3	14.8	-3.0%
RG3	526500	139500	15.9	15.5	2.9%

2.5 Background Nitrogen Deposition

2.5.1 Nutrient nitrogen data was collected from the Air Pollution Information System (APIS) for the sensitive ecological receptors modelled as part of the HRA. Table 2.5.1 presents the nutrient nitrogen for the sensitive ecological receptors.

Table 2.5.1: Sensitive ecological receptor nitrogen deposition details

Designated site	Habitat	Nutrient nitrogen	
		Minimum empirical critical load (kg N/ha/yr)	Average background nitrogen deposition (kg N/ha/yr)
Unnamed woodland 1	Forest	10	30.24
Unnamed woodland 2	Forest	10	28
Unnamed woodland 3	Forest	10	26.46
Unnamed woodland 4	Forest	10	26.46
Unnamed woodland 5	Forest	10	26.46
Unnamed woodland 6	Forest	10	29.12
Unnamed woodland 7	Forest	10	29.54
Unnamed woodland 8	Forest	10	24.64
Unnamed woodland 9	Forest	10	28.84
Unnamed woodland 10	Forest	10	28.84
Unnamed woodland 11	Forest	10	26.46
Unnamed woodland 12	Forest	10	30.8
Unnamed woodland 13	Forest	10	30.8
Unnamed woodland 14	Forest	10	29.54
Unnamed woodland 15	Forest	10	27.16
Unnamed woodland 16 & Bridgeham Wood	Forest	10	27.86
Unnamed woodland 17	Forest	10	30.8
Unnamed woodland 18	Forest	10	27.86
Unnamed woodland 19	Forest	10	26.18
Unnamed woodland 20	Forest	10	32.9
Unnamed woodland 21	Forest	10	30.66
Unnamed woodland 22	Forest	10	27.16
Unnamed woodland 23	Forest	10	28.56
Unnamed woodland 24	Forest	10	30.24
Unnamed woodland 25	Forest	10	31.5
Unnamed woodland 26	Forest	10	30.24
Unnamed woodland 27	Forest	10	26.46
Unnamed woodland 28	Forest	10	28.84
Unnamed woodland 29	Forest	10	31.22
Unnamed woodland 30	Forest	10	28.28
Unnamed woodland 31	Forest	10	28.56
Unnamed woodland 32	Forest	10	29.12
Unnamed woodland 33	Forest	10	26.46

Designated site	Habitat	Nutrient nitrogen	
		Minimum empirical critical load (kg N/ha/yr)	Average background nitrogen deposition (kg N/ha/yr)
Unnamed woodland 34	Forest	10	33.46
Unnamed woodland 35	Forest	10	29.12
Unnamed woodland 36	Forest	10	29.4
Unnamed woodland 37	Forest	10	30.8
Unnamed woodland 38	Forest	10	30.24
Unnamed woodland 39	Forest	10	30.24
Unnamed woodland 40	Forest	10	30.24
Unnamed woodland 41	Forest	10	25.9
Black Pit Shaw	Forest	10	27.16
Unnamed woodland 42	Forest	10	24.64
Unnamed woodland 43	Forest	10	27.16
Unnamed woodland 44	Forest	10	28.14
Unnamed woodland 45	Forest	10	31.5
Unnamed woodland 46 & Bridges Wood	Forest	10	27.86
Unnamed woodland 47	Forest	10	31.22
Unnamed woodland 48	Forest	10	31.5
Unnamed woodland 49	Forest	10	27.86
Unnamed woodland 50	Forest	10	31.5
Unnamed woodland 51	Forest	10	31.5
Unnamed woodland 52	Forest	10	29.54
Unnamed woodland 53	Forest	10	29.12
Unnamed woodland 54	Forest	10	27.86
Park Farm East	Forest	10	27.16
Unnamed woodland 55	Forest	10	29.54
Unnamed woodland 56	Forest	10	28.84
Unnamed woodland 57	Forest	10	24.5
Unnamed woodland 58	Forest	10	27.86
Unnamed woodland 59	Forest	10	31.5
Unnamed woodland 60	Forest	10	29.54
Unnamed woodland 61	Forest	10	28.84
Unnamed woodland 62	Forest	10	29.54
Unnamed woodland 63	Forest	10	25.9
Unnamed woodland 64	Forest	10	28.28
Unnamed woodland 65	Forest	10	31.5
Unnamed woodland 66	Forest	10	28.28
Unnamed woodland 67	Forest	10	31.5
Unnamed woodland 68	Forest	10	30.8
Unnamed woodland 69	Forest	10	30.24

Designated site	Habitat	Nutrient nitrogen	
		Minimum empirical critical load (kg N/ha/yr)	Average background nitrogen deposition (kg N/ha/yr)
Unnamed woodland 70	Forest	10	26.88
Unnamed woodland 71	Forest	10	28.84
Unnamed woodland 72	Forest	10	30.8
Unnamed woodland 73	Forest	10	30.8
Unnamed woodland 74	Forest	10	29.12
Unnamed woodland 75	Forest	10	27.58
Unnamed woodland 76 & Worthway	Forest	10	31.5
Unnamed woodland 77	Forest	10	31.5
Unnamed woodland 78	Forest	10	31.5
Unnamed woodland 79	Forest	10	29.12
Unnamed woodland 80	Forest	10	29.12
Unnamed woodland 81	Forest	10	33.46
Unnamed woodland 82	Forest	10	26.46
Unnamed woodland 83	Forest	10	30.66
Unnamed woodland 84	Forest	10	26.46
Unnamed woodland 85	Forest	10	31.5
Unnamed woodland 86	Forest	10	25.9
Unnamed woodland 87	Forest	10	28
Unnamed woodland 88	Forest	10	28.28
Unnamed woodland 89	Forest	10	29.54
Unnamed woodland 90	Forest	10	28
Unnamed woodland 91	Forest	10	29.12
Unnamed woodland 92	Forest	10	29.4
Unnamed woodland 93	Forest	10	28.84
Unnamed woodland 94	Forest	10	29.12
Unnamed woodland 95	Forest	10	28
Unnamed woodland 96	Forest	10	26.46
Unnamed woodland 97	Forest	10	28
Unnamed woodland 98	Forest	10	31.5
Unnamed woodland 99	Forest	10	29.12
Unnamed woodland 100	Forest	10	26.46
Unnamed woodland 101	Forest	10	25.9
Unnamed woodland 102	Forest	10	28.28
Unnamed woodland 103	Forest	10	24.64
Unnamed woodland 104	Forest	10	28
Unnamed woodland 105	Forest	10	27.86
Unnamed woodland 106	Forest	10	28.84
Unnamed woodland 107	Forest	10	29.12

Designated site	Habitat	Nutrient nitrogen	
		Minimum empirical critical load (kg N/ha/yr)	Average background nitrogen deposition (kg N/ha/yr)
Unnamed woodland 108	Forest	10	28.84
Unnamed woodland 109	Forest	10	24.64
Unnamed woodland 110	Forest	10	30.24
Unnamed woodland 111	Forest	10	27.86
Unnamed woodland 112	Forest	10	27.86
Unnamed woodland 113	Forest	10	28.84
Unnamed woodland 114	Forest	10	29.54
Unnamed woodland 115	Forest	10	28
Unnamed woodland 116	Forest	10	31.92
Unnamed woodland 117	Forest	10	27.58
Unnamed woodland 118	Forest	10	29.12
Unnamed woodland 119	Forest	10	26.46
Unnamed woodland 120	Forest	10	28.56
Unnamed woodland 121	Forest	10	29.12
Unnamed woodland 122	Forest	10	29.12
Unnamed woodland 123	Forest	10	28.84
Unnamed woodland 124	Forest	10	31.92
Unnamed woodland 125	Forest	10	31.22
Unnamed woodland 126	Forest	10	31.22
Unnamed woodland 127	Forest	10	30.24
Unnamed woodland 128	Forest	10	30.8
Unnamed woodland 129	Forest	10	30.24
Unnamed woodland 130	Forest	10	26.46
Unnamed woodland 131	Forest	10	30.24
Unnamed woodland 132	Forest	10	28.84
Unnamed woodland 133	Forest	10	26.46
Unnamed woodland 134	Forest	10	28.84
Unnamed woodland 135	Forest	10	27.86
Unnamed woodland 136	Forest	10	27.16
Unnamed woodland 137	Forest	10	28.28
Unnamed woodland 138	Forest	10	29.54
Unnamed woodland 139	Forest	10	30.66
Unnamed woodland 140	Forest	10	30.8
Unnamed woodland 141	Forest	10	29.12
Unnamed woodland 142	Forest	10	25.76
Unnamed woodland 143	Forest	10	31.92
Unnamed woodland 144	Forest	10	31.5
Unnamed woodland 145	Forest	10	29.12

Designated site	Habitat	Nutrient nitrogen	
		Minimum empirical critical load (kg N/ha/yr)	Average background nitrogen deposition (kg N/ha/yr)
Unnamed woodland 146	Forest	10	28.28
Unnamed woodland 147	Forest	10	29.54
Unnamed woodland 148	Forest	10	29.54
Unnamed woodland 149	Forest	10	24.64
Unnamed woodland 150	Forest	10	29.12
Unnamed woodland 151	Forest	10	31.5
Unnamed woodland 152	Forest	10	29.54
Unnamed woodland 153	Forest	10	24.64
Unnamed woodland 154	Forest	10	20.44
Unnamed woodland 155	Forest	10	30.24
Unnamed woodland 156	Forest	10	27.58
Unnamed woodland 157	Forest	10	28.84
Wallage Wood & Worthway	Forest	10	31.5
Unnamed woodland 158	Forest	10	20.44
Unnamed woodland 159	Forest	10	27.86
Unnamed woodland 160	Forest	10	30.1
Unnamed woodland 161	Forest	10	26.46
Unnamed woodland 162	Forest	10	26.88
Unnamed woodland 163	Forest	10	25.9
Unnamed woodland 164	Forest	10	28.56
Unnamed woodland 165	Forest	10	31.5
Unnamed woodland 166	Forest	10	29.54
Unnamed woodland 167	Forest	10	28
Unnamed woodland 168	Forest	10	27.86
Unnamed woodland 169	Forest	10	26.46
Wantley Wood	Forest	10	25.9
Unnamed woodland 170	Forest	10	31.92
Unnamed woodland 171	Forest	10	30.24
Unnamed woodland 172	Forest	10	29.12
Unnamed woodland 173	Forest	10	27.86
Unnamed woodland 174	Forest	10	24.5
Unnamed woodland 175	Forest	10	31.5
Unnamed woodland 176	Forest	10	28.28
Unnamed woodland 177	Forest	10	23.94
Unnamed woodland 178	Forest	10	32.9
Unnamed woodland 179	Forest	10	29.12
Unnamed woodland 180	Forest	10	32.9
Unnamed woodland 181	Forest	10	24.5

Designated site	Habitat	Nutrient nitrogen	
		Minimum empirical critical load (kg N/ha/yr)	Average background nitrogen deposition (kg N/ha/yr)
Unnamed woodland 182	Forest	10	25.9
Unnamed woodland 183	Forest	10	28.84
Unnamed woodland 184	Forest	10	31.92
Unnamed woodland 185	Forest	10	33.46
Unnamed woodland 186	Forest	10	28.56
Hazeldean Shaw West	Forest	10	25.9
Unnamed woodland 187	Forest	10	28.28
Unnamed woodland 188	Forest	10	24.64
Unnamed woodland 189	Forest	10	29.12
Unnamed woodland 190	Forest	10	31.22
Unnamed woodland 191	Forest	10	30.66
Unnamed woodland 192	Forest	10	24.5
Unnamed woodland 193	Forest	10	31.92
Unnamed woodland 194	Forest	10	24.5
Unnamed woodland 195	Forest	10	29.12
Unnamed woodland 196	Forest	10	31.22
Unnamed woodland 197	Forest	10	28.14
Unnamed woodland 198	Forest	10	30.24
Unnamed woodland 199	Forest	10	20.44
Heathyground & A264 Copthorne	Forest	10	31.5
Unnamed woodland 200	Forest	10	32.9
Unnamed woodland 201	Forest	10	33.46
Chobham Common	Grassland	10	15.5
Chobham Common	Grassland	10	15.5
Thorpe Park No. 1 Gravel Pit	Grassland	0	9.1
Ockham And Wisley	Grassland	10	13.8
Ockham And Wisley	Grassland	10	13.8
Mole Gap To Reigate Escarpment	Grassland	5	18.2
Banstead Downs	Grassland	15	17.9
Riddlesdown	Forest	10	31.4
Woldingham & Oxted Downs	Forest	10	32.1
Titsey Woods	Forest	15	30.8
Westerham Wood	Forest	15	31
Sullington Warren	Forest	10	14.8
Epsom And Ashtead Commons	Forest	10	30.2
Roundshaw Downs	Forest	10	30.1
Foxley Wood	Forest	10	30.1
Bramley Bank	Forest	10	32.9

Designated site	Habitat	Nutrient nitrogen	
		Minimum empirical critical load (kg N/ha/yr)	Average background nitrogen deposition (kg N/ha/yr)
Edolph'S Copse	Forest	10	28.56
Unnamed Veteran Tree 1	Forest	10	30.8
Unnamed Veteran Tree 2	Forest	10	31.5
Unnamed Veteran Tree 3	Forest	5	28.28
Unnamed Veteran Tree 4	Forest	10	29.54
Unnamed Veteran Tree 5	Forest	10	29.54
Unnamed Veteran Tree 6	Forest	10	26.88
Unnamed Veteran Tree 7	Forest	10	26.46
Unnamed Veteran Tree 8	Forest	10	27.58
Unnamed Veteran Tree 9	Forest	10	31.5
Unnamed Veteran Tree 10	Forest	5	25.9
Unnamed Veteran Tree 11	Forest	10	32.9
Unnamed Veteran Tree 12	Forest	10	28.42
Unnamed Veteran Tree 13	Forest	10	30.1
Unnamed Veteran Tree 14	Forest	10	28.28
Unnamed Veteran Tree 15	Forest	10	30.1
Unnamed Veteran Tree 16	Forest	10	24.5
Unnamed Veteran Tree 17	Forest	10	27.02
Unnamed Veteran Tree 18	Forest	10	26.88
Unnamed Veteran Tree 19	Forest	10	24.5
Unnamed Veteran Tree 20	Forest	10	29.54
Unnamed Veteran Tree 21	Forest	10	29.4
Unnamed Veteran Tree 22	Forest	10	28
Unnamed Veteran Tree 23	Forest	10	29.4
Unnamed Veteran Tree 24	Forest	10	29.54
Unnamed Veteran Tree 25	Forest	10	26.88
Unnamed Veteran Tree 26	Forest	10	26.88
Unnamed Veteran Tree 27	Forest	10	28.42
Unnamed Veteran Tree 28	Forest	10	28.42
Unnamed Veteran Tree 29	Forest	10	26.46
Croham Hurst	Forest	10	30.1
Unnamed Veteran Tree 30	Forest	10	28.84
Hardriding Shaw	Forest	10	30.24
Unnamed Veteran Tree 31	Forest	10	28.7
Beggarsbush Bottom	Forest	10	27.16
Unnamed Veteran Tree 32	Forest	10	32.9
Ockham and Wisley	Grassland	10	13.8
Thursley, Ash, Pirbright & Chobham	Grassland	10	16.9

Designated site	Habitat	Nutrient nitrogen	
		Minimum empirical critical load (kg N/ha/yr)	Average background nitrogen deposition (kg N/ha/yr)
Thames Basin Heaths	Forest	5	17.9
Mole Gap and Reigate Enscarpment	Forest	5	18.2
Mole Gap and Reigate Enscarpment	Forest	5	18.2
Target Hill Park	Forest	10	28.7
Buchan Hill Ponds	Forest	10	28.7
Buchan	Forest	10	28.7
Worth Way	Forest	10	29.54
Worth Meadows	Forest	10	31.5
Copthorne Common	Grassland	5	18.06
Oaken Wood, Stony Plats & High Lines	Forest	10	31.5
Copthrone Meadows	Grassland	5	18.06
Cophall Field	Forest	10	27.86
Copper Coin Paddocks	Forest	10	27.86
Bridges Fields	Forest	10	27.86
Wheatfield March	Forest	10	28.28
Withy Gill	Grassland	20	16.38
Norleyland Wood	Forest	10	29.54
Charlwood, Stanhill Court Meadow	Forest	10	28.56
Unnamed woodland 202	Forest	10	26.88
Unnamed woodland 203	Forest	10	24.64
Unnamed woodland 204	Forest	10	26.46
Home Wood	Forest	10	30.24
High Wood	Forest	10	30.24
Chantry Mill	Forest	0	0
Unnamed woodland 205	Forest	10	29.12
Wellfield Copse	Forest	10	31.5
Heathyground Wood	Forest	10	31.5
Anton Crescent Wetland	Grassland	10	15.54
Earlswood Common	Grassland	15	16.38
Earlswood Common	Grassland	15	16.38
Unnamed woodland 206	Forest	10	28.84
Warnham	Forest	10	29.54
Sayers Common Wood East	Forest	10	27.58
Sayers Common Wood	Forest	10	27.58
Slay Pit	Forest	10	25.9
Reed Pond Shaw	Forest	10	29.12
Unnamed woodland 207	Forest	10	29.54
Unnamed woodland 208	Forest	10	28.56

Designated site	Habitat	Nutrient nitrogen	
		Minimum empirical critical load (kg N/ha/yr)	Average background nitrogen deposition (kg N/ha/yr)
Unnamed woodland 209 & Ilfield Brook Wood and Meadows	Forest	10	28.28
Unnamed woodland 210	Forest	10	29.54
Unnamed woodland 211	Forest	10	28.28
Unnamed woodland 212	Forest	5	28.68
Unnamed woodland 213	Forest	5	28.68
Willoughby Fields	Forest	10	29.54
Glover's Wood	Forest	10	28.56
Waterlea Meadow	Forest	10	29.54
The Hawth	Forest	10	29.54
Ewhurst Wood	Forest	10	29.54
Ifield Pond and Surroundings	Forest	10	28.28
Brockle Wood	Forest	10	29.54
Ewhurst Wood	Forest	10	29.54
Unnamed woodland 214	Forest	10	28.28
Unnamed woodland 215	Forest	10	28.28
Unnamed woodland 216	Forest	10	28.28
Unnamed woodland 217	Forest	10	28.28

3 Model Verification

3.1 Overview

3.1.1 Model verification refers to the comparison of modelled pollutant concentrations with measured concentrations at the same points to assess the performance of the model and determine an adjustment factor if one is required. Defra's Technical Guidance (TG22) (Defra, 2022) provides advice on model verification, which is used for modelling of road networks in isolation, highways assessments, local air quality management and other local modelling of roads (Defra, 2022). Should the model results for NO_2 be largely within ±25 % of the measured values and there is no systematic over or under-prediction of concentrations, then the Defra guidance (TG22) (Defra, 2022) advises that no adjustment is necessary. If this is not the case, then the modelled values are adjusted based on the observed relationship between modelled and measured NO_x concentrations to provide better agreement.

3.1.2 Modelled results may not compare as well at some locations for a number of reasons including:

- uncertainties in estimated traffic flow and speed data;
- model set up (including street canyons, road widths, receptor locations);
- model limitations (treatment of roughness and meteorological data);
- uncertainty in monitoring data (notably diffusion tubes, eg bias adjustment factors and annualisation of short-term data);
- uncertainty in estimates of background concentrations; and
- uncertainty in emissions/emission factors.

3.1.3 The above factors were investigated as part of the model verification process to minimise the uncertainties as far as practicable.

3.1.4 The model verification was reviewed following the PEIR (Preliminary Environmental Information Report) to take into account all feedback during consultation and engagement. The key points of feedback were all addressed and the model verification for the ES is improved compared with the PEIR, with fewer zones, improved correlation between modelled and monitored results. The requested data for the verification statistics has also been provided. The results of model verification were presented at the air quality topic working group in November 2022, and the results and processes were agreed.

3.2 Model Verification

3.2.1 Some monitoring locations are not suitable for model verification purposes as there may be specific local influences unaccounted for in the input data or model, or they may be located too close to the road, in which case Defra's guidance (TG22) (Defra, 2022) advises they should not be used. All NO_2 monitoring location sites (420 in total) within 200 m from the ARN with monitoring data in 2019, were investigated and are listed in Table 3.2.1. Each site was examined for its suitability for inclusion in the verification study. The criteria used to exclude monitoring data from the verification process are outlined below.

- Monitoring site with no monitoring data for 2018.
- Monitoring site with low data capture for 2018, ie less than 75 per cent in a year.
- Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
- Passive monitoring site co-located with continuous monitor, continuous monitoring results used in verification instead.
- Monitoring site located on a road island, where concentrations cannot be accurately represented in the model.
- Kerbside location, ie too close to the road to be accurately represented by the model.
- Monitoring site obstructed by vegetation and therefore concentrations would not be accurately represented in the model.
- Monitoring site influenced by local characteristics which were not explicitly modelled.

3.2.2 From the monitoring data in the study area for 2018, the baseline year for the study, 247 sites were selected for inclusion in the model verification exercise (see Figures 3.3.1 and 3.3.2 for locations). The justification for the exclusion for the other 173 monitoring sites is provided in Table 3.2.1.

Table 3.2.1: Diffusion Tube NO$_2$ Monitoring Data for 2018 within 200 m of the ARN

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)
Gatwick Airport				
HR6	528068	137806	Roadside	23.0
HR9	528193	137805	Urban background	23.7
RG2/RG6	528597	141833	Urban background	25.2
HR13	528253	137820	Kerbside	25.9
HR19	528316	138050	Urban background	27.3
HR12	528258	137811	Roadside	28.1
HR1	528073	137821	Roadside	28.8
BR15	527690	142641	Roadside	30.2
HR2	528113	137823	Roadside	30.2
HR16	528276	137861	Roadside	30.3
BR1	527881	142769	Roadside	30.4
HR3	528147	137825	Roadside	31.4
HR15	528288	137829	Roadside	32.5
BR16	527682	142648	Roadside	33.6
HR7	528149	137808	Roadside	34.2
BR11	527568	142568	Roadside	34.7
BR14	527655	142616	Roadside	35.6
HR17	528308	138013	Urban background	36.3
HR4	528153	137871	Roadside	36.7
BR8	527694	142686	Roadside	36.9
BR2	527798	142758	Kerbside	36.9
HR20	528276	137854	Roadside	37.3
BR6	527750	142749	Roadside	38.0
BR10	527626	142611	Kerbside	38.6
BR7	527722	142717	Roadside	39.1
BR12	527582	142552	Roadside	39.2
BR13	527636	142599	Roadside	40.0
BR18	527716	142686	Roadside	**41.2**
HR8	528168	137839	Roadside	**41.4**
BR4	527785	142758	Kerbside	**41.5**
BR3	527795	142800	Roadside	**41.5**
BR9	527670	142659	Roadside	**41.6**
HR18	528240	138014	Roadside	**42.0**
BR20	527759	142737	Roadside	**45.1**
HR5	528157	137913	Roadside	**45.7**
BR5	527781	142763	Kerbside	**46.0**

ID	X	Y	Location type	Annual Mean NO₂ (μg/m³)
BR17	527705	142677	Roadside	**47.1**
BR19	527734	142707	Roadside	**49.0**
RG1	528204	142330	Urban background	20.2
HR14	528369	137779	Urban background	21.0
HR10	528211	137808	Urban background	21.9
HR11	528249	137794	Roadside	22.5
Crawley				
CR52	529417	141498	Industrial	24.0
CR78	530037	138555	Urban background	24.0
CR81	529047	134474	Urban background	24.0
CA2	529417	141498	Industrial	25.0
CR48	527110	139530	Urban background	25.0
CR53	529417	141498	Industrial	25.0
CR54	529417	141498	Industrial	25.0
CR79	529312	138534	Urban background	25.0
CR86	526878	136821	Roadside	26.0
CR88	525489	136573	Urban background	26.0
CR90	526953	138660	Roadside	26.0
CR94	528841	137069	Roadside	26.0
CR80	530437	136522	Urban background	28.0
CR66	526743	136346	Roadside	29.0
LGW3	528583	140827	Industrial	30.0
CR85	528295	138009	Urban background	30.0
CR96	529125	137196	Roadside	30.0
CR100	526326	136487	Roadside	30.0
CR1	526799	136785	Roadside	33.0
CR 60	526759	136949	Roadside	33.0
CR74	528978	139599	Urban background	34.0
CR91	528681	137177	Roadside	34.0
CR76	528294	137811	Roadside	35.0
CR77	528362	137814	Roadside	35.0
CR98	528515	139275	Roadside	35.0
CR 99	528410	135628	Urban background	17.0
CR102	526449	134139	Roadside	37.0
CR62	528438	138088	Urban background	38.0
CR87	526908	136754	Roadside	38.0
CR49	526320	139860	Urban background	18.0
CR64	528150	137825	Roadside	40.0

ID	X	Y	Location type	Annual Mean NO₂ (µg/m³)
CR69	528443	138082	Urban background	40.0
CR 55	528446	138085	Roadside	**41.0**
CR97	528603	136950	Roadside	**41.0**
CR93	528895	137115	Roadside	**48.0**
CR63	528157	137913	Roadside	**52.0**
CR101	525679	135556	Roadside	**54.0**
CR103	528848	137802	Urban background	NA
CR104	527333	135846	Urban background	NA
CR107	524806	136822	Urban background	NA
CR109	527174	136357	Urban background	NA
CR110	526928	136356	Roadside	NA
CR111	526804	136375	Roadside	NA
CR95	528882	137086	Roadside	31.0
CR105	526940	137831	Roadside	NA
CR106	527000	138357	Roadside	NA
CR108	526901	136381	Roadside	NA
CR4	529864	138206	Urban background	21.0
CR50	527810	139931	Urban background	21.0
CR75	529335	139589	Urban background	21.0
CR51	529490	141460	Urban background	22.0
CR89	527715	137893	Urban background	22.0
Croydon				
CY50	535470	163782	Urban background	14.8
CY56a	531364	166097	Industrial	27.0
CY46	529749	159641	Urban background	29.5
CR7	531136	164251	Roadside	31.0
CY97c	531151	164258	Roadside	35.3
CY42	530881	166312	Roadside	37.3
CY52	532683	164196	Roadside	37.8
CY48	532808	168102	Roadside	39.5
CY43	533167	166466	Roadside	39.9
CR9	532566	165599	Roadside	**41.0**
CY51	535415	163976	Roadside	**42.9**
CY59	532561	165381	Roadside	**49.8**
CY98b	532583	165638	Roadside	**50.8**
CY41	530727	160842	Roadside	**52.7**
CY58	532383	165957	Roadside	**67.8**
CY99	533940	168390	Roadside	33.9

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)
CY101d	533558	167759	Roadside	NA
CY102d	533380	167882	Roadside	NA
CY106d	530835	167021	Roadside	NA
CY108d	529717	160416	Roadside	NA
CY109d	529404	159387	Roadside	NA
CY110d	531702	162125	Roadside	NA
CY111d	533475	162432	Roadside	NA
CY112d	531995	164889	Roadside	NA
CY100d	533049	166124	Roadside	NA
CY103d	532788	168022	Roadside	NA
CY107d	531123	164298	Background	NA
CY113d	532000	166284	Roadside	NA
CR4	532584	165630	Roadside	NA
CY47	530663	160813	Urban background	22.3
Elmbridge				
Oxshott 1	514554	160618	Roadside	NA
Oxshott 2	514574	160493	Roadside	NA
Epsom and Ewell				
EE42	521006	160902	Roadside	23.1
EE38	520725	160858	Roadside	23.3
EE9	519822	163743	Roadside	23.5
EE16	522026	162624	Roadside	25.5
EE37	520946	160839	Roadside	26.9
EE6	520535	165029	Kerbside	30.4
EE7	520911	164636	Kerbside	33.5
EE53	522370	163287	Roadside	NA
EE52	522304	163212	Roadside	NA
Horsham				
HO4	509085	114198	Roadside	23.0
Storrington 17n	508678	114147	Urban background	13.3
Cowfold 8n	521411	122667	Urban background	13.5
Storrington 16n	508971	114356	Roadside	24.0
Cowfold 6n	521310	122248	Roadside	25.1
Storrington 5	508742	114288	Roadside	26.4
Cowfold AU A/B/C	521356	122552	Roadside	26.6
Storrington 8/9/10 AURN	509085	114198	Roadside	26.6

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)
Horsham 7	516952	132215	Roadside	27.4
HO5	521356	122552	Roadside	28.4
Storrington 12n	508599	114325	Roadside	28.6
Storrington 13n	508669	114306	Roadside	29.9
Cowfold 4	521311	122704	Roadside	31.4
Cowfold 3	521267	122676	Roadside	31.8
Storrington 3	508934	114298	Roadside	32.9
Cowfold 1_2	521324	122610	Roadside	35.4
Storrington 4	508832	114272	Roadside	35.8
Storrington 11n	508520	114364	Roadside	37.8
Cowfold 7n	521460	122473	Roadside	**42.4**
Storrington 1	508960	114271	Roadside	**44.7**
Storrington 15n	509097	114526	Roadside	18.9
Storrington 19n	508945	114268	Roadside	**50.6**
Storrington 18n	508210	114240	Roadside	19.1
Horsham 11n	517672	130322	Roadside	NA
Horsham 12	516909	130755	Roadside	NA
Cowfold 5n	521082	122702	Roadside	24.9
Cowfold 9	521587	122459	Roadside	NA
Storrington 14n	509316	114140	Roadside	19.7
Storrington 7	508364	114385	Roadside	20.9
Storrington 6	508395	114447	Roadside	22.3
Kingston Upon Thames				
20	517250	161577	Roadside	34.9
15	520190	165263	Kerbside	**41.0**
Lewes				
47	536441	116231	Roadside	NA
48	542020	115773	Roadside	NA
49	540135	113548	Roadside	NA
Merton				
2 (GA)	524129	166116	Roadside	36.7
53	524621	166786	Kerbside	**43.1**
3	524551	166744	Kerbside	NA
Mid Sussex				
MSAQ27	526870	120238	Urban background	22.8
MSAQ24	529918	115476	Roadside	24.0

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)
MSAQ6	526138	129827	Roadside	26.2
MSAQ25	531176	138829	Kerbside	26.9
MSAQ18	529907	115428	Kerbside	28.1
MSAQ17	529894	115340	Kerbside	28.7
MSAQ12	530000	115490	Kerbside	33.5
MSAQ14	529911	115598	Kerbside	34.0
MSAQ23	529935	115478	Roadside	34.5
MSAQ15	529930	115600	Kerbside	35.1
MSAQ19	529779	115557	Roadside	17.4
MSAQ13	529995	115476	Kerbside	38.9
MSAQ11	529930	115481	Roadside	**40.1**
MSAQ10	529911	115489	Roadside	**41.2**
MSAQ4	539919	138161	Urban Centre	NA
MSAQ30	526314	133235	Roadside	NA
MSAQ31	537680	139009	Roadside	NA
MSAQ32	530791	120295	Roadside	NA
MSAQ34	531144	118862	Roadside	NA
MSAQ35	528904	114415	Rural	NA
MSAQ37	533933	138473	Roadside	NA
MSAQ39	539116	138384	Roadside	NA
MSAQ40	532894	118063	Roadside	NA
MSAQ29	539040	138451	Roadside	NA
MSAQ36	537609	139406	Roadside	NA
MSAQ38	539005	138480	Roadside	NA
MSAQ8	528477	112870	Roadside	NA
MSAQ16	529918	115441	Roadside	19.9
MSAQ7	530435	137279	Kerbside	22.5
Mole Valley				
MV12	517674	156840	Roadside	22.8
MV6	517210	157200	Roadside	23.7
MV8	523412	140582	Suburban	14.6
MV10	517712	156744	Roadside	28.5
MV9	526913	142369	Suburban	10.3
MV16	514677	156557	Roadside	NA
MV17	516763	156565	Roadside	NA
MV15	513617	154429	Roadside	NA
MV11	517804	156751	Roadside	22.3

ID	X	Y	Location type	Annual Mean NO₂ (µg/m³)
Reigate and Banstead				
RB140	528121	150798	Roadside	22.6
RB65	528596	142641	Suburban	22.8
RB141	527373	150596	Roadside	22.9
RB178	528592	141831	Suburban	23.0
RB13	528362	142983	Other	23.1
RB19	529067	153375	Suburban	23.1
RB70	528343	142374	Suburban	23.3
RB102 2	530936	144278	Rural	23.4
RB179	528592	141831	Suburban	23.4
RB180	528592	141831	Suburban	23.4
RB114	524368	150477	Roadside	23.5
RB36	528894	153755	Roadside	23.8
RB43	528804	153617	Roadside	23.8
RB177	527750	142759	Roadside	23.8
RB11	528103	142227	Suburban	23.9
RB57	528498	141953	Suburban	24.2
RB53	528030	142369	Suburban	24.4
RB54	528113	142319	Suburban	24.5
RB193	528780	156431	Roadside	24.6
RB27	521886	153905	Roadside	24.7
RB50	525708	152969	Roadside	24.7
RB58	528538	141897	Suburban	24.7
RB69	528347	142229	Suburban	24.7
RB98	527927	142229	Suburban	24.7
RB167	527836	150657	Roadside	24.7
RB55	528254	142196	Suburban	24.8
RG6	528592	141831	Suburban	24.9
RB60	528605	141910	Suburban	24.9
RB113	524795	150404	Roadside	24.9
RB52	527903	142470	Suburban	25.0
RB72	528238	142587	Suburban	25.1
RB95	525383	150639	Roadside	25.1
RB12	528426	142933	Roadside	25.3
RB78	528553	141857	Suburban	25.5
RB176	527765	142779	Roadside	25.5
RB115	524751	150428	Roadside	26.3
RB34	524158	152430	Roadside	26.4

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)
RB59	528602	141789	Suburban	26.5
RB191	528785	156448	Roadside	26.5
RB196	528797	156331	Roadside	26.8
RB107	525468	150293	Roadside	27.0
RB187	528788	156488	Roadside	27.0
RB110	529015	153440	Roadside	27.1
RB111	525031	150291	Roadside	27.1
RB175	527955	142999	Roadside	27.5
RB209	528833	156547	Roadside	27.8
RB44	525540	150305	Roadside	28.5
RB192	528784	156442	Roadside	28.5
RG2	528553	141857	Suburban	NA
RB215	528853	156646	Roadside	29.0
RB45	525492	150281	Roadside	29.2
RB151	528502	142952	Roadside	29.4
RB116	525022	150317	Roadside	29.6
RB20	529026	153420	Roadside	30.3
RB109	525387	150178	Roadside	30.3
RB174	527852	142841	Roadside	30.3
RB182	528835	156728	Roadside	30.3
RB1	525246	150252	Roadside	30.6
RB122	528013	150475	Roadside	30.6
RB190	528788	156460	Roadside	30.7
RB186	528790	156500	Roadside	30.8
RB145	527852	150158	Kerbside	30.9
RB46	525346	150241	Roadside	31.0
RB80	528553	141857	Suburban	31.4
RB189	528789	156465	Roadside	31.4
RB120	528196	150421	Roadside	31.5
RB124	529011	153284	Roadside	31.7
RB125	525589	151655	Roadside	31.8
RB188	528792	156478	Roadside	32.2
RB152	528583	152420	Roadside	32.4
RB79	528553	141857	Suburban	32.5
RB194	528776	156381	Kerbside	32.5
RB118	525151	150467	Roadside	32.8
RB150	525397	150867	Roadside	33.1
RB214	528848	156617	Roadside	33.1

ID	X	Y	Location type	Annual Mean NO₂ (µg/m³)
RB31	525516	152362	Roadside	16.3
RB123	527838	150474	Kerbside	33.5
RB104	525204	150254	Roadside	34.0
RB9	525750	149677	Urban background	16.4
RB199	528800	156390	Roadside	34.1
RB201	528804	156414	Roadside	34.2
RB206	528816	156477	Roadside	34.5
RB47	525112	150270	Roadside	34.8
RB184	528807	156555	Roadside	34.8
RB105	525200	150239	Roadside	35.0
RB207	528818	156486	Roadside	35.2
RB147	528732	156407	Urban background	17.0
RB197	528795	156373	Roadside	36.2
RB117	525077	150330	Roadside	36.3
RB183	528813	156580	Roadside	36.4
RB213	528845	156604	Roadside	36.5
RB211	528839	156577	Roadside	36.6
RB204	528810	156457	Roadside	36.8
RB203	528809	156454	Roadside	36.9
RB195	528772	156349	Kerbside	37.0
RB202	528808	156444	Roadside	37.7
RB198	528796	156379	Roadside	38.2
RB49	525699	152941	Roadside	39.2
RB219	528877	156744	Roadside	39.2
RB210	528835	156559	Roadside	39.3
RB212	528840	156582	Roadside	39.3
RB146	528757	156277	Kerbside	**40.4**
RB121	528096	150769	Kerbside	**41.1**
RB200	528798	156409	Roadside	**42.1**
RB216	528861	156690	Roadside	**42.5**
RB218	528866	156738	Kerbside	**42.6**
RB137	528830	156640	Roadside	**43.2**
RG1	528204	142331	Suburban	18.8
RB217	528864	156712	Roadside	**43.2**
RB149	527737	142710	Roadside	**43.4**
RB205	528809	156466	Roadside	**44.0**
RB136	528808	156474	Roadside	**45.9**
RB181	528850	156724	Roadside	**47.0**

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)
RG7	528802	156435	Roadside	**47.4**
RB8	525246	150286	Urban background	19.0
RB208	528822	156526	Roadside	**53.0**
RB148	528853	156674	Kerbside	**59.5**
RB40	529240	154293	Roadside	19.0
RB76	528967	142452	Suburban	19.6
RB223	528802	156435	Roadside	NA
RB224	528802	156435	Roadside	NA
RB225	528802	156435	Roadside	NA
RB24	528204	142331	Urban background	19.8
RB77	528790	142584	Suburban	19.8
RB33	524080	152580	Roadside	20.3
RB51	527865	142594	Suburban	20.8
RB61	528575	142015	Suburban	21.3
RB29	521903	153978	Roadside	21.5
RB25	528204	142331	Urban background	21.6
RB26	528204	142331	Urban background	21.6
RB64	528608	142440	Suburban	21.6
RB68	528479	142243	Suburban	21.7
RB75	529190	142219	Suburban	21.9
RB30	522118	153782	Roadside	22.0
RB37	529225	153599	Roadside	22.0
RB73	528192	142672	Suburban	22.0
RB82	528749	155790	Suburban	31.3
RB39	529209	153570	Roadside	22.1
RB56	528381	142085	Suburban	22.2
RB74	529170	141954	Suburban	22.3
RB66	528480	142516	Suburban	22.5
Runnymede				
RY8	504309	163952	Suburban	22.5
RY25	501746	171347	Roadside	33.5
RY33	501679	171676	Intermediate	34.5
RY39	498859	166225	Roadside	28.4
RY71	504209	164259	Intermediate	NA
RY19	505223	162698	Roadside	32.3
RY26	501707	171391	Roadside	36.5
RY44	504628	164435	Roadside	NA
RY52	503011	171333	Roadside	NA

ID	X	Y	Location type	Annual Mean NO$_2$ (µg/m^3)
Sevenoaks				
DT25	544771	154002	Roadside	26.1
DT34	549427	155691	Roadside	26.1
DT43	551281	156860	Roadside	28.5
DT84	546802	155000	Roadside	32.5
DT54	551216	157007	Roadside	32.7
DT24	544414	153915	Roadside	35.8
DT12	546816	155851	Roadside	39.8
DT36	544594	154025	Kerbside	**40.1**
DT85	547095	155100	Roadside	**43.7**
DT98	550955	157680	Roadside	NA
Sutton				
ST07	528401	166038	Urban background	22.4
ST11	529835	165041	Urban background	24.5
ST32	525184	165845	Urban background	24.3
H2	528446	166287	Urban background	26.8
ST8	529781	166597	Industrial	25.0
ST24	530130	165404	Roadside	28.9
ST21	525574	166286	Urban background	29.4
H1	528356	166067	Roadside	30.0
H3	528510	166007	Roadside	**44.1**
ST36	530636	164839	Roadside	29.3
ST35	524782	165167	Roadside	31.1
BL	529400	167235	Roadside	29.0
ST25	523874	165683	Roadside	31.6
ST23	529734	163868	Roadside	37.0
ST5	529400	167224	Industrial	29.0
ST38	526048	163633	Roadside	35.1
ST22	525063	162474	Roadside	36.1
ST33	526021	164025	Roadside	34.5
ST39	526017	166470	Roadside	**40.7**
ST29	528342	164614	Roadside	38.9
ST34	525772	165115	Roadside	38.9
ST40	524362	163596	Roadside	**41.1**
ST6	522557	165787	Kerbside	**52.0**
ST4	528925	163804	Kerbside	**47.0**
ST9	530124	165323	Roadside	NA

ID	X	Y	Location type	Annual Mean NO₂ (µg/m³)
ST43	525883	162518	Roadside	NA
Tandridge				
TD30	540253	153712	Urban background	22.8
TD38	531840	150826	Roadside	24.2
TD35	531950	150782	Roadside	28.4
TD5	535072	152658	Roadside	28.8
TD27	531932	142226	Kerbside	30.2
TD10	535013	151820	Roadside	32.0
TD11	534985	152050	Roadside	33.4
TD40	530592	150507	Roadside	34.3
TD19	531134	143585	Urban background	19.2
TD37	530385	150480	Kerbside	19.6
TD1	537174	139654	Roadside	NA
TD2	536336	148437	Roadside	NA
TD3	535875	146674	Roadside	NA
TD15	534995	151859	Roadside	NA
TD16	534992	151916	Roadside	NA
TD17	534989	151967	Roadside	NA
TD18	535002	151944	Roadside	NA
TD25	533840	158843	Urban background	19.7
TD26	531105	142939	Urban background	21.1
Waverley				
WBC46	505795	139054	Roadside	NA
WBC47	504045	135425	Roadside	NA
Woking				
PR	504926	161063	Kerbside	26.5
M25	505611	161180	Other	**53.9**

Exceedance of the air quality standard (40 µg/m3) are shown in **bold**

NA: Monitoring site not operational for year of monitoring.

Table 3.2.2: Justification for Exclusion of Monitoring Site

Model ID	Site ID	Justification for exclusion
M3	MV9	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M13	Cowfold 8n	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M15	MV8	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M16	CY50	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M24	RG2	No monitoring data for 2018.
M31	RB31	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M32	RB9	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M34	CR 99	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M35	RB147	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M44	RB8	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M45	RB40	Monitoring site obstructed by vegetation and therefore concentrations would not be accurately represented in the model.
M46	Storrington 18n	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M50	TD37	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M53	TD25	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M55	RB24	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M57	MSAQ16	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M61	RG1	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M67	CR4	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M70	HR14	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M75	RB25	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M76	RB26	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M84	HR10	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M91	RB39	Monitoring site obstructed by vegetation and therefore concentrations would not be accurately represented in the model.
M93	CY47	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M105	RB141	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M107	HR6	Low data capture.
M108	HO4	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M110	RB178	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M112	EE42	Low data capture.
M114	RB19	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M116	EE38	Low data capture.
M121	RB179	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.

Model ID	Site ID	Justification for exclusion
M122	RB180	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M123	EE9	Low data capture.
M129	HR9	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M136	CR52	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M137	CR78	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M140	MSAQ24	Monitoring site obstructed by vegetation and therefore concentrations would not be accurately represented in the model.
M141	ST07	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M152	RB50	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M164	CR53	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M165	CR54	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M175	RG2/RG6	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M178	EE16	Low data capture.
M182	HR13	Kerbside location, ie too close to the road to be accurately represented by the model.
M183	CR86	Monitoring site influenced by localised characteristics which were not explicitly modelled.
M185	CR90	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M186	CR94	Monitoring site obstructed by vegetation and therefore concentrations would not be accurately represented in the model.
M191	MSAQ6	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M196	ST11	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M199	Cowfold AU A/B/C	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M200	Storrington 8/9/10 AURN	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M202	EE37	Low data capture.
M203	MSAQ25	Monitoring site obstructed by vegetation and therefore concentrations would not be accurately represented in the model.
M205	CY56a	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M211	ST32	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M215	HR19	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M221	RB209	Monitoring site obstructed by vegetation and therefore concentrations would not be accurately represented in the model.
M223	MSAQ18	Kerbside location, ie too close to the road to be accurately represented by the model.
M224	HR12	Monitoring site located on a road island, where concentrations cannot be accurately represented in the model.
M232	DT43	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M244	RB151	Kerbside location, ie too close to the road to be accurately represented by the model.
M245	CY46	Low data capture.
M253	CR85	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M255	CR100	Low data capture.
M257	ST8	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.

Model ID	Site ID	Justification for exclusion
M260	TD27	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M281	HR3	Kerbside location, ie too close to the road to be accurately represented by the model.
M291	ST21	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M294	H3	Monitoring site influenced by localised characteristics which were not explicitly modelled.
M301	DT54	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M311	EE7	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M317	MSAQ14	Kerbside location, ie too close to the road to be accurately represented by the model.
M319	ST35	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M326	TD40	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M331	ST25	Kerbside location, ie too close to the road to be accurately represented by the model.
M341	ST23	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M343	MSAQ15	Kerbside location, ie too close to the road to be accurately represented by the model.
M345	CY97c	Passive monitoring site co-located with continuous monitor. Continuous monitoring results used in verification instead.
M349	DT24	Kerbside location, ie too close to the road to be accurately represented by the model.
M350	ST5	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M362	ST38	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M366	CR102	Low data capture.
M373	Storrington 11n	Kerbside location, ie too close to the road to be accurately represented by the model.
M379	ST33	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M380	MSAQ13	Kerbside location, ie too close to the road to be accurately represented by the model.
M391	CY43	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M396	DT36	Monitoring site influenced by localised characteristics which were not explicitly modelled.
M400	CR9	Monitoring site located on a road island, where concentrations cannot be accurately represented in the model.
M402	RB121	Kerbside location, ie too close to the road to be accurately represented by the model.
M417	CY51	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M422	DT85	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M424	Storrington 1	Monitoring site influenced by localised characteristics which were not explicitly modelled.
M425	ST40	Monitoring site influenced by localised characteristics which were not explicitly modelled.
M436	Storrington 19n	Monitoring site influenced by localised characteristics which were not explicitly modelled.
M439	CY41	Kerbside location, ie too close to the road to be accurately represented by the model.
M441	CR101	Low data capture.
M442	ST6	Kerbside location, ie too close to the road to be accurately represented by the model.
M443	RB148	Kerbside location, ie too close to the road to be accurately represented by the model.
M444	ST4	Kerbside location, ie too close to the road to be accurately represented by the model.

Model ID	Site ID	Justification for exclusion
M446	CR103	No monitoring data for 2018.
M447	CR104	No monitoring data for 2018.
M448	CR107	No monitoring data for 2018.
M449	CR109	No monitoring data for 2018.
M450	CR110	No monitoring data for 2018.
M451	CR111	No monitoring data for 2018.
M453	CY101d	No monitoring data for 2018.
M454	CY102d	No monitoring data for 2018.
M455	CY106d	No monitoring data for 2018.
M456	CY108d	No monitoring data for 2018.
M457	CY109d	No monitoring data for 2018.
M458	CY110d	No monitoring data for 2018.
M459	CY111d	No monitoring data for 2018.
M460	CY112d	No monitoring data for 2018.
M461	Oxshott 1	No monitoring data for 2018.
M462	EE53	No monitoring data for 2018.
M463	47	No monitoring data for 2018.
M464	48	No monitoring data for 2018.
M465	3	No monitoring data for 2018.
M466	MSAQ4	No monitoring data for 2018.
M467	MSAQ30	No monitoring data for 2018.
M468	MSAQ31	No monitoring data for 2018.
M469	MSAQ32	No monitoring data for 2018.
M470	MSAQ34	No monitoring data for 2018.
M471	MSAQ35	No monitoring data for 2018.
M472	MSAQ37	No monitoring data for 2018.
M473	MSAQ39	No monitoring data for 2018.
M474	MSAQ40	No monitoring data for 2018.
M475	MV16	No monitoring data for 2018.
M476	MV17	No monitoring data for 2018.
M478	RY25	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M479	RY33	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M480	RY39	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M481	RY71	No monitoring data for 2018.

Model ID	Site ID	Justification for exclusion
M482	DT98	No monitoring data for 2018.
M483	ST9	No monitoring data for 2018.
M484	ST43	No monitoring data for 2018.
M485	WBC46	No monitoring data for 2018.
M486	WBC47	No monitoring data for 2018.
M487	PR	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M489	MSAQ29	No monitoring data for 2018.
M490	MSAQ36	No monitoring data for 2018.
M491	MSAQ38	No monitoring data for 2018.
M492	49	No monitoring data for 2018.
M493	MSAQ8	No monitoring data for 2018.
M494	Horsham 11n	No monitoring data for 2018.
M495	Horsham 12	No monitoring data for 2018.
M496	RB223	No monitoring data for 2018.
M497	RB224	No monitoring data for 2018.
M498	RB225	No monitoring data for 2018.
M500	RY26	Monitoring site located adjacent to a road not modelled or set back from modelled road sources.
M501	RY44	No monitoring data for 2018.
M502	RY52	No monitoring data for 2018.
M504	EE52	No monitoring data for 2018.
M506	Cowfold 9	No monitoring data for 2018.
M507	CY100d	No monitoring data for 2018.
M508	CY103d	No monitoring data for 2018.
M509	CY107d	No monitoring data for 2018.
M510	CY113d	No monitoring data for 2018.
M511	Oxshott 2	No monitoring data for 2018.
M513	CR105	No monitoring data for 2018.
M514	CR106	No monitoring data for 2018.
M515	CR108	No monitoring data for 2018.
M516	CR4	No monitoring data for 2018.
M517	MV15	No monitoring data for 2018.
M518	TD1	No monitoring data for 2018.
M519	TD2	No monitoring data for 2018.
M520	TD3	No monitoring data for 2018.

Model ID	Site ID	Justification for exclusion
M521	TD15	No monitoring data for 2018.
M522	TD16	No monitoring data for 2018.
M523	TD17	No monitoring data for 2018.
M524	TD18	No monitoring data for 2018.
M525	M25	Monitoring site influenced by localised characteristics which were not explicitly modelled.

3.3 Model verification zones

3.3.1 As described in Section 3.1, there are a number of reasons why modelling and monitoring results differ. At the majority of sites, it can be observed in that there is tendency for the model to under-estimate NO_2 concentrations and therefore an adjustment to the modelled concentrations was considered suitable.

3.3.2 At all locations a detailed review was carried out to review model set-up, traffic data and monitoring location as well as reviewing local factors which could affect concentrations. A proportionate approach has been adopted for the modelling verification process, whereby the aim of providing results which meet the Defra criteria in LAQM (TG22) (Defra 2022) are met, along with being reasonably conservative to provide a robust assessment.

3.3.3 Eight zone specific factors were derived where the modelling performance was significantly different and required area specific adjustment taking into account local regions within the study area. .1 provides details of the zones and modelled adjustment factors. Two zones, Gatwick and Merstham were derived where no adjustment factor was required for the modelled concentrations and did not require the generic verification factor. This is justified by a good agreement between modelled and monitored concentrations and model results are largely within ±25 per cent of measured values, in line with the Defra Guidance (TG22) (Defra, 2022). One zone for the M23 and M25 was derived with an adjustment factor of 0.8. To be conservative, a factor of 1 was used to apply the model results.

3.3.4 A generic verification factor of 1.3 was derived for the study area which represents a non-London area with suburban and rural roads.

3.3.5 The model is performing well, provides a conservative approach and is proportionate in terms of being able to identify significant effects for the ES. The ES assessment model verification results have improved from the PEIR. This is shown by a reduction in the number of verification zones from 18 to 12 and an improvement in the majority of factors. Additionally, some zones have been reduced in size. The zones with their corresponding factors that have been applied to the road contribution of the modelled concentrations in the study area are presented in Table 3.3.1.

3.3.6 Table 3.3.1 provides three statistical parameters: correlation coefficient, Root Mean Square Error (RMSE) and Fractional Bias. The ideal values for these parameters are 1.00, 0.0 and 0.0, respectively. These parameters are commonly used to evaluate model performance and describe the general uncertainties of dispersion models by comparing monitoring and modelled data. RMSE can be used to define the uncertainty of a model, where an RMSE within 25% of the air quality objective for NO_2 would equate to 10 µg/m³. Although the majority of monitoring sites are a close match following verification, there are occasional sites which are outliers within this process. These are still included within the process for balance.

3.3.7 Diagram 3.3.1 to Diagram 3.3.12 show the comparison of the model's performance in each zone prior to any adjustment and after applying the adjustment factors.

Table 3.3.1: 12 Zonal Adjustment Factors

Zone	Number of Sites	Modelled Road Adjustment Factor	Correlation Coefficient	RMSE ($\mu g/m^3$)	Fractional Bias
Generic	58	1.3	0.8	4.3	0.01
Brighton Road (airport)	23	1.3	0.3	6.1	0.01
Cowfold	6	1.6	0.7	2.9	-0.03
Crawley	3	1.7	-1.0	4.3	0.05
Croydon, Park Lane	3	1.6	-1.0	9.7	-0.01
Gatwick	42	1	0.6	3.6	0.03
Hassocks	5	2	0.7	3.7	0.02
Hazelwick Roundabout	16	1.2	0.9	5.0	-0.07
London	61	1.2	0.5	5.7	0.02
M23 and M25	21	0.8*	0.6	5.0	-0.06
Merstham	3	1	-0.9	3.1	0.00
Storrington	5	1.7	1.0	6.2	-0.05

*A factor of 1 was used to process the results as a conservative assumption.

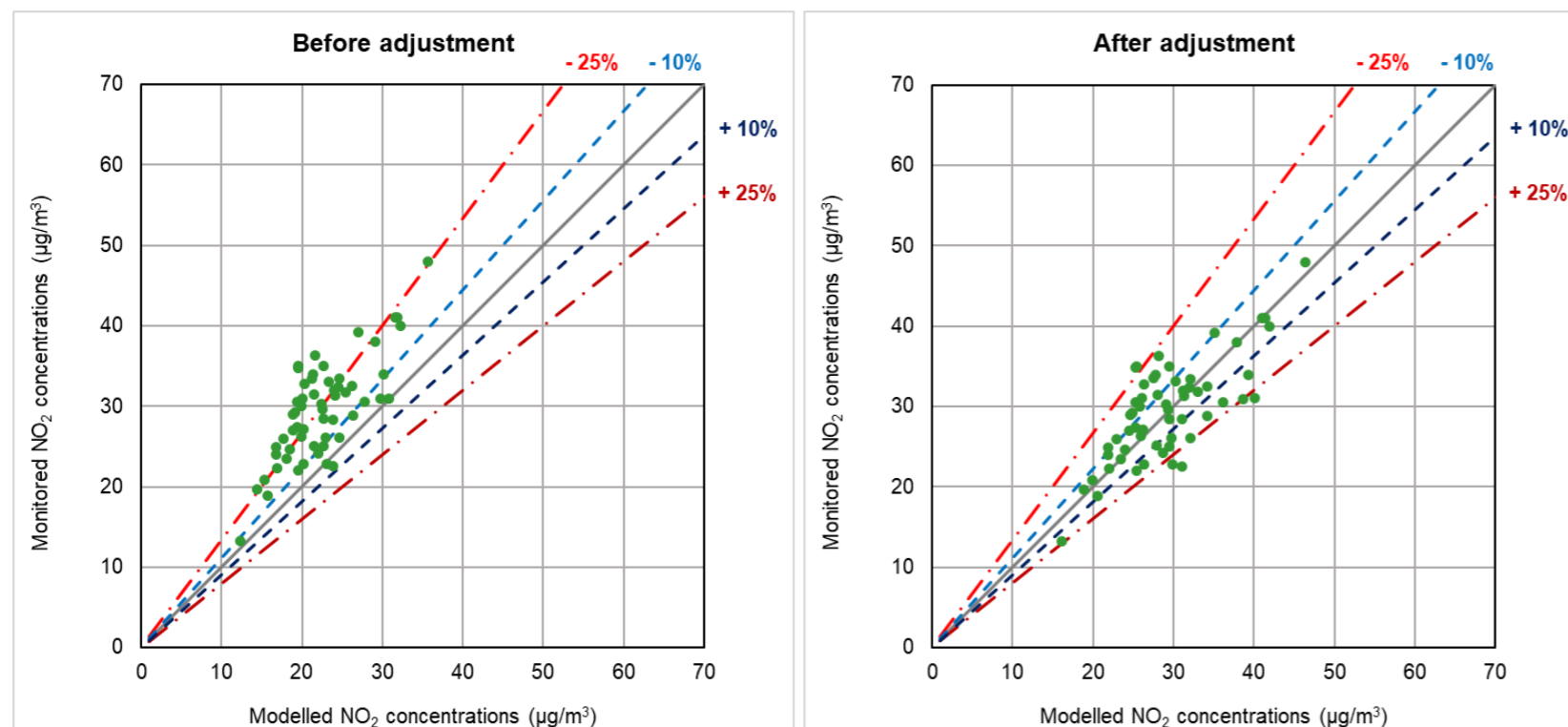**Diagram 3.3.1: Model performance before and after adjustment, Generic zone**

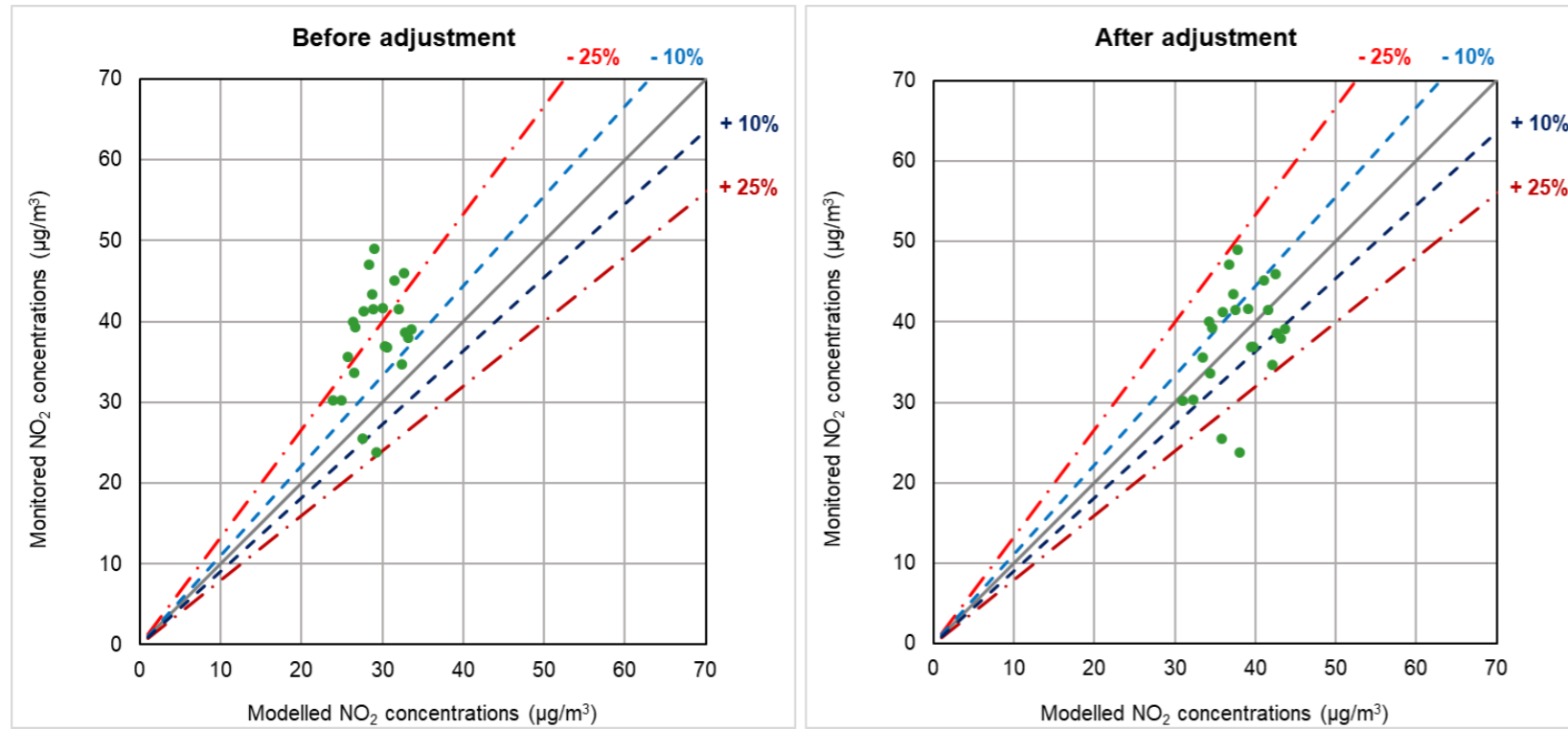**Diagram 3.3.2: Model performance before and after adjustment, Brighton Road (airport) zone**

Diagram 3.3.3: Model performance before and after adjustment, Cowfold zone
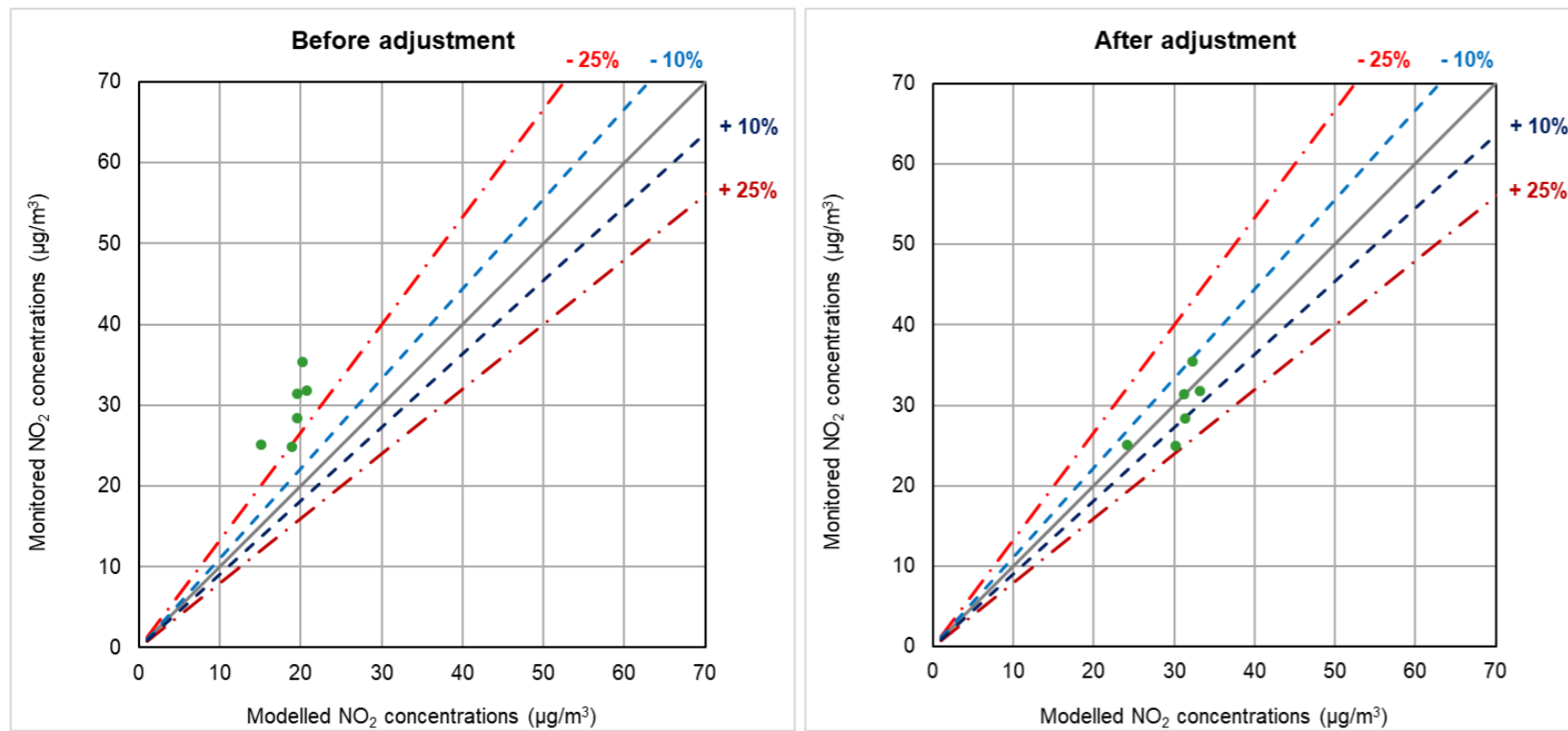
Diagram 3.3.4: Model performance before and after adjustment, Crawley zone
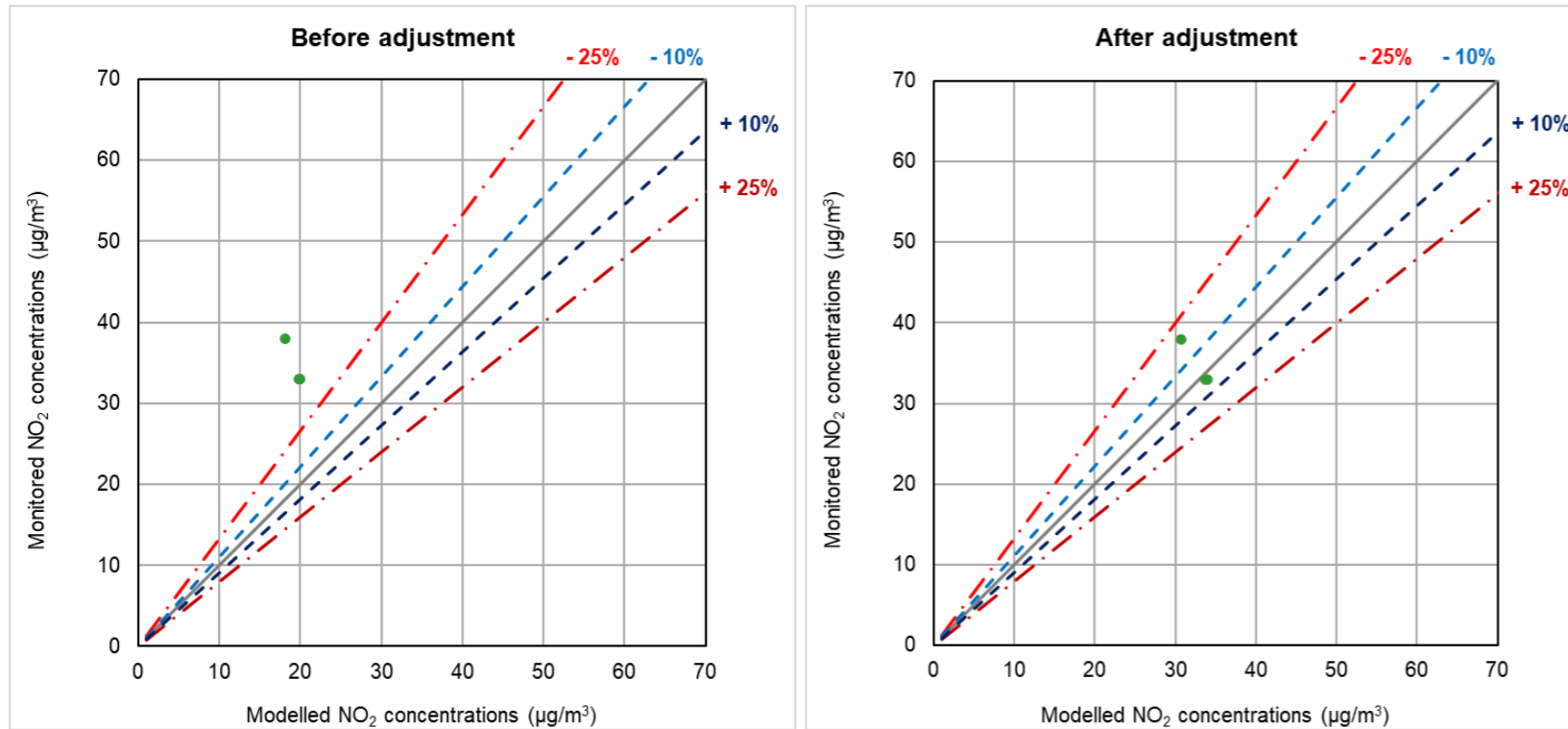

Diagram 3.3.5: Model performance before and after adjustment, Croydon (Park Lane) zone
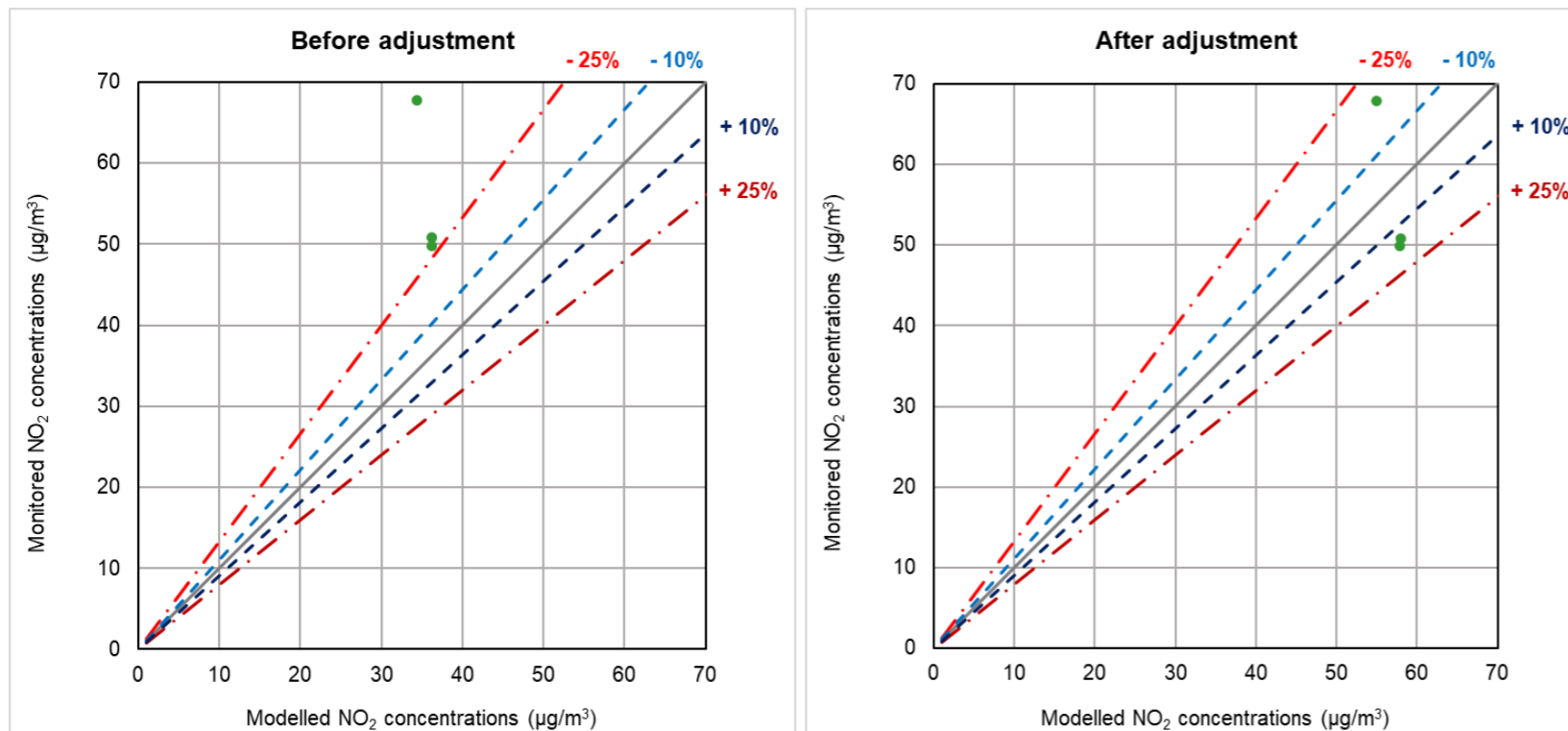
Diagram 3.3.6: Model performance before and after adjustment, Gatwick zone

Diagram 3.3.7: Model performance before and after adjustment, Hassocks zone

Diagram 3.3.8: Model performance before and after adjustment, Hazelwick Roundabout zone

Diagram 3.3.9: Model performance before and after adjustment, London zone
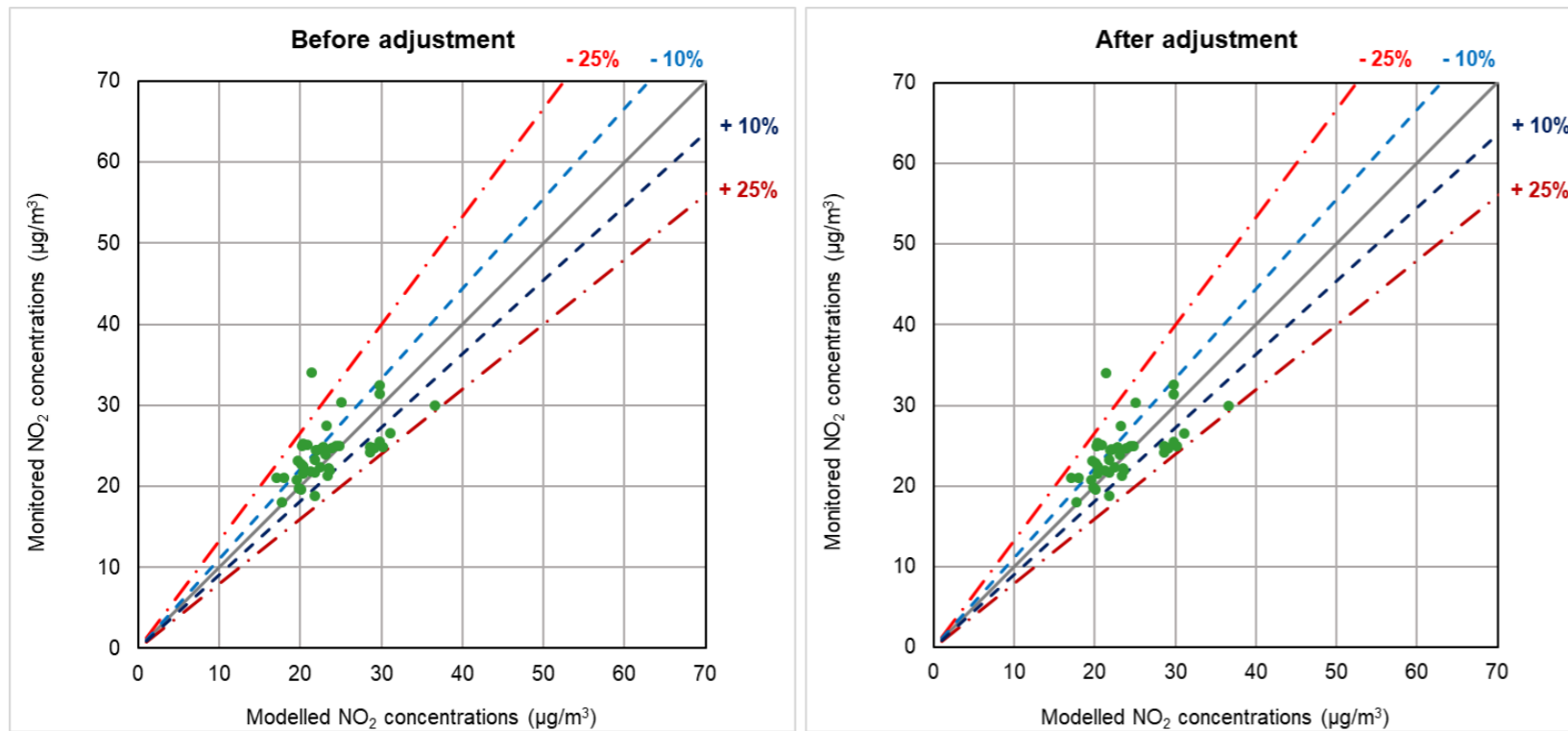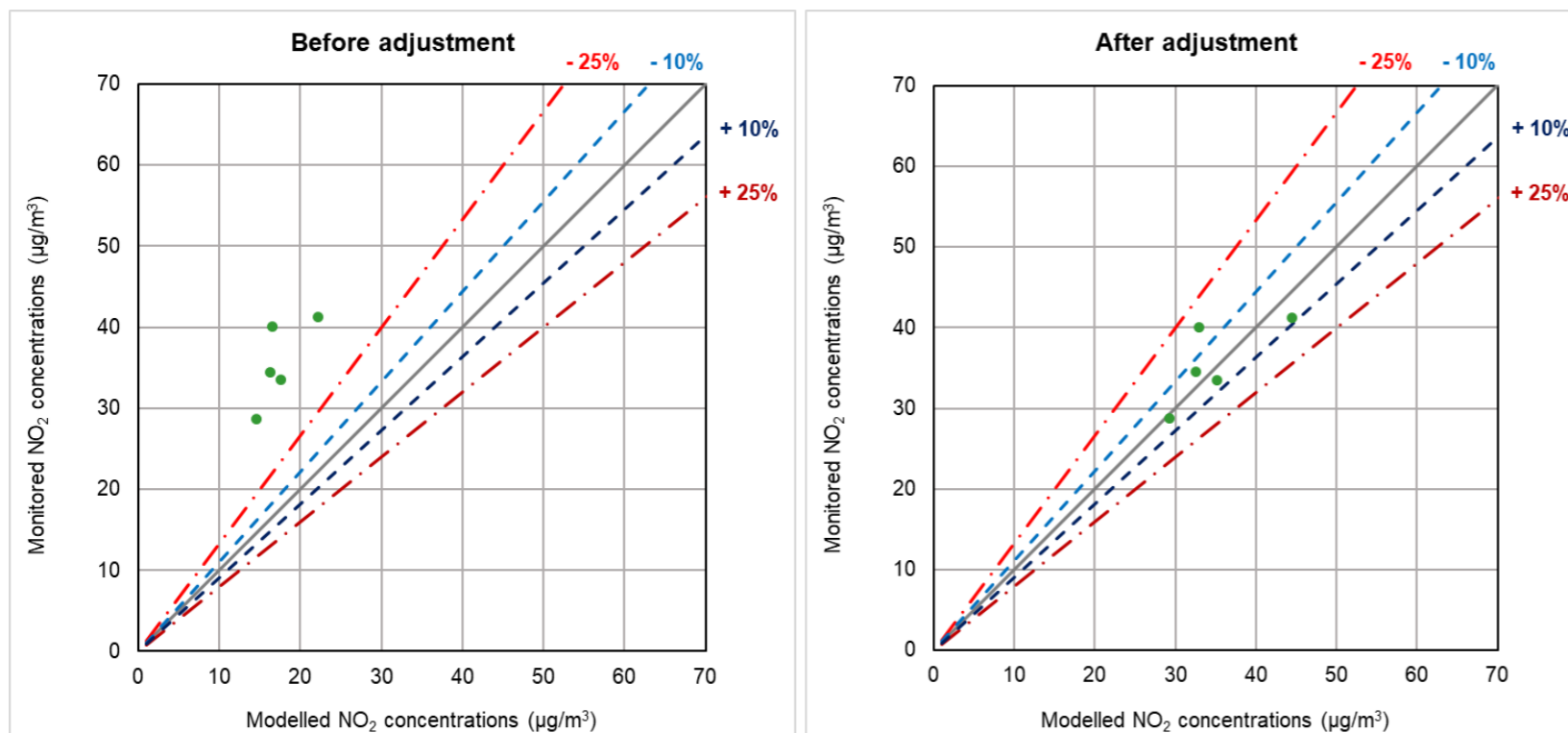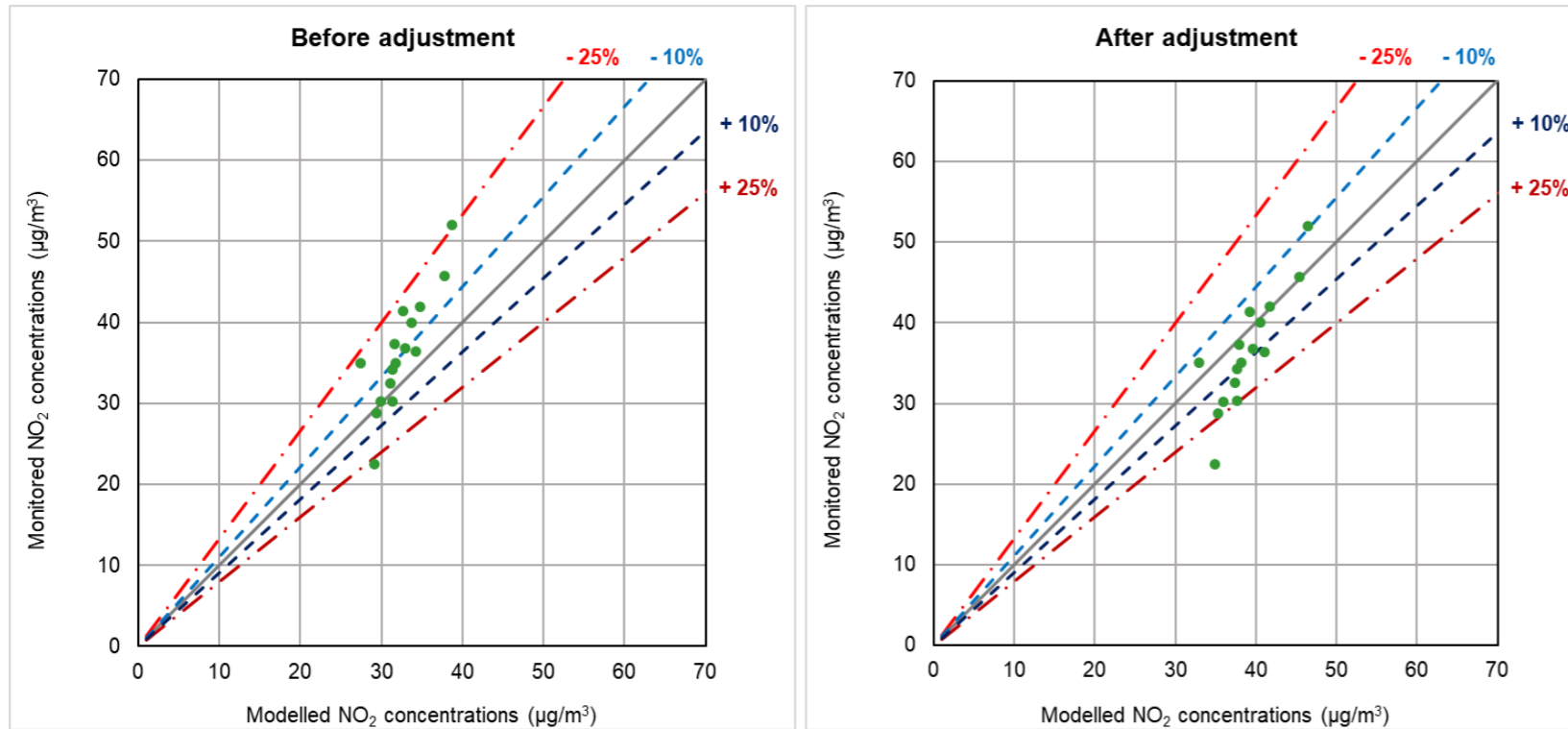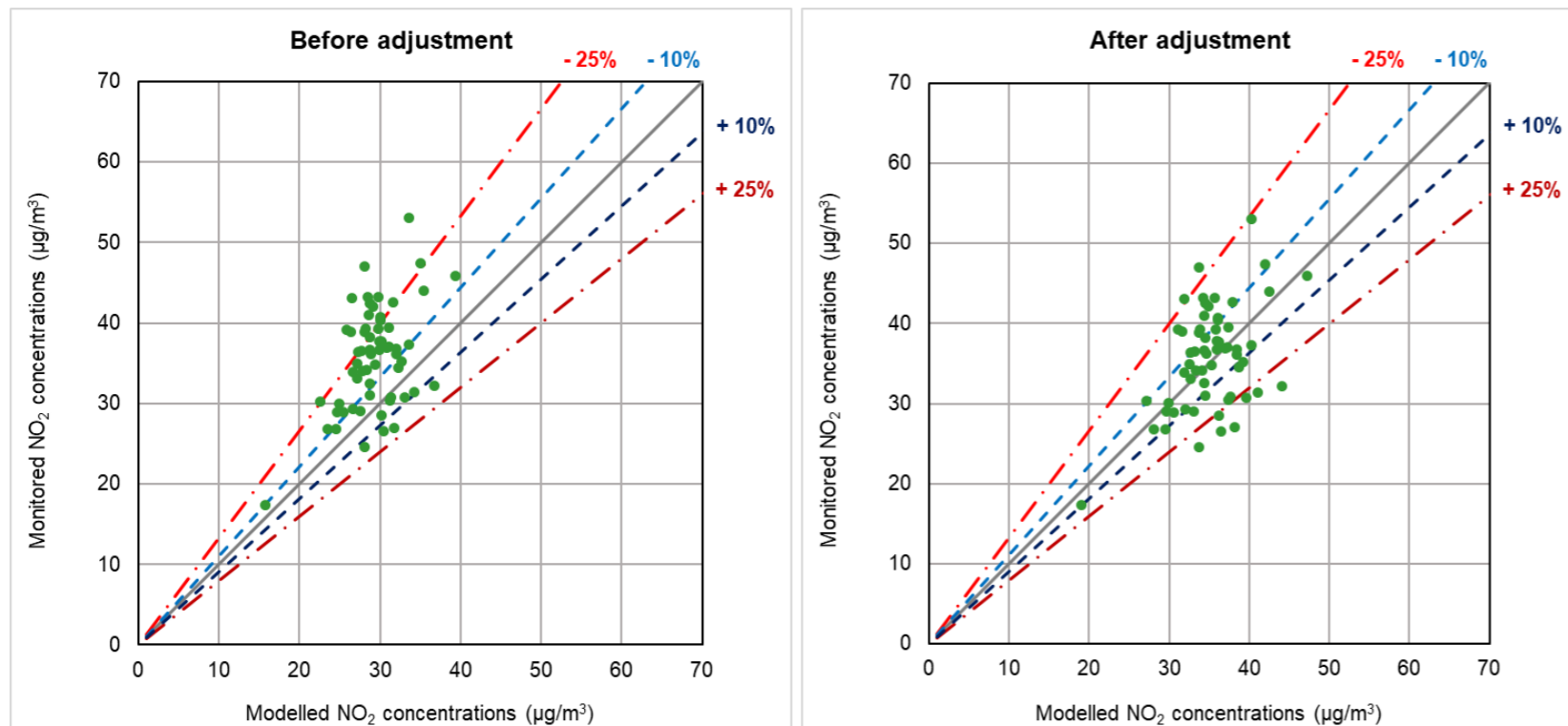
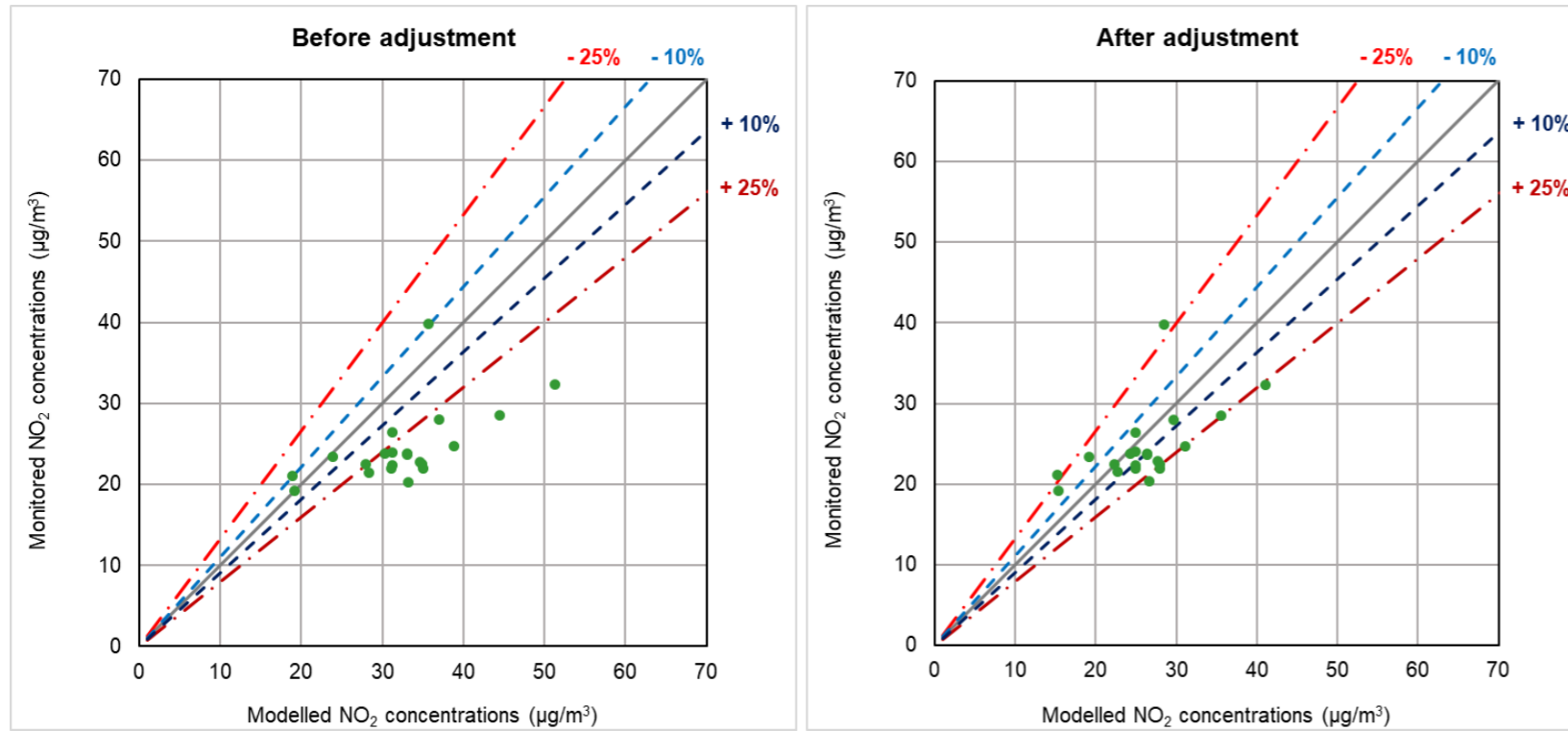**Diagram 3.3.10: Model performance before and after adjustment, M23 and M25 zone**

Diagram 3.3.11: Model performance before and after adjustment, Merstham zone
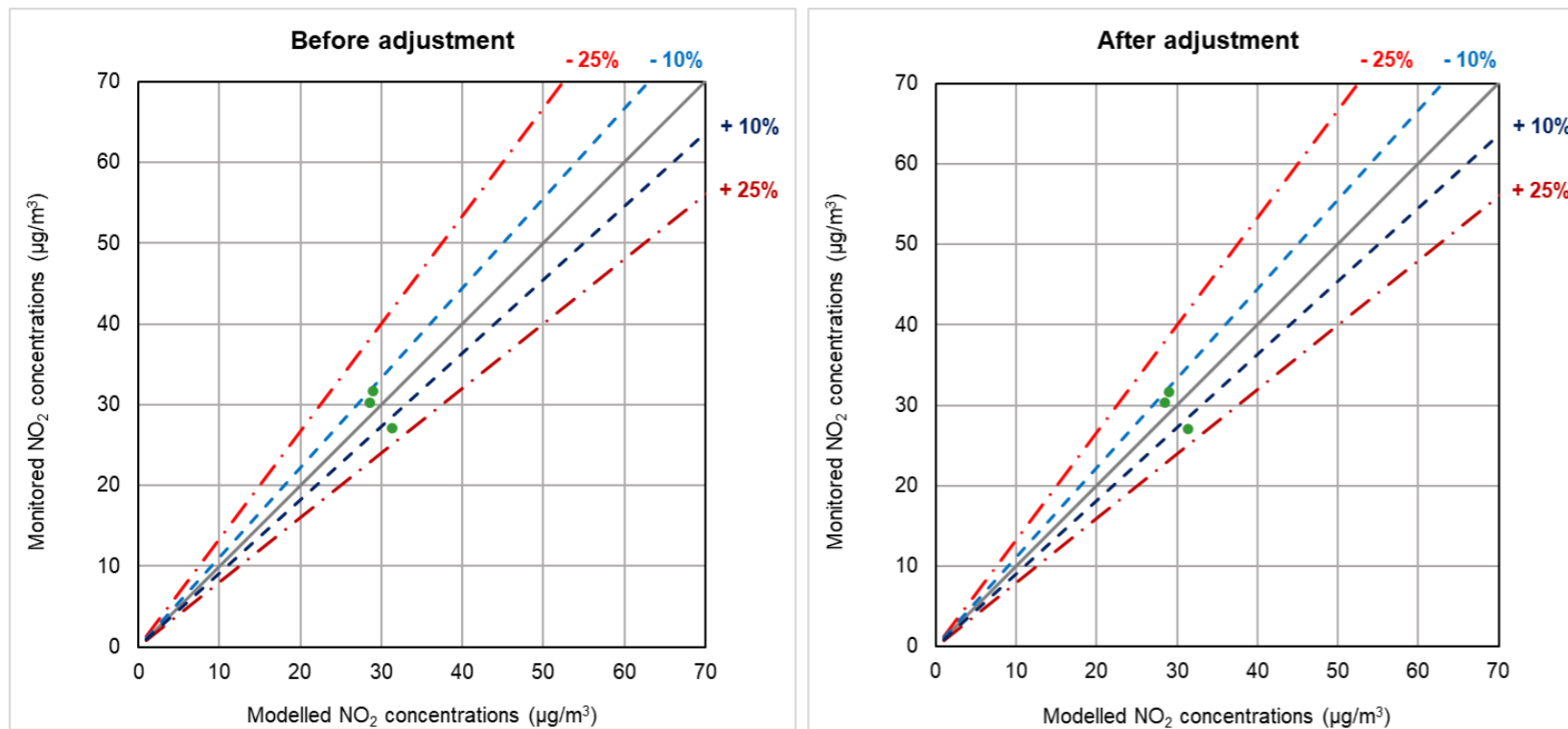
Diagram 3.3.12: Model performance before and after adjustment, Storrington zone
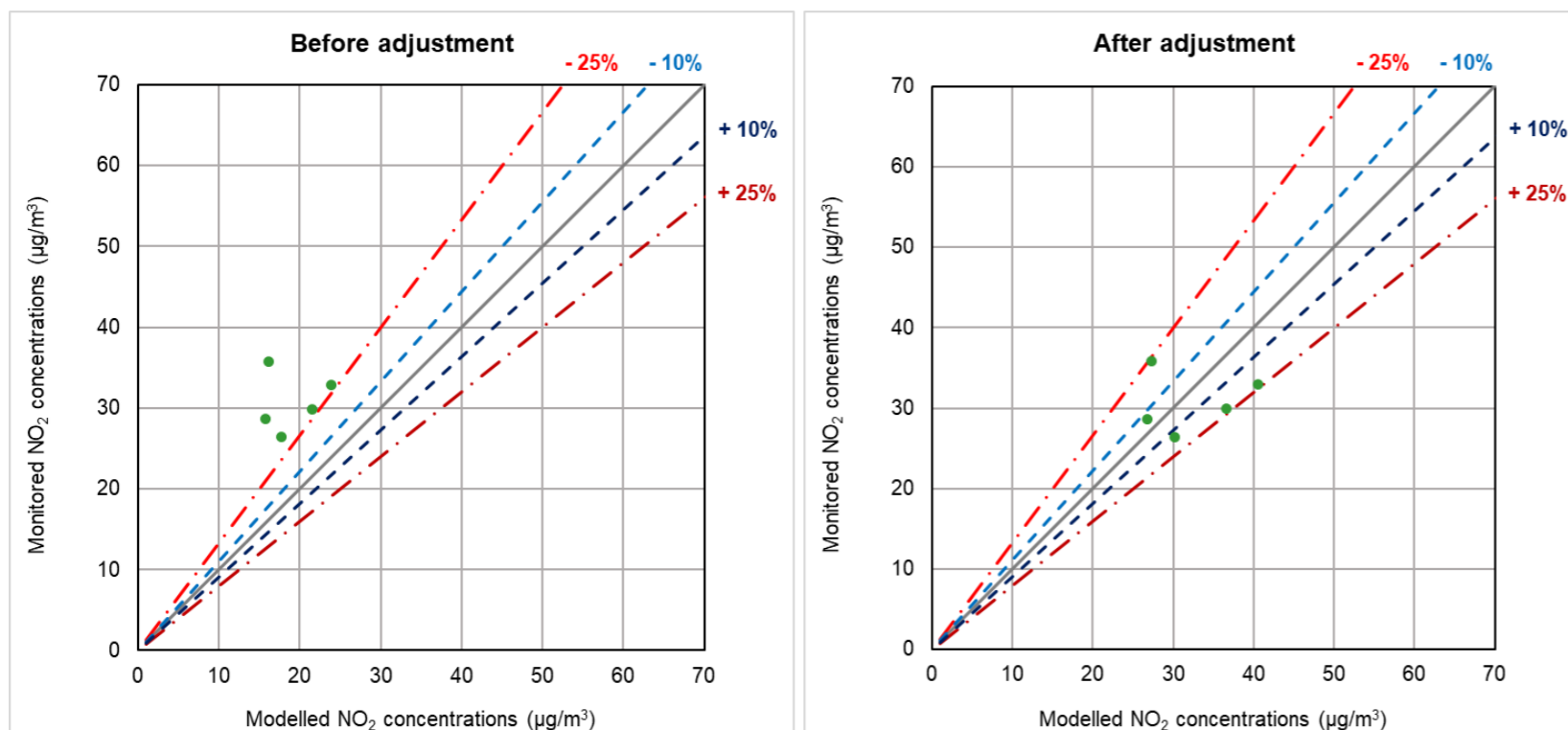
Table 3.3.2: Comparison of Modelled and 2018 Monitored NO₂ Concentrations before and after Adjustment

LA ID	Type	Monitoring Authority	2018 Monitored NO₂ (µg/m³)	Non-adjusted Modelled NO₂ (µg/m³)	Difference[1] before adjustment	Adjusted Modelled NO₂ (µg/m³)	Difference[1] post-adjustment	Non-adjusted Modelled Road NOₓ (µg/m³)	Adjusted Modelled Road NOₓ (µg/m³)
Area with Generic Factor									
RB140	DT	Reigate and Banstead	22.6	23.9	6%	31.0	37%	14.1	18.3
MSAQ27	DT	Mid Sussex	22.8	23.0	1%	29.9	31%	19.2	25.0
TD30	DT	Tandridge	22.8	20.2	-11%	26.3	15%	9.6	12.4
Storrington 17n	DT	Horsham	13.3	12.4	-7%	16.1	21%	3.6	4.7
RB114	DT	Reigate and Banstead	23.5	18.1	-23%	23.5	0%	7.7	10.0
Storrington 16n	DT	Horsham	24.0	16.8	-30%	21.9	-9%	10.1	13.1
TD38	DT	Tandridge	24.2	22.1	-9%	28.7	18%	11.0	14.3
RB167	DT	Reigate and Banstead	24.7	18.4	-25%	24.0	-3%	3.3	4.3
RB113	DT	Reigate and Banstead	24.9	16.8	-32%	21.9	-12%	5.7	7.5
CR79	DT	Crawley	25.0	22.7	-9%	29.5	18%	12.7	16.5
RB95	DT	Reigate and Banstead	25.1	21.4	-15%	27.9	11%	10.4	13.5
CR88	DT	Crawley	26.0	17.6	-32%	22.9	-12%	8.4	10.9

LA ID	Type	Monitoring Authority	2018 Monitored NO$_2$ (µg/m³)	Non-adjusted Modelled NO$_2$ (µg/m³)	Difference[1] before adjustment	Adjusted Modelled NO$_2$ (µg/m³)	Difference[1] post-adjustment	Non-adjusted Modelled Road NO$_x$ (µg/m³)	Adjusted Modelled Road NO$_x$ (µg/m³)
DT25	DT	Sevenoaks	26.1	22.9	-12%	29.8	14%	12.8	16.6
DT34	DT	Sevenoaks	26.1	24.6	-6%	32.0	23%	18.8	24.5
RB115	DT	Reigate and Banstead	26.3	20.0	-24%	26.0	-1%	10.7	13.9
RB107	DT	Reigate and Banstead	27.0	18.8	-30%	24.5	-9%	6.1	7.9
RB111	DT	Reigate and Banstead	27.1	20.2	-26%	26.2	-3%	8.3	10.7
Horsham 7	DT	Horsham	27.4	19.4	-29%	25.2	-8%	12.2	15.8
TD35	DT	Tandridge	28.4	23.9	-16%	31.0	9%	14.2	18.4
RB44	DT	Reigate and Banstead	28.5	22.7	-21%	29.5	3%	12.4	16.2
TD5	DT	Tandridge	28.8	26.3	-9%	34.2	19%	17.8	23.2
CR66	DT	Crawley	29.0	18.9	-35%	24.6	-15%	7.5	9.8
RB45	DT	Reigate and Banstead	29.2	19.1	-34%	24.9	-15%	6.6	8.6
RB116	DT	Reigate and Banstead	29.6	22.5	-24%	29.3	-1%	12.2	15.9
CR96	DT	Crawley	30.0	19.9	-34%	25.8	-14%	7.3	9.4
RB109	DT	Reigate and Banstead	30.3	22.4	-26%	29.1	-4%	11.9	15.5
RB1	DT	Reigate and Banstead	30.6	19.4	-37%	25.2	-18%	7.0	9.1
RB122	DT	Reigate and Banstead	30.6	27.9	-9%	36.2	18%	21.5	28.0
RB145	DT	Reigate and Banstead	30.9	29.7	-4%	38.7	25%	23.5	30.6
RB46	DT	Reigate and Banstead	31.0	20.0	-35%	26.0	-16%	8.0	10.4
RB120	DT	Reigate and Banstead	31.5	21.5	-32%	28.0	-11%	10.0	13.0
RB125	DT	Reigate and Banstead	31.8	25.4	-20%	33.0	4%	18.3	23.8
TD10	DT	Tandridge	32.0	24.0	-25%	31.2	-2%	15.3	19.9
RB152	DT	Reigate and Banstead	32.4	24.5	-24%	31.9	-2%	13.3	17.2
DT84	DT	Sevenoaks	32.5	26.3	-19%	34.1	5%	20.9	27.2
RB118	DT	Reigate and Banstead	32.8	20.3	-38%	26.4	-20%	8.5	11.0
RB150	DT	Reigate and Banstead	33.1	23.3	-30%	30.3	-9%	13.6	17.6
TD11	DT	Tandridge	33.4	24.7	-26%	32.1	-4%	13.6	17.7
RB123	DT	Reigate and Banstead	33.5	21.2	-37%	27.6	-18%	7.7	10.1
CR91	DT	Crawley	34.0	30.2	-11%	39.3	16%	12.1	15.7
RB104	DT	Reigate and Banstead	34.0	21.3	-37%	27.7	-18%	10.2	13.3
RB47	DT	Reigate and Banstead	34.8	19.5	-44%	25.3	-27%	7.1	9.3
CR98	DT	Crawley	35.0	22.6	-35%	29.4	-16%	11.1	14.5
RB105	DT	Reigate and Banstead	35.0	19.5	-44%	25.4	-28%	7.2	9.3
RB117	DT	Reigate and Banstead	36.3	21.6	-40%	28.1	-22%	10.7	13.9
CR62	DT	Crawley	38.0	29.1	-23%	37.8	-1%	21.6	28.0
RB49	DT	Reigate and Banstead	39.2	27.0	-31%	35.1	-10%	21.3	27.7

LA ID	Type	Monitoring Authority	2018 Monitored NO$_2$ (µg/m³)	Non-adjusted Modelled NO$_2$ (µg/m³)	Difference[1] before adjustment	Adjusted Modelled NO$_2$ (µg/m³)	Difference[1] post-adjustment	Non-adjusted Modelled Road NO$_x$ (µg/m³)	Adjusted Modelled Road NO$_x$ (µg/m³)
CR69	DT	Crawley	40.0	32.3	-19%	42.0	5%	28.3	36.8
CR 55	DT	Crawley	41.0	31.6	-23%	41.0	0%	26.7	34.8
CR97	DT	Crawley	41.0	31.8	-22%	41.4	1%	29.7	38.7
Storrington 15n	DT	Horsham	18.9	15.8	-17%	20.5	9%	8.7	11.3
CR93	DT	Crawley	48.0	35.7	-26%	46.4	-3%	24.4	31.7
Storrington 14n	DT	Horsham	19.7	14.5	-27%	18.8	-4%	6.8	8.8
CR95	DT	Crawley	31.0	30.8	-1%	40.1	29%	13.5	17.5
Storrington 7	DT	Horsham	20.9	15.3	-27%	19.9	-5%	7.8	10.2
CR89	DT	Crawley	22.0	19.6	-11%	25.5	16%	6.5	8.5
RB82	DT	Reigate and Banstead	31.3	24.1	-23%	31.3	0%	17.0	22.1
Storrington 6	DT	Horsham	22.3	16.9	-24%	22.0	-2%	10.2	13.2
Brighton Road (airport) Zone									
RB177	DT	Reigate and Banstead	23.8	29.3	23%	38.1	60%	22.9	29.8
RB176	DT	Reigate and Banstead	25.5	27.6	8%	35.9	41%	19.5	25.4
RB174	DT	Reigate and Banstead	30.3	24.9	-18%	32.3	7%	14.6	19.0
RB149	DT	Reigate and Banstead	43.4	28.7	-34%	37.3	-14%	21.4	27.8
BR15	DT	Gatwick Airport	30.2	23.9	-21%	31.0	3%	12.0	15.6
BR16	DT	Gatwick Airport	33.6	26.5	-21%	34.4	2%	16.9	22.0
BR11	DT	Gatwick Airport	34.7	32.4	-6%	42.2	22%	28.8	37.4
BR14	DT	Gatwick Airport	35.6	25.8	-28%	33.5	-6%	15.4	20.0
BR8	DT	Gatwick Airport	36.9	30.5	-17%	39.7	8%	25.1	32.7
BR2	DT	Gatwick Airport	36.9	30.4	-18%	39.5	7%	24.9	32.4
BR6	DT	Gatwick Airport	38.0	33.2	-13%	43.2	14%	31.2	40.5
BR10	DT	Gatwick Airport	38.6	32.8	-15%	42.6	10%	29.6	38.5
BR7	DT	Gatwick Airport	39.1	33.6	-14%	43.7	12%	31.9	41.5
BR12	DT	Gatwick Airport	39.2	26.6	-32%	34.6	-12%	16.7	21.7
BR13	DT	Gatwick Airport	40.0	26.4	-34%	34.3	-14%	16.4	21.4
BR18	DT	Gatwick Airport	41.2	27.7	-33%	36.0	-13%	19.3	25.1
BR4	DT	Gatwick Airport	41.5	32.0	-23%	41.6	0%	28.5	37.0
BR3	DT	Gatwick Airport	41.5	28.8	-31%	37.5	-10%	22.0	28.6
BR9	DT	Gatwick Airport	41.6	30.1	-28%	39.1	-6%	24.0	31.2
BR20	DT	Gatwick Airport	45.1	31.6	-30%	41.0	-9%	27.4	35.6
BR5	DT	Gatwick Airport	46.0	32.7	-29%	42.5	-8%	29.9	38.9
BR17	DT	Gatwick Airport	47.1	28.3	-40%	36.8	-22%	20.5	26.6

LA ID	Type	Monitoring Authority	2018 Monitored NO$_2$ (µg/m^3)	Non-adjusted Modelled NO$_2$ (µg/m^3)	Difference[1] before adjustment	Adjusted Modelled NO$_2$ (µg/m^3)	Difference[1] post-adjustment	Non-adjusted Modelled Road NO$_x$ (µg/m^3)	Adjusted Modelled Road NO$_x$ (µg/m^3)
BR19	DT	Gatwick Airport	49.0	29.0	-41%	37.7	-23%	22.1	28.7
Cowfold Zone									
Cowfold 6n	DT	Horsham	25.1	15.1	-40%	24.2	-4%	6.6	10.6
HO5	CM	Horsham	28.4	19.6	-31%	31.4	10%	13.5	21.6
Cowfold 4	DT	Horsham	31.4	19.6	-38%	31.3	0%	13.4	21.5
Cowfold 3	DT	Horsham	31.8	20.8	-35%	33.2	4%	15.4	24.7
Cowfold 1_2	DT	Horsham	35.4	20.2	-43%	32.3	-9%	14.5	23.1
Cowfold 7n	DT	Horsham	42.4	18.3	-57%	29.4	-31%	11.5	18.5
Cowfold 5n	DT	Horsham	24.9	18.9	-24%	30.2	21%	12.4	19.8
CR1	DT	Crawley	33.0	19.9	-40%	33.8	2%	9.0	15.2
CR 60	DT	Crawley	33.0	20.0	-39%	34.0	3%	9.1	15.5
CR87	DT	Crawley	38.0	18.1	-52%	30.7	-19%	6.1	10.4
Croydon Zone									
CY59	DT	Croydon	49.8	36.2	-27%	57.9	16%	24.3	38.8
CY98b	DT	Croydon	50.8	36.2	-29%	58.0	14%	24.5	39.1
CY58	DT	Croydon	67.8	34.3	-49%	55.0	-19%	19.9	31.9
Gatwick Zone									
RB65	DT	Reigate and Banstead	22.8	20.1	-12%	20.1	-12%	3.6	3.6
RB13	DT	Reigate and Banstead	23.1	19.7	-15%	19.7	-15%	4.2	4.2
RB70	DT	Reigate and Banstead	23.3	21.8	-6%	21.8	-6%	4.6	4.6
RB11	DT	Reigate and Banstead	23.9	23.1	-3%	23.1	-3%	5.3	5.3
RB57	DT	Reigate and Banstead	24.2	28.6	18%	28.6	18%	5.6	5.6
RB53	DT	Reigate and Banstead	24.4	21.9	-10%	21.9	-10%	4.4	4.4
RB54	DT	Reigate and Banstead	24.5	22.1	-10%	22.1	-10%	4.4	4.4
RB58	DT	Reigate and Banstead	24.7	29.2	18%	29.2	18%	6.3	6.3
RB69	DT	Reigate and Banstead	24.7	22.7	-8%	22.7	-8%	4.9	4.9
RB98	DT	Reigate and Banstead	24.7	23.8	-4%	23.8	-4%	7.8	7.8
RB55	DT	Reigate and Banstead	24.8	22.8	-8%	22.8	-8%	4.7	4.7
RG6	CM	Reigate and Banstead	24.9	30.2	21%	30.2	21%	7.6	7.6
RB60	DT	Reigate and Banstead	24.9	28.5	15%	28.5	15%	5.7	5.7
CA2	CM	Crawley	25.0	24.4	-2%	24.4	-2%	8.9	8.9
CR48	DT	Crawley	25.0	24.8	-1%	24.8	-1%	15.7	15.7
RB52	DT	Reigate and Banstead	25.0	20.2	-19%	20.2	-19%	4.3	4.3

LA ID	Type	Monitoring Authority	2018 Monitored NO$_2$ (µg/m³)	Non-adjusted Modelled NO$_2$ (µg/m³)	Difference[1] before adjustment	Adjusted Modelled NO$_2$ (µg/m³)	Difference[1] post-adjustment	Non-adjusted Modelled Road NO$_x$ (µg/m³)	Adjusted Modelled Road NO$_x$ (µg/m³)
RB72	DT	Reigate and Banstead	25.1	20.9	-17%	20.9	-17%	4.4	4.4
RB12	DT	Reigate and Banstead	25.3	20.3	-20%	20.3	-20%	5.0	5.0
RB78	DT	Reigate and Banstead	25.5	29.8	17%	29.8	17%	7.0	7.0
RB59	DT	Reigate and Banstead	26.5	31.0	17%	31.0	17%	8.7	8.7
RB175	DT	Reigate and Banstead	27.5	23.3	-15%	23.3	-15%	12.3	12.3
LGW3	CM	Crawley	30.0	36.7	22%	36.7	22%	6.4	6.4
RB80	DT	Reigate and Banstead	31.4	29.8	-5%	29.8	-5%	7.0	7.0
RB79	DT	Reigate and Banstead	32.5	29.8	-8%	29.8	-8%	7.0	7.0
CR74	DT	Crawley	34.0	21.4	-37%	21.4	-37%	8.6	8.6
CR49	DT	Crawley	18.0	17.8	-1%	17.8	-1%	2.2	2.2
RG1	CM	Reigate and Banstead	18.8	21.7	16%	21.7	16%	4.0	4.0
RB76	DT	Reigate and Banstead	19.6	20.0	2%	20.0	2%	3.1	3.1
RB77	DT	Reigate and Banstead	19.8	19.8	0%	19.8	0%	3.0	3.0
RB51	DT	Reigate and Banstead	20.8	19.5	-6%	19.5	-6%	4.1	4.1
CR50	DT	Crawley	21.0	17.9	-15%	17.9	-15%	3.3	3.3
CR75	DT	Crawley	21.0	17.0	-19%	17.0	-19%	4.7	4.7
RB61	DT	Reigate and Banstead	21.3	23.4	10%	23.4	10%	4.6	4.6
RB64	DT	Reigate and Banstead	21.6	20.4	-6%	20.4	-6%	3.0	3.0
RB68	DT	Reigate and Banstead	21.7	21.7	0%	21.7	0%	3.6	3.6
RB75	DT	Reigate and Banstead	21.9	21.2	-3%	21.2	-3%	6.1	6.1
CR51	DT	Crawley	22.0	23.6	7%	23.6	7%	10.2	10.2
RB73	DT	Reigate and Banstead	22.0	20.5	-7%	20.5	-7%	4.2	4.2
RB56	DT	Reigate and Banstead	22.2	23.5	6%	23.5	6%	4.8	4.8
RB74	DT	Reigate and Banstead	22.3	22.4	0%	22.4	0%	6.4	6.4
RB66	DT	Reigate and Banstead	22.5	20.3	-10%	20.3	-10%	3.2	3.2
BR1	DT	Gatwick Airport	30.4	25.0	-18%	25.0	-18%	14.5	14.5
Hassocks Zone									
MSAQ17	DT	Mid Sussex	28.7	14.6	-49%	29.2	2%	6.2	12.4
MSAQ12	DT	Mid Sussex	33.5	17.6	-47%	35.2	5%	10.7	21.4
MSAQ23	DT	Mid Sussex	34.5	16.3	-53%	32.6	-6%	8.7	17.4
MSAQ11	DT	Mid Sussex	40.1	16.5	-59%	33.0	-18%	9.0	18.0
MSAQ10	DT	Mid Sussex	41.2	22.2	-46%	44.5	8%	18.2	36.5
Hazelwick Roundabout Zone									
CR76	DT	Crawley	35.0	31.8	-9%	38.1	9%	15.3	18.4

LA ID	Type	Monitoring Authority	2018 Monitored NO₂ (µg/m³)	Non-adjusted Modelled NO₂ (µg/m³)	Difference[1] before adjustment	Adjusted Modelled NO₂ (µg/m³)	Difference[1] post-adjustment	Non-adjusted Modelled Road NOₓ (µg/m³)	Adjusted Modelled Road NOₓ (µg/m³)
CR77	DT	Crawley	35.0	27.4	-22%	32.9	-6%	6.4	7.7
CR64	DT	Crawley	40.0	33.8	-16%	40.5	1%	19.7	23.7
CR63	DT	Crawley	52.0	38.7	-26%	46.4	-11%	31.7	38.0
HR1	DT	Gatwick Airport	28.8	29.4	2%	35.2	22%	10.2	12.3
HR2	DT	Gatwick Airport	30.2	30.0	-1%	35.9	19%	11.4	13.7
HR16	DT	Gatwick Airport	30.3	31.3	3%	37.6	24%	14.3	17.2
HR15	DT	Gatwick Airport	32.5	31.2	-4%	37.4	15%	14.0	16.7
HR7	DT	Gatwick Airport	34.2	31.3	-8%	37.6	10%	14.3	17.2
HR17	DT	Gatwick Airport	36.3	34.2	-6%	41.1	13%	32.7	39.2
HR4	DT	Gatwick Airport	36.7	33.0	-10%	39.6	8%	17.9	21.5
HR20	DT	Gatwick Airport	37.3	31.6	-15%	38.0	2%	15.0	18.0
HR8	DT	Gatwick Airport	41.4	32.7	-21%	39.3	-5%	17.3	20.8
HR18	DT	Gatwick Airport	42.0	34.8	-17%	41.7	0%	34.0	40.8
HR5	DT	Gatwick Airport	45.7	37.8	-17%	45.4	-1%	29.5	35.4
HR11	DT	Gatwick Airport	22.5	29.1	29%	34.9	55%	9.7	11.6
London Zone									
RB193	DT	Reigate and Banstead	24.6	28.1	14%	33.7	37%	24.8	29.8
RB191	DT	Reigate and Banstead	26.5	30.4	15%	36.5	38%	29.5	35.4
RB196	DT	Reigate and Banstead	26.8	24.6	-8%	29.5	10%	18.3	21.9
RB187	DT	Reigate and Banstead	27.0	31.8	18%	38.1	41%	32.4	38.9
RB192	DT	Reigate and Banstead	28.5	30.2	6%	36.2	27%	29.1	34.9
RB215	DT	Reigate and Banstead	29.0	27.5	-5%	33.1	14%	23.8	28.5
H2	DT	Sutton	26.8	23.5	-12%	28.1	5%	7.9	9.4
RB182	DT	Reigate and Banstead	30.3	22.6	-25%	27.1	-10%	14.8	17.7
EE6	DT	Epsom and Ewell	30.4	31.2	3%	37.4	23%	21.6	25.9
ST24	DT	Sutton	28.9	25.5	-12%	30.6	6%	7.4	8.9
RB190	DT	Reigate and Banstead	30.7	33.1	8%	39.7	29%	35.3	42.4
RB186	DT	Reigate and Banstead	30.8	31.3	2%	37.6	22%	31.5	37.8
CR7	CM	Croydon	31.0	28.7	-7%	34.5	11%	16.0	19.3
RB189	DT	Reigate and Banstead	31.4	34.2	9%	41.0	31%	37.8	45.4
RB188	DT	Reigate and Banstead	32.2	36.8	14%	44.1	37%	44.0	52.8
H1	DT	Sutton	30.0	24.9	-17%	29.9	0%	10.4	12.5
RB194	DT	Reigate and Banstead	32.5	28.7	-12%	34.4	6%	26.0	31.2
ST36	DT	Sutton	29.3	26.6	-9%	32.0	9%	12.0	14.4

LA ID	Type	Monitoring Authority	2018 Monitored NO$_2$ (µg/m³)	Non-adjusted Modelled NO$_2$ (µg/m³)	Difference[1] before adjustment	Adjusted Modelled NO$_2$ (µg/m³)	Difference[1] post-adjustment	Non-adjusted Modelled Road NO$_x$ (µg/m³)	Adjusted Modelled Road NO$_x$ (µg/m³)
RB214	DT	Reigate and Banstead	33.1	27.2	-18%	32.6	-1%	23.1	27.7
RB199	DT	Reigate and Banstead	34.1	27.8	-19%	33.3	-2%	24.2	29.0
BL	DT	Sutton	29.0	24.7	-15%	29.6	2%	7.0	8.4
RB201	DT	Reigate and Banstead	34.2	28.4	-17%	34.1	0%	25.4	30.5
RB206	DT	Reigate and Banstead	34.5	32.3	-6%	38.7	12%	33.6	40.3
RB184	DT	Reigate and Banstead	34.8	29.4	-16%	35.2	1%	27.4	32.9
20	DT	Kingston Upon Thames	34.9	27.2	-22%	32.6	-7%	21.3	25.5
RB207	DT	Reigate and Banstead	35.2	32.7	-7%	39.2	11%	34.4	41.3
RB197	DT	Reigate and Banstead	36.2	28.9	-20%	34.6	-4%	26.4	31.6
RB183	DT	Reigate and Banstead	36.4	27.3	-25%	32.7	-10%	23.2	27.9
RB213	DT	Reigate and Banstead	36.5	27.6	-24%	33.2	-9%	24.0	28.8
RB211	DT	Reigate and Banstead	36.6	28.7	-22%	34.4	-6%	26.0	31.2
2 (GA)	DT	Merton	36.7	30.0	-18%	36.0	-2%	18.4	22.1
MSAQ19	DT	Mid Sussex	17.4	15.8	-9%	19.0	9%	8.0	9.6
RB204	DT	Reigate and Banstead	36.8	32.0	-13%	38.4	4%	32.9	39.5
RB203	DT	Reigate and Banstead	36.9	30.8	-16%	37.0	0%	30.5	36.5
RB195	DT	Reigate and Banstead	37.0	31.1	-16%	37.3	1%	30.9	37.1
ST22	DT	Sutton	36.1	32.1	-11%	38.5	7%	27.2	32.6
CY42	DT	Croydon	37.3	33.6	-10%	40.3	8%	23.7	28.4
RB202	DT	Reigate and Banstead	37.7	30.2	-20%	36.2	-4%	29.0	34.8
CY52	DT	Croydon	37.8	29.9	-21%	35.9	-5%	17.5	21.0
RB198	DT	Reigate and Banstead	38.2	28.7	-25%	34.4	-10%	26.1	31.3
RB219	DT	Reigate and Banstead	39.2	25.9	-34%	31.1	-21%	20.7	24.8
RB210	DT	Reigate and Banstead	39.3	29.8	-24%	35.8	-9%	28.4	34.0
RB212	DT	Reigate and Banstead	39.3	28.2	-28%	33.8	-14%	25.0	30.0
ST39	DT	Sutton	40.7	30.1	-26%	36.1	-11%	17.7	21.2
CY48	DT	Croydon	39.5	31.2	-21%	37.4	-5%	17.3	20.7
RB146	DT	Reigate and Banstead	40.4	30.1	-26%	36.1	-11%	28.9	34.6
15	DT	Kingston Upon Thames	41.0	28.6	-30%	34.3	-16%	16.2	19.4
ST29	DT	Sutton	38.9	26.4	-32%	31.6	-19%	13.4	16.1
RB200	DT	Reigate and Banstead	42.1	29.1	-31%	35.0	-17%	26.9	32.3
RB216	DT	Reigate and Banstead	42.5	28.8	-32%	34.5	-19%	26.2	31.4
RB218	DT	Reigate and Banstead	42.6	31.6	-26%	37.9	-11%	32.0	38.4
ST34	DT	Sutton	38.9	28.1	-28%	33.7	-13%	14.2	17.1
53	DT	Merton	43.1	26.5	-38%	31.8	-26%	11.6	13.9

LA ID	Type	Monitoring Authority	2018 Monitored NO_2 ($\mu g/m^3$)	Non-adjusted Modelled NO_2 ($\mu g/m^3$)	Difference[1] before adjustment	Adjusted Modelled NO_2 ($\mu g/m^3$)	Difference[1] post-adjustment	Non-adjusted Modelled Road NO_x ($\mu g/m^3$)	Adjusted Modelled Road NO_x ($\mu g/m^3$)
RB137	DT	Reigate and Banstead	43.2	28.5	-34%	34.2	-21%	25.7	30.8
RB217	DT	Reigate and Banstead	43.2	29.7	-31%	35.7	-17%	28.2	33.8
RB205	DT	Reigate and Banstead	44.0	35.4	-20%	42.5	-3%	40.7	48.8
RB136	DT	Reigate and Banstead	45.9	39.4	-14%	47.2	3%	50.6	60.7
RB181	DT	Reigate and Banstead	47.0	28.1	-40%	33.7	-28%	24.9	29.8
RG7	CM	Reigate and Banstead	47.4	35.0	-26%	42.0	-11%	39.8	47.8
RB208	DT	Reigate and Banstead	53.0	33.6	-37%	40.3	-24%	36.4	43.6
CY99	DT	Croydon	33.9	26.6	-22%	31.9	-6%	9.0	10.9
M23 and M25 Zone									
MV12	DT	Mole Valley	22.8	34.6	52%	27.7	21%	36.1	28.9
RB102 2	DT	Reigate and Banstead	23.4	23.9	2%	19.1	-18%	18.6	14.9
MV6	DT	Mole Valley	23.7	33.0	39%	26.4	12%	31.4	25.2
RB36	DT	Reigate and Banstead	23.8	33.0	39%	26.4	11%	30.4	24.3
RB43	DT	Reigate and Banstead	23.8	30.3	27%	24.2	2%	24.5	19.6
CR81	DT	Crawley	24.0	31.2	30%	24.9	4%	31.7	25.4
RB27	DT	Reigate and Banstead	24.7	38.8	57%	31.1	26%	49.3	39.5
RB34	DT	Reigate and Banstead	26.4	31.2	18%	24.9	-6%	30.4	24.3
CR80	DT	Crawley	28.0	37.1	32%	29.6	6%	47.5	38.0
MV10	DT	Mole Valley	28.5	44.5	56%	35.6	25%	62.4	49.9
DT12	DT	Sevenoaks	39.8	35.7	-10%	28.5	-28%	40.9	32.7
TD19	DT	Tandridge	19.2	19.1	0%	15.3	-20%	9.8	7.9
RY8	DT	Runnymede	22.5	34.9	55%	27.9	24%	34.7	27.7
RY19	DT	Runnymede	32.3	51.3	59%	41.1	27%	79.7	63.8
RB33	DT	Reigate and Banstead	20.3	33.2	64%	26.6	31%	34.9	27.9
TD26	DT	Tandridge	21.1	19.0	-10%	15.2	-28%	10.0	8.0
RB29	DT	Reigate and Banstead	21.5	28.4	32%	22.7	6%	25.6	20.5
RB30	DT	Reigate and Banstead	22.0	31.1	42%	24.9	13%	30.8	24.6
RB37	DT	Reigate and Banstead	22.0	35.0	59%	28.0	27%	34.5	27.6
MV11	DT	Mole Valley	22.3	31.2	40%	24.9	12%	28.5	22.8
MSAQ7	DT	Mid Sussex	22.5	28.0	24%	22.4	-1%	26.1	20.9
Mertsham Zone									
RB110	DT	Reigate and Banstead	27.1	31.4	16%	31.4	16%	26.4	26.4
RB20	DT	Reigate and Banstead	30.3	28.5	-6%	28.5	-6%	20.5	20.5
RB124	DT	Reigate and Banstead	31.7	29.0	-9%	29.0	-9%	21.4	21.4

LA ID	Type	Monitoring Authority	2018 Monitored NO_2 ($\mu g/m^3$)	Non-adjusted Modelled NO_2 ($\mu g/m^3$)	Difference[1] before adjustment	Adjusted Modelled NO_2 ($\mu g/m^3$)	Difference[1] post-adjustment	Non-adjusted Modelled Road NO_x ($\mu g/m^3$)	Adjusted Modelled Road NO_x ($\mu g/m^3$)
Storrington Zone									
Storrington 5	DT	Horsham	26.4	17.8	-33%	30.2	14%	11.5	19.6
Storrington 12n	DT	Horsham	28.6	15.8	-45%	26.8	-6%	8.5	14.5
Storrington 13n	DT	Horsham	29.9	21.6	-28%	36.6	23%	17.7	30.0
Storrington 3	DT	Horsham	32.9	23.9	-27%	40.6	23%	21.7	36.8
Storrington 4	DT	Horsham	35.8	16.1	-55%	27.4	-24%	9.0	15.3

[1] Calculated as ([modelled – monitored] / monitored)

4   References

4.1   Website Resources

Air Pollution Information System (APIS). Available from https://www.apis.ac.uk/ [online source]

4.2   Legislation

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).

The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390.

The Environmental Permitting (England and Wales) Regulations 2016 (as amended).

4.3   Published Documents

Arup (2020) Air quality monitoring survey analysis report for 2019. Report for Gatwick Airport Ltd.

Crawley Borough Council (2021) 2021 Air Quality Annual Status Report (ASR).

Department for Environment Food and Rural Affairs (Defra) (2022) Local Air Quality Management Technical Guidance (TG22).

Elmbridge Borough Council (2022) 2022 Air Quality Annual Status Report (ASR).

Epsom and Ewell Borough Council (2022) 2022 Air Quality Annual Status Report (ASR).

Guildford Borough Council (2020) 2020 Air Quality Annual Status Report (ASR).

Horsham District Council (2022) 2022 Annual Status Report (ASR) for Horsham District Council.

Lewes District Council (2020) 2020 Air Quality Annual Status Report (ASR).

London Borough of Croydon (2021) London Borough of Croydon Air Quality Annual Status Report for 2020.

London Borough of Merton (2021) London Borough of Merton Air Quality Annual Status Report for 2020.

London Borough of Sutton (2021) London Borough of Sutton Air Quality Annual Status Report for 2020.

Mid Sussex District Council (2022) 2022 Air Quality Annual Status Report (ASR).

Mole Valley District Council (2020) 2020 Annual Status Report (ASR) for Mole Valley District Council.

Reigate and Banstead Borough Council (2020) 2020 Air Quality Annual Status Report (ASR).

Royal Borough of Kingston Upon Thames (2021) Royal Borough of Kingston Upon Thames Air Quality Annual Status Report for 2020.

Runnymede Borough Council (2022) Air Quality Annual Status Report (ASR) 2020

Sevenoaks District Council (2022) 2022 Air Quality Annual Status Report (ASR).

Tandridge District Council (2022) 2022 Annual Status Report (ASR).

UK Centre for Ecology and Hydrology (2022) Air Pollution Information System (APIS) [online source]. Available at: http://www.apis.ac.uk/

Waverley Borough Council (2022) 2022 Air Quality Annual Status Report (ASR).

Wealden District Council (2022) 2022 Air Quality Annual Status Report (ASR).

Woking Borough Council (2022) 2022 Air Quality Annual Status Report (ASR)

4.4   Glossary of Terms

Table 4.4.1: Glossary of Terms

Term	Description
APIS	Air Pollution Information System
ARN	Affect Road Network
ASR	Annual Status Report
CARE	Central Area Recycling Enclosure
CBC	Crawley Borough Council
Defra	Department of Environment, Food and Rural Affairs
EA	Environment Agency
EIA	Environmental Impact Assessment
ES	Environmental Statement
GAL	Gatwick Airport Limited – the company which operates Gatwick Airport
HRA	Habitat Regulation Assessment
NAEI	UK National Atmospheric Emissions Inventory
NO_2	Nitrogen Dioxide
PEIR	Preliminary Environmental Information Report
PM_{10}	Airborne particles that have a median diameter of 10 microns
$PM_{2.5}$	Airborne particles that have a median diameter of 2.5 microns
RMSE	Root Mean Square Error
SG	Specified Generator
TRA	Traffic Reliability Area