Royal Borough of Kingston upon Thames

Air Quality Annual Status Report for 2022

Date of publication: 20 September 2023

This report provides a detailed overview of air quality in the Royal Borough of Kingston upon Thames during 2022. It has been produced to meet the requirements of the London Local Air Quality Management (LLAQM) statutory process[1].

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[1] LLAQM Policy and Technical Guidance 2019 (LLAQM.TG(19))

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Abbreviations

Abbreviation	Description
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
BEB	Buildings Emission Benchmark
CAB	Cleaner Air Borough
EV	Electric Vehicle
GLA	Greater London Authority
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LLAQM	London Local Air Quality Management
NO_2	Nitrogen Dioxide
NRMM	Non-Road Mobile Machinery
PM_{10}	Particulate matter less than 10 micron in diameter
$PM_{2.5}$	Particulate matter less than 2.5 micron in diameter
TEB	Transport Emissions Benchmark
TfL	Transport for London

Table A. Summary of National Air Quality Standards and Objectives

Pollutant	Standard / Objective (UK)	Averaging Period	Date[(1)]
Nitrogen dioxide (NO_2)	200 µg m^{-3} not to be exceeded more than 18 times a year	1-hour mean	31 Dec 2005
Nitrogen dioxide (NO_2)	40 µg m^{-3}	Annual mean	31 Dec 2005
Particles (PM_{10})	50 µg m^{-3} not to be exceeded more than 35 times a year	24-hour mean	31 Dec 2004
Particles (PM_{10})	40 µg m^{-3}	Annual mean	31 Dec 2004
Particles ($PM_{2.5}$)	25 µg m^{-3}	Annual mean	2021
Particles ($PM_{2.5}$)	Target of 15% reduction in concentration at urban background locations	3-year mean	Between 2010 and 2021
Sulphur dioxide (SO_2)	266 µg m^{-3} not to be exceeded more than 35 times a year	15-minute mean	31 Dec 2005
Sulphur dioxide (SO_2)	350 µg m^{-3} not to be exceeded more than 24 times a year	1-hour mean	31 Dec 2004
Sulphur dioxide (SO_2)	125 µg m^{-3} mot to be exceeded more than 3 times a year	24-hour mean	31 Dec 2004

Notes:

(1) Date by which to be achieved by and maintained thereafter

1. Air Quality Monitoring

1.1. Locations

Table B. Details of Automatic Monitoring Sites for 2022

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA? If so, which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (N/A if not applicable) (m)	Inlet height (m)	Pollutants monitored	Monitoring technique
KT4	Tolworth Broadway	519706	165885	Roadside	Y	7	4.2	1.6	NO_2, PM_{10} / $PM_{2.5}$*	Chemiluminescent; BAM
KT5	Cromwell Road	518562	169519	Roadside	Y	3	2.7	1.6	NO_2, PM_{10}	Chemiluminescent; BAM
KT6	Kingston Vale	521251	172166	Roadside	Y	10	3	1.6	NO_2, PM_{10}	Chemiluminescent; BAM

*KT4 was changed from PM_{10} to $PM_{2.5}$ in April 2022

Table C. Details of Non-Automatic Monitoring Sites for 2022

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA? If so, which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (N/A if not applicable) (m)	Inlet height (m)	Pollutant monitored	Tube co-located with an automatic monitor (Y/N)
1	Guildhall Complex	517951	169029	Kerbside	Y	15	1	2.5	NO_2	N
2	17-19 Penrhyn Road	518067	168672	Roadside	Y	3	2	2.5	NO_2	N
3	52 Portsmouth Road	517565	167715	Roadside	Y	5	2	2.5	NO_2	N
4	88 Brighton Road	517532	167296	Kerbside	Y	4	0.5	2.5	NO_2	N
5	Victoria Road/Brighton Road	517765	167143	Kerbside	Y	1	3	2.5	NO_2	N
6	St. Mark's Hill/Ewell Road	518424	167604	Roadside	Y	2.5	5	2.5	NO_2	N
7	Victoria Road near Surbiton Station	518039	167346	Kerbside	Y	2	0.5	2.5	NO_2	N
8	Upper Brighton Road/Langley Road	518336	166655	Roadside	Y	2.5	2	2.5	NO_2	N
9	199 Douglas Road/Thornhill Road	518737	165768	Kerbside	Y	3	0.5	2.5	NO_2	N

10	Ewell Road near jct Elgar Avenue	519365	166230	Kerbside	Y	4	0.5	2.5	NO_2	N
11	53 Elgar Avenue	519664	166505	Kerbside	Y	6	0.5	2.5	NO_2	N
12	136 Tolworth Broadway/ Service Road	519714	165886	Roadside	Y	3	2	2.5	NO_2	N
13	Tolworth Roundabout (Sundial Court)	519808	165873	Kerbside	Y	1.5	1	2.5	NO_2	N
14	Kingston Road (near station)	519872	165692	Kerbside	Y	14	0.5	2.5	NO_2	N
15	A240 Kingston Road/Old Kingston Road	520192	165264	Kerbside	Y	30	0.5	2.5	NO_2	N
16	Hook Road South/Hunters Road	518087	165096	Kerbside	Y	6	1	2.5	NO_2	N
17	Hook Road (St Paul's Primary)	518026	164785	Roadside	Y	2.5	2	2.5	NO_2	N
18	Hook Centre	517991	164532	Kerbside	Y	4	0.5	2.5	NO_2	N
19	Garrison Lane/Reynolds Avenue	518155	163395	Kerbside	Y	5	0.5	2.5	NO_2	N
20	353 Malden Rushett Crossroads	517256	161578	Roadside	Y	2	2.5	2.5	NO_2	N
21	Opposite 148 Leatherhead Road	517683	163465	Roadside	Y	2	3	2.5	NO_2	N

22	Hook Rise North/Tolworth Rec Centre	518601	165270	Roadside	Y	3	1.5	2.5	NO_2	N
23	40 Fife Road	518147	169455	Kerbside	Y	4	0.5	2.5	NO_2	N
24	14-16 Cromwell Road	518467	169509	Roadside	Y	2	2	2.5	NO_2	N
25	Queen Elizabeth Road/London Road	518533	169348	Kerbside	Y	4	0.5	2.5	NO_2	N
26	Richmond Road/Kings Road	518199	170056	Roadside	Y	4	1.5	2.5	NO_2	N
27	Fire Station, Richmond Road	517800	171423	Roadside	Y	12	1	2.5	NO_2	N
28	41 Kingston Hill	519353	169895	Kerbside	Y	3	1	2.5	NO_2	N
29	240 Kingston Vale near Robin Hood Lane	521107	172055	Kerbside	Y	6	0.5	2.5	NO_2	N
30	Coombe Hill School	520611	169889	Roadside	Y	10	2.5	2.5	NO_2	N
31	248 Malden Road near A3	521651	167397	Kerbside	Y	8	0.5	2.5	NO_2	N
32	South Lane	521252	166877	Kerbside	Y	7	0.5	2.5	NO_2	N
33	96 Burlington Road	521873	168117	Roadside	Y	3	1.5	2.5	NO_2	N

34	66 New Malden High Street	521416	168373	Roadside	Y	7	1.5	2.5	NO_2	N
35	113-115 Clarence Avenue	520708	169258	Roadside	Y	4	1	2.5	NO_2	N
36	38 Coombe Lane West near A3 junction	520047	169651	Roadside	Y	3	2	2.5	NO_2	N
37	51 Elm Road	520764	169525	Kerbside	Y	6	0.5	2.5	NO_2	N
38	Kingston Road (Carpet Right)	520503	168388	Roadside	Y	15	2	2.5	NO_2	N
39	Cambridge Road/ Gloucester Road	519372	169098	Kerbside	Y	1	8	2.5	NO_2	N
40	Cambridge Road/Hawks Road	519064	169244	Roadside	Y	1.5	1.5	2.5	NO_2	N

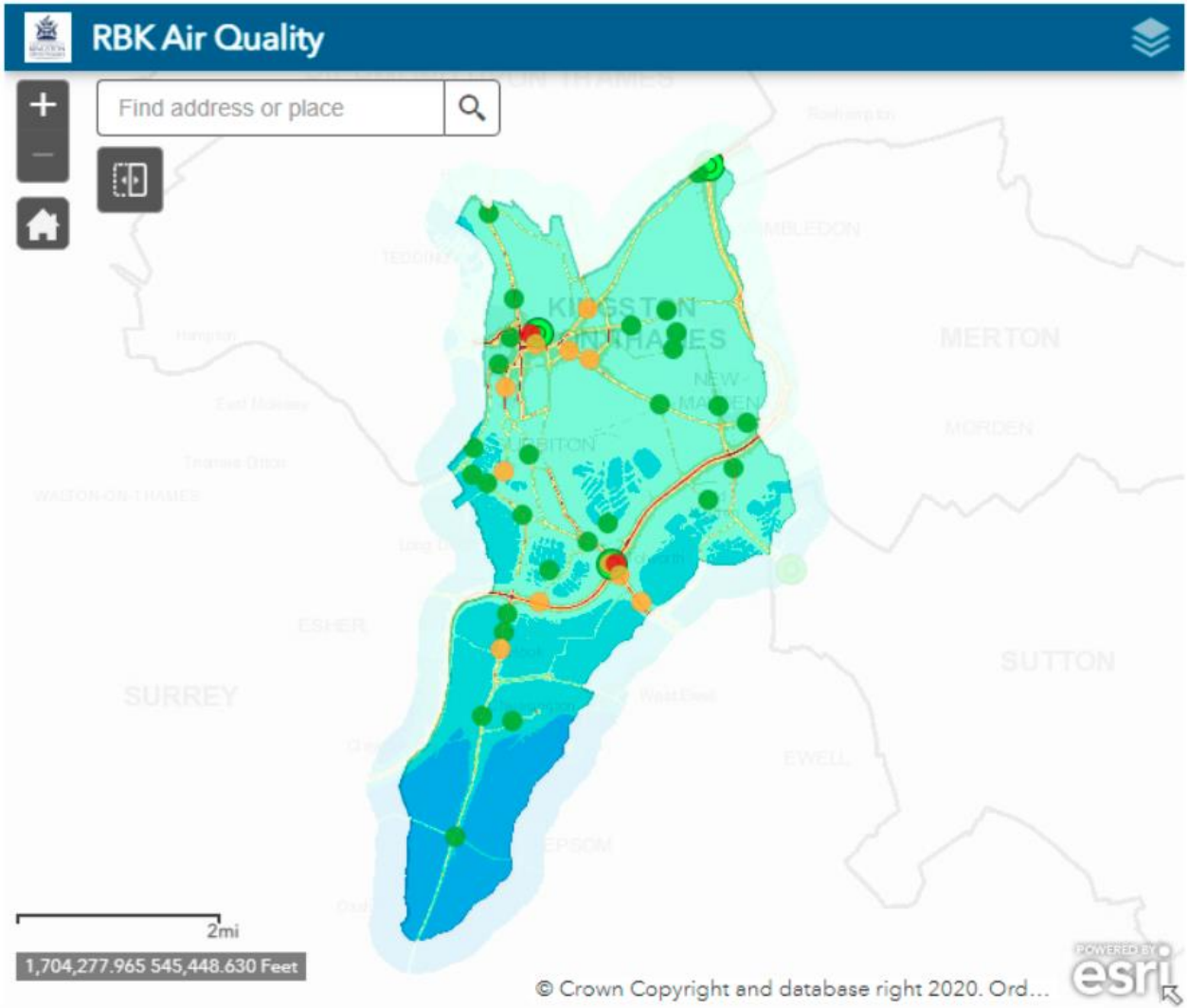

Figure 1. Air Quality Monitoring Locations

1.2. Comparison of Monitoring Results with the Air Quality Objectives

The results presented are after adjustments for “annualisation” and for distance to a location of relevant public exposure (if required), the details of which are described in Appendix A.

Table D. Annual Mean NO_2 Ratified and Bias-adjusted Monitoring Results

Site ID	Site type	Valid data capture for monitoring period %[(a)]	Valid data capture 2022 %[(b)]	2015	2016	2017	2018	2019	2020	2021	2022
KT4	Roadside	49	49	**48.50 (*c)**	**50.70 (*c)**	**48.9**	**44.00**	**41.41**	32.80	30.87	34.95 *(32.69)
KT5	Roadside	100	100	-	-	-	**57.00 (*c)**	**57.22**	**44.70 (40.6)**	**50.51**	**43.43 (42.3)**
KT6	Roadside	97	97	-	-	-	36.00	33.18	24.60	25.54	24.51
1	Kerbside	92	92	25.17	25.03	21.61	21.65	20.09	16.27	15.16	14.57
2	Roadside	100	100	**44.48**	**46.48**	**40.27**	**44.03**	**40.95**	33.17	28.34	26.36

Site ID	Site type	Valid data capture for monitoring period %[a]	Valid data capture 2022 %[b]	2015	2016	2017	2018	2019	2020	2021	2022
3	Roadside	100	100	35.09	38.65	34.55	30.72	28.57	23.14	22.22	20.59
4	Kerbside	100	100	28.56	32.90	26.46	27.55	25.62	20.75	19.58	18.33
5	Kerbside	100	100	**40.59**	**40.40**	35.82	36.93	34.34	27.82	26.49	26.30
6	Roadside	100	100	**40.75**	**42.99**	37.46	36.40	33.85	27.42	22.18	19.81
7	Kerbside	100	100	**49.92**	**48.97**	**44.25**	**43.53**	**40.48**	32.79	27.11	27.45
8	Roadside	100	100	**42.44**	**41.96**	38.14	37.62	34.99	28.34	26.03	23.92
9	Kerbside	92	92	25.67	26.99	24.7	22.15	20.60	16.69	16.97	14.70
10	Kerbside	100	100	**48.61**	**48.61**	**45.72**	38.06	35.40	28.67	26.32	23.72
11	Kerbside	92	92	28.82	30.74	26.71	26.08	24.25	19.65	17.67	17.17
12	Roadside	75	75	**67.18**	**55.22**	**51.28**	**43.75**	**40.69**	32.96	34.10	29.60

Site ID	Site type	Valid data capture for monitoring period %[a]	Valid data capture 2022 %[b]	2015	2016	2017	2018	2019	2020	2021	2022
13	Kerbside	100	100	**72.22**	**76.96**	**72.24**	**65.06**	**60.51**	**42.70 (44.4)**	**45.56**	**40.70 (39.1)**
14	Kerbside	100	100	**62.4**	**59.73**	**54.34**	**41.55**	38.64	31.30	31.55	28.41
15	Kerbside	100	100	**42.78**	**46.32**	**46.40**	**41.00**	38.13	30.89	34.22	31.69
16	Kerbside	92	92	**43.41**	**45.57**	**40.57**	38.45	35.76	28.96	24.97	24.00
17	Roadside	100	100	38.18	39.66	35.98	36.98	34.39	27.86	22.75	24.00
18	Kerbside	100	100	**48.54**	**47.96**	**46.41**	**42.7**	39.71	32.17	24.65	25.52
19	Kerbside	100	100	27.43	28.89	27.35	29.48	27.42	22.21	19.43	18.35
20	Roadside	100	100	36.89	38.43	36.42	34.94	32.49	26.32	22.2	22.48
21	Roadside	100	100	37.94	38.51	35.07	36.05	33.53	27.16	24.21	21.87

Site ID	Site type	Valid data capture for monitoring period %[a]	Valid data capture 2022 %[b]	2015	2016	2017	2018	2019	2020	2021	2022
22	Roadside	92	92	**52.57**	**50.12**	**54.57**	**44.8**	**41.66**	33.75	31.1	28.54
23	Kerbside	100	100	35.5	34.73	31.13	39.55	36.78	29.79	23.47	22.65
24	Roadside	100	100	**93.97**	**90.62**	**84.52**	**75.91**	**70.60**	**60.10 (51.20)**	**52.61**	**50.05 (51.1)**
25	Kerbside	92	92	**46.3**	**45.61**	**43.12**	**40.04**	37.24	30.16	25.06	23.80
26	Roadside	100	100	34.59	38.56	35.54	34.68	32.25	26.12	23.93	21.40
27	Roadside	100	100	35.07	36.04	31.61	34.84	32.4	26.24	14.13	13.10
28	Kerbside	100	100	**57.38**	**53.65**	**50.95**	**49.58**	**46.11**	37.35 (33.3)	**43.27**	39.98
29	Kerbside	100	100	39.19	**41.39**	34.73	31.53	29.32	23.75	21.32	22.28
30	Roadside	100	100	**40.65**	**40.56**	39.03	38.93	36.20	29.33	30.97	28.22

Site ID	Site type	Valid data capture for monitoring period %[a]	Valid data capture 2022 %[b]	2015	2016	2017	2018	2019	2020	2021	2022
31	Kerbside	100	100	**45.22**	**45.63**	**41.95**	38.60	35.90	29.08	33.25	28.75
32	Kerbside	100	100	24.51	27.62	24.98	27.06	25.17	20.38	16.28	15.87
33	Roadside	100	100	**41.88**	**42.88**	**40.34**	38.92	36.20	29.32	31.24	28.58
34	Roadside	100	100	30.95	**40.15**	35.67	37.75	35.11	28.44	27.85	26.27
35	Roadside	100	100	31.13	32.65	29.93	30.65	28.50	23.09	24.9	22.47
36	Roadside	100	100	39.08	36.35	34.97	32.22	29.96	24.27	27.22	25.23
37	Kerbside	100	100	27.07	28.39	28.31	25.96	24.14	19.56	18.52	17.52
38	Roadside	100	100	31.43	38.16	32.94	36.08	33.55	27.18	33.79	31.43
39	Kerbside	100	100	**49.84**	**51.9**	**48.29**	**46.75**	**43.48**	35.22	35.12	32.72
40	Roadside	100	100	**43.79**	**45.63**	**43.56**	**42.30**	39.34	31.86	31.02	29.93

Notes:

The annual mean concentrations are presented as µg m^{-3}.

Exceedances of the NO_2 annual mean AQO of 40 µg m^{-3} are shown in **bold**.

NO_2 annual means in excess of 60 µg m^{-3}, indicating a potential exceedance of the NO_2 hourly mean AQS objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias.

NO_2 annual data has been distance adjusted for data within 10% of the NO_2 annual mean objective. The adjusted results are shown in brackets.

All means have been "annualised" in accordance with LLAQM Technical Guidance if valid data capture for the calendar year is less than 75% and greater than 25%. The unadjusted results are shown in asterisk and brackets.

Results have been distance corrected where applicable.

(a) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(b) data capture for the full calendar year (e.g. if monitoring was carried out for six months, the maximum data capture for the full calendar year would be 50%).

Automatic monitoring site KT5 (Cromwell Road) exceeded NO_2 annual mean AQO with NO_2 concentrations of 43.5 µg m^{-3}.

Diffusion tube monitoring sites 13 and 24 exceeded NO_2 annual mean AQO with NO_2 concentrations of 40.7 and 50.1 µg m^{-3}, respectively, however site 28 is very close to the objective (39.98 µg m^{-3}) and whilst it is positive that it appears to be on a downward trend, it should not be assumed that this site is below the objective limit on that basis of this years data.

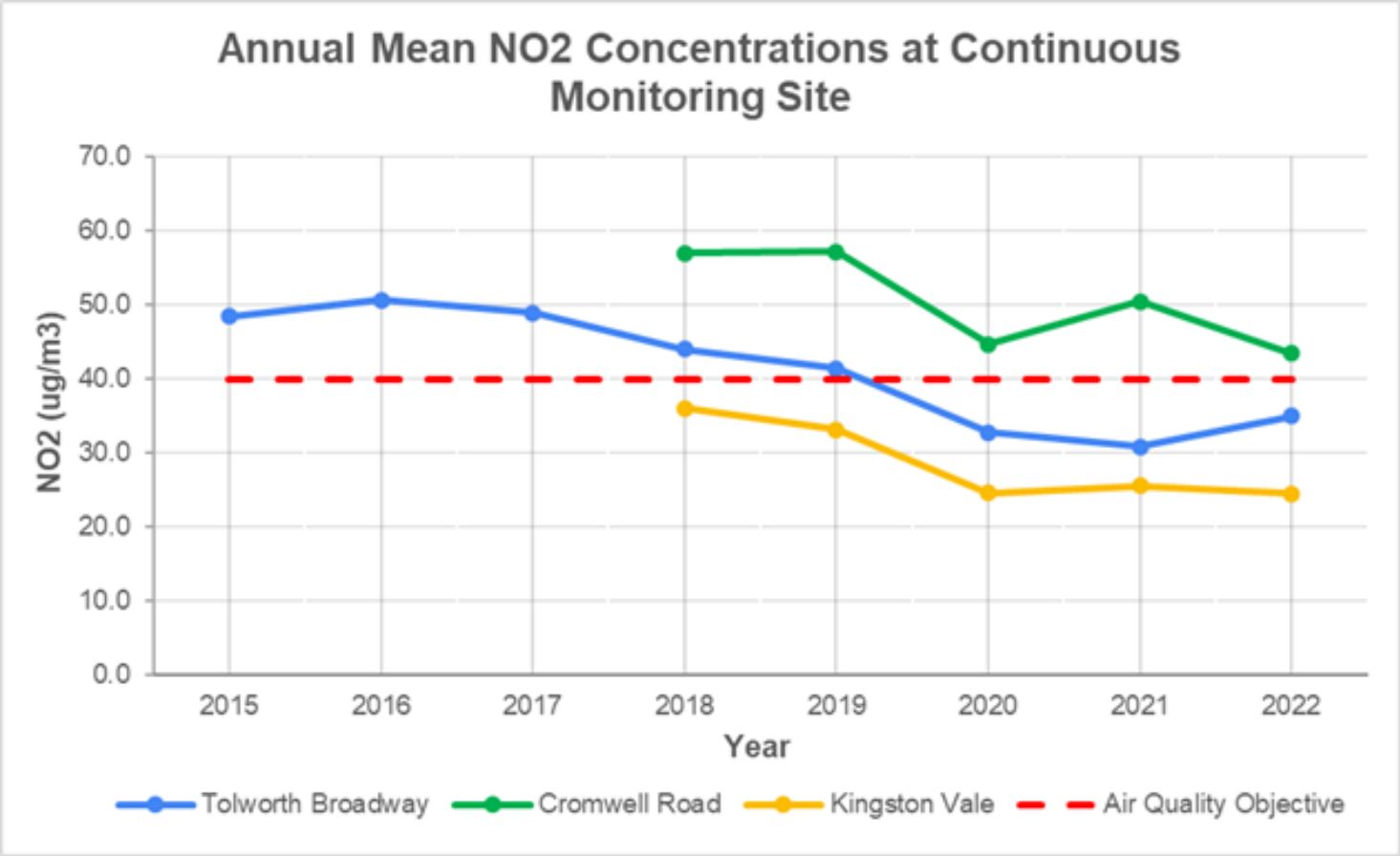

Figure 2. Annual Mean NO_2 Concentrations at Automatic Monitoring Sites

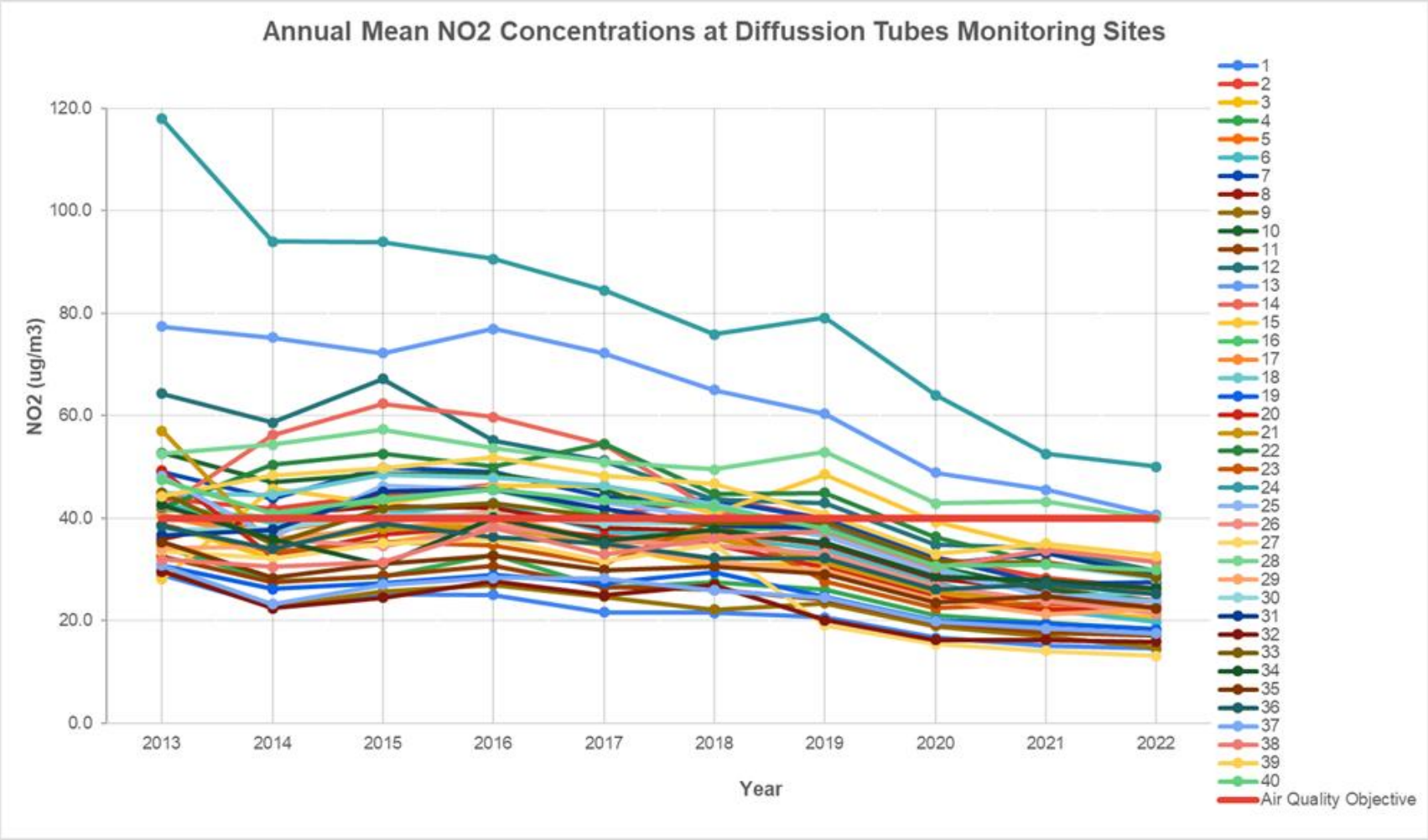

Figure 3. Annual Mean NO_2 Concentrations at Diffusion Tube Monitoring Sites

Diffusion tube data over the years show a decrease in NO_2 concentration. This year, 2022, only two diffusion tube sites were above the 40 µg m^{-3} Air Quality Objective.

Table E. **NO_2 Automatic Monitoring Results: Comparison with 1-hour Mean Objective, Number of 1-Hour Means > 200 µg m^{-3}**

Site ID	Valid data capture for monitoring period %([a])	Valid data capture 2022 %([b])	2015	2016	2017	2018	2019	2020	2021	2022
Tolworth Broadway	49	49	0	5	8	0	0	0 (109.5)	0	0 (106.8)
Cromwell Road	100	100	-	-	-	1	5	0	0	0
Kingston Vale	97	97	-	-	-	0	0	0	0	0

Notes

Results are presented as the number of 1-hour periods where concentrations greater than 200 µg m^{-3} have been recorded.

Exceedance of the NO_2 short-term AQO of 200 µg m^{-3} over the permitted 18 hours per year are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(a) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

(b) Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

Automatic monitoring sites KT5 and KT6 showed that the concentration of NO_2 (over 1-hour periods) never exceeded 200 µg m^{-3}.

Site KT4 (Tolworth Broadway) had a capture data below 75% and was annualised. The 99.8th percentile of 1-hour means was 106.8 µg m^{-3}.

Table F. Annual Mean PM_{10} Automatic Monitoring Results (µg m^{-3})

Site ID	Valid data capture for monitoring period %([a])	Valid data capture 2022 %([b])	2015	2016	2017	2018	2019	2020	2021	2022
Tolworth Broadway	-	-	20	24	23	23	22	21.7	21.6	-
Cromwell Road	98	98	-	-	-	30	26	23.9	27.7	30.1
Kingston Vale	77	77	-	-	-	22	20	17.7	17.7	16.7

Notes

The annual mean concentrations are presented as µg m^{-3}.

Exceedances of the PM_{10} annual mean AQO of 40 µg m^{-3} are shown in **bold**.

All means have been "annualised" in accordance with LLAQM Technical Guidance if valid data capture is less than 75% and more than 25%.

(a) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(b) Data capture for the full calendar year (e.g. if monitoring were carried out for six months, the maximum data capture for the full calendar year would be 50%).

Automatic monitoring site KT4 had a data capture below 25% for PM10 concentrations because the monitor was changed to $PM_{2.5}$ in April 2022. Thus the data capture rate for PM_{10} was invalid.

Sites KT5 and KT6 had annual mean PM_{10} concentrations below the Air Quality Objective.

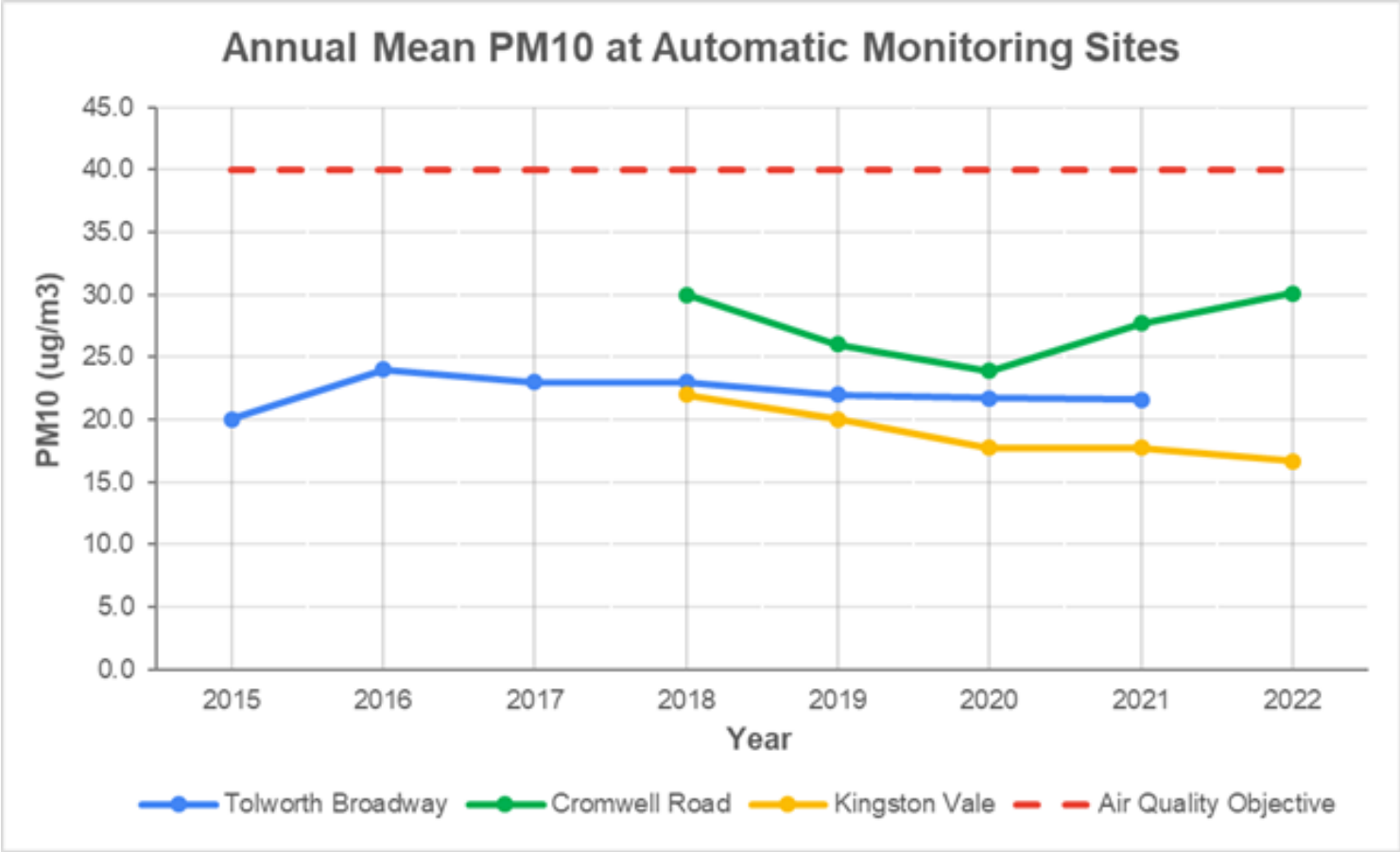

Figure 4. Annual Mean PM_{10} Automatic Monitoring Results

Table G. PM_{10} Automatic Monitoring Results: Comparison with 24-Hour Mean Objective, Number of PM_{10} 24-Hour Means > 50 µg m^{-3}

Site ID	Valid data capture for monitoring period %[a]	Valid data capture 2022 %[b]	2015	2016	2017	2018	2019	2020	2021	2022
Tolworth Broadway	-	-	1	9	6	2	7	6	5	-
Cromwell Road	98	98	-	-	-	15 (50)	15	9	14	21
Kingston Vale	77	77	-	-	-	2 (35)	4	3	2	1 (29)

Notes

Exceedances of the PM_{10} 24-hour mean objective (50 µg m^{-3} over the permitted 35 days per year) are shown in **bold.**

Where the period of valid data is less than 85% of a full year, the 90.4th percentile is provided in brackets.

(a) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

(b) data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

In 2022, automatic monitoring site KT4 (Tolworth Broadway) data capture was below 25%, because the monitor was changed to $PM_{2.5}$ in April 2022 and thus the data capture period was invalid.

The number of PM_{10} 24-hour mean exceedances for site KT6 (Kingston Vale) has been decreasing over the years. While the exceedance numbers for site KT5 (Cromwell Road) are increasing. However, both sites were still below the 35 exceedances stated in the Air Quality Objective.

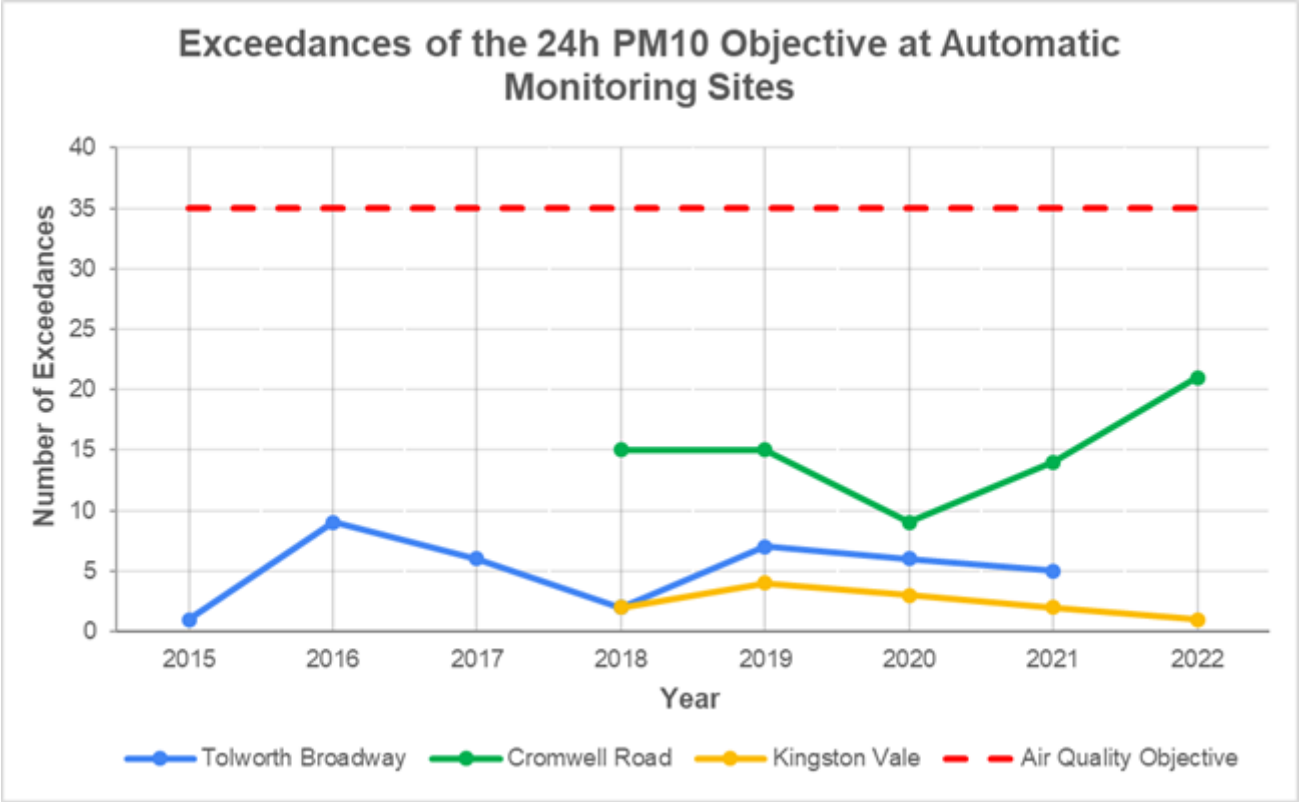

Figure 5. Exceedances of the 24h PM_{10} Objective at Automatic Monitoring Stations

Table H. Annual Mean $PM_{2.5}$ Automatic Monitoring Results (µg m^{-3})

Site ID	Valid data capture for monitoring period %[(a)]	Valid data capture 2022 %[(b)]	2022
Tolworth Broadway	54	54	8.3

Notes

The annual mean concentrations are presented as µg m^{-3}.

Exceedances of the $PM_{2.5}$ annual mean AQO of 25 µg m^{-3} are shown in **bold**.

All means have been "annualised" in accordance with LLAQM Technical Guidance if valid data capture is less than 75% and more than 25%.

(a) Data capture for the monitoring period in cases where monitoring was only carried out for part of the year.

(b) Data capture for the full calendar year (e.g. if monitoring was carried out for six months, the maximum data capture for the full calendar year would be 50%).

In 2022, the annual mean of $PM_{2.5}$ was 8.3 µg m^{-3} which is below the Air Quality Objective. The annual mean was annualised in accordance with the LLAQM Technical Guidance, as data was missing from January to June 2022.

2. Action to Improve Air Quality

2.1. Air Quality Action Plan Progress

Table I provides a brief summary of the Royal Borough of Kingston upon Thames progress against the Air Quality Action Plan, showing progress made this year. New projects which commenced in 2022 are shown at the bottom of the table.

Table I. Delivery of Air Quality Action Plan Measures

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
1	Borough Fleet Actions	Ensure that all SEND Vehicles are Euro 6 Compliant with a reissued fleet of vehicles by Sept. 2021 and transition to all electric vehicles as soon as a suitable replacement is available to match current specification.	No progress towards electric vehicles
2	Borough Fleet Actions	Kingston to sign the Clean Van Commitment from Global Action Plan and commit to swapping fleet vehicles for zero emission versions, where they exist and are suitable,	Ongoing project as vehicle contracts are renewed and technology offers suitable vehicles. The Kingston Council has committed to an all-electric refuse fleet

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
		by 2028. Kingston to lobby vehicle providers to sign the commitment too.	which is on order and should be implemented in 2023
3	Borough Fleet Actions	Replace all remaining housing fleet to electric when suitable cost-effective electric vehicles are available. Ensure that housing fleet vehicles for which like for like EV options do not yet exist are Euro VI-compliant.	Ongoing project as vehicle contracts are renewed and technology offers suitable vehicles.
4	Borough Fleet Actions	Devise and implement a driver training system to promote efficient driving practice amongst Council employees.	During 2022 the specification of this training system was finalised and a contract to deliver the scheme will be issued in 2023, funded by a DEFRA Air Quality Grant
5	Cleaner Transport	Continue to lobby TfL and Surrey CC to increase the rate at which ultra-low emission buses are introduced in Kingston.	All TfL & Surrey buses are Ultra Low Emission. We continue to work with TfL to increase the number of zero emission vehicles

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
6	Cleaner Transport	Carry out a public consultation process to maximise quality of the bus service by optimising routes and frequencies.	Sustainable Transport officers have commenced a borough-wide review of the bus network in conjunction with TfL and Surrey County Council
7	Cleaner Transport	Lobby Transport for London and South Western Railways for changes to the zones system for Kingston, Surbiton and Chessington resulting in cheaper, Zone 5 fares.	The Council continues to raise this topic at Officer and Member level whenever the opportunity presents.
8	Cleaner Transport	Implement a public e-bike hire scheme in the borough in 2021	Launched September 2022 in conjunction with London Borough of Sutton
9	Cleaner Transport	Working with schools to carry out an Active Travel Challenge over one month with rewards on offer for entrants. Possibly	In 2022, there has been some difficulty in recruiting to vacancies tasked with

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
		targeting parents and guardians with children at schools with school streets	progressing this action and therefore limited progress has been made.
10	Cleaner Transport	In conjunction with recommendation 4.3, run a rewards programme for Active Travel Employers, offering rewards to employers with the greatest commitment to active travel (e.g. showers at work, secure cycle parking, Cycle Scheme uptake, etc.).	No engagement with businesses on behaviour change due to resourcing challenges arising from the TfL/GLA funding award.
11	Cleaner Transport	Encourage businesses to sign up to a green pledge for Kingston. Hold a healthy green workplaces conference to encourage the use of sustainable transport	This Action has been adopted into the the Climate Emergency Action Plan, Theme 6, Green Economy and is being progressed through delivery of that Plan www.kingston.gov.uk/downloads/file/1694/kingston-s-climate-action-plan
12		Investigate simplifying payment methods for newly installed charge points in the borough.	The Lamp column charging point operator has partnered with Bonnet app which

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
	Cleaner Transport	This is likely to take the form of a ‘one app’ approach to payments. This aim will be taken into consideration for all future procurement of charging points.	includes many different charging point operators charging points and also includes the Source London charging points - one app can now be used to access both the lamp column charging points and Source London charging points in the borough.
13	Cleaner Transport	Discouraging unnecessary idling through continued participation with the Idling Action campaign if possible, installation of anti-idling road signs at known hotspots, promotion of anti-idling online workshops provided by Idling Action with schools, businesses, and borough drivers.	The Pan London project finished in 2022 but we continue to investigate reports of vehicle idling. In 2022, numerous sites were identified for anti-idling signs, over 50 anti idling signs were installed.
14	Cleaner Transport	Assess the feasibility of changing all borough residential roads to 20mph.	Funding has been made available in 2022, with the intention to achieve 100% coverage of the borough by the end of 2023/24 (subject

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
			to statutory consultation). Progress was made with roads in Kingston and Surbiton neighbourhoods becoming 20 mph zones
15	Cleaner Transport	Increasing the proportion of electric and hydrogen vehicles and low emission vehicles in Car Clubs	Car club contract due to go out to market Summer 2023. New contract will include targets to introduce EV and hybrid vehicles within a two year time frame.
16	Cleaner Transport	4 Very Important Pedestrian Days a year on weekdays leading to trials of play streets in residential areas. In business areas, target one a year on a Sunday.	This project is currently in the feasibility phase
17	Cleaner Transport	Surcharge on diesel vehicles below Euro 6 standards for Resident's and Controlled Parking Zone permits	Enabling work including recommissioning of the service providers was commenced in 2022. Free permits for EVs were delivered in 2021 and remain available.

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
			Elected Members are due to consider next steps for Emission Based Pricing in the coming year, pending outcome of ULEZ expansion
18	Cleaner Transport	Installation of 100 resident charge points close to homes on targeted residential streets in 2021	Delivered
19	Cleaner Transport	Installation of rapid electric vehicle chargers in 3 RBK town centre car parks	On hold to 2023/24
20	Cleaner Transport	Reallocation of road space; reducing parking in accessible destinations and or restricting parking on congested high streets and busy roads to improve bus journey times, cycling	In 2022, consultations were carried out on CPZ reviews and the introduction of new CPZ and PPA.

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
		experience, and reduce emissions caused by congested traffic.	
21	Cleaner Transport	Provision of infrastructure to support walking and cycling.	Funding for cycle parking provided for the purchase of 7 secure cycle hangars. Additional funding is being sought to enable additional on-street residential hangars. Completion of the outstanding sections of the RBK Cycle Route network (formally “GoCycle”) is planned for the next two years.
22	Delivery Servicing & Freight	Update of local authority Procurement policies to include a requirement for suppliers with large fleets to have attained silver FORS accreditation	An environmental clause has been drafted and is incorporated into all relevant contracts. The contract review should be completed and implemented by the end of June 2023. This is the provision that specifically relates to this point:

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
			Where applicable, and in any case where it concerns Providers with fleet, the Provider shall have Silver Fleet Operator Recognition Scheme (FORS) accreditation
23	Delivery Servicing & Freight	Update of Procurement policies to ensure sustainable logistical measures are implemented (and include requirements for preferentially scoring bidders based on their sustainable criteria)	Decarbonising and Safeguarding our World is one of the key themes of the Social Value framework that is incorporated into the evaluation criteria as a standalone criteria, with a min weighting of 10%, and a range of 10%-20%. As part of each procurement exercise, officer review the council's social value measurement framework and identify the relevant measures relating to environment, not limited to below: Air pollution is reduced

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
			NT31 Savings in CO2 emissions on contract not from transport (specify how these are to be achieved). NT31.1 Please specify and evidence the baseline level of emissions used to measure savings/reductions against, and the baseline year (e.g. 100 tonnes of CO2e based on 2018 emission levels), see also Technical guidance for NT31. NT31.2 Please specify and evidence the target level of emissions on the project (as determined by the reduction commitments), see also Technical guidance for NT31. NT32 Car miles saved on the project (e.g. cycle to work programmes, public transport or car pooling programmes, etc.)

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
			In addition, in line with PPN06/21 and PPN03/23, a set of questions related to reducing carbon emissions have been introduced - they are already live now in our e-tendering portal as part of new SQ requirements.
24	Delivery Servicing & Freight	Secure delivery and servicing plans and monitoring via planning obligations for large traffic generators, including commercial developments, new and expanded schools, other community facilities and major residential developments.	We already request a Planning Condition regarding a Delivery Service Plan for all larger developments and Transport Officers review these as part of the process.
25	Emissions from developments and buildings	Construction Management Plans imposed by planning obligation on all major and other sensitive developments in consultation with	We already request a Planning Condition regarding a Construction Management Plan for all larger developments and Transport Officers review these as part of the process.

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
		advice from Transport/Highways and Air Quality	
26	Emissions from developments and buildings	London Plan policies on energy efficiency applied to relevant development; Aspiration to adopt BREEAM target policies for development in RBK new Local Plan in Q4 2023 subject to viability testing.	Relevant developments are considered against London Plan's policy requirements. Draft policy requirements for higher BREEAM standards are being considered as part of the new Local Plan process - the requirements require viability testing - outcomes are expected at the end of 2023.
27	Emissions from developments and buildings	Ensuring enforcement of Non-Road Mobile Machinery (NRMM) air quality policies through continuing membership of the NRMM enforcement project.	The use of our standard NRMM planning condition during 2022 is summarised in Table J. Additionally, the Council is a longstanding member of the pan-London NRMM project, funded by the MAQF. Construction Logistics Plans also form part

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
			of the new draft Sustainable Transport Strategy, consulted on between January and March 2022
28	Emissions from developments and buildings	Apply London Plan CHP and biomass air quality policies to relevant development.	Ongoing
29	Emissions from developments and buildings	Applying London Plan 2021 Air Quality Neutral policies to new major development.	Ongoing
30	Emissions from developments and buildings	Urban Greening Factor requirement for relevant development in line with London Plan; Maintenance plans for green infrastructure secured by planning condition.	Ongoing

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
31	Emissions from developments and buildings	Ensuring that Smoke Control Zones are fully promoted and enforced through investigating complaints of smoke, consolidating the smoke control zones into a single zone that encompasses the entire borough, and investigating fuel retailers for compliance.	The consolidation of historic Smoke Control Orders has been agreed at a council level. The consultation was delayed due to resources, however the new Smoke Control Orders are due for implementation by Winter 2023, pending confirmation of the Revocation Order by the Secretary of State.
32	Emissions from developments and buildings	Promoting and delivering energy efficiency retrofitting projects in workplaces and homes using the GLA RE:NEW and RE:FIT programmes to replace old boilers /top-up loft insulation in combination with other energy conservation measures.	This project commenced in April 2022 and will continue through 2023

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
33	Emissions from developments and buildings	Ensure that planning and development within the borough are compliant with relevant planning policies in relation to air quality in order to mitigate the potential impacts of development on air quality and to protect the health and amenity of the population.	Ongoing - all relevant planning applications are assessed for impacts on air quality.
34	Localised Solutions	Carry out air quality audits on the three schools in Kingston where NO_2 concentrations are the highest in accordance with the GLA audit toolkit. Promote Schools Pollution Helpdesk and GLA audit toolkit.	Due to limited resources, this project has not yet commenced. Aim to start later in 2023, subject to recruitment to vacant posts
35	Localised Solutions	Bid for funding to be able to implement 3 experimental schools streets per year and	Funding was used to deliver 2 school streets in 2022.

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
		seek to make existing experimental schemes permanent.	
36	Localised Solutions	Liaise with South West London boroughs not covered by the inner London ULEZ regarding the potential for a south London ULEZ	The London wide ULEZ is planned for expansion in August 2023, therefore this action has been superseded.
37	Localised Solutions	Carry out study to assess feasibility of implementing Kingston's first Zero Emissions Zone	Initial discussions held towards this action which is for future compliance
38	Localised Solutions	Continue to ensure that streets are designed in line with Healthy Streets Guidance with a specific focus on promoting sustainable transport by making highways safer, more accessible, and attractive through design, maintenance and greening. Implement a framework to ensure that all planned	Ongoing

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
		maintenance works consider Healthy Streets impacts.	
40	Monitoring and other core statutory duties	Collect and publish air quality monitoring data in line with the requirements of the London Local Air Quality Management framework.	Data from our continuous monitoring network is published through our membership of the London Air Quality Network. In addition the Internet of Things project provides additional monitoring data through Breathe London. Aqualine, roll out 6 monitors across RBK Borough
41	Public Health and Awareness Raising	Design and deliver a clean air communications campaign to raise awareness of the harm caused by poor air quality and how individuals can take action to reduce their emissions.	Each year the council supports various campaign days. The Idling Action London #EngineOffEveryStop campaign to educate motorists about the dangers of engine idling and the health impacts it causes.

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
			Clean Air Day (June) and Car Free Day (September) promote sustainable forms of transport including walking and cycling. The days include a range of events across the borough. The campaigns are promoted on social media, in the resident's e-newsletter and adverts in newspapers and on the JCDecaux advertising board network.
42	Public Health and Awareness Raising	Develop a communications strategy which raises awareness of the harm caused by solid fuel burning. Material to be published early every winter for maximum impact.	The Council is part of a Pan London Wood Burning project which includes research into the effects of wood burning in domestic premises, and a communications strategy which raises awareness of the harm caused by solid fuel burning

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
43	Public Health and Awareness Raising	Implement a schools outreach programme designed to raise awareness of the impacts of air pollution and help them to create clean air route plans. Provide this service to at least five schools in the borough and produce an article outlining findings for the head's newsletter.	This work hasn't commenced due to vacancies in the service. A new Sustainable Transport officer was appointed in early 2023 and this scheme forms part of their remit.
44	Public Health and Awareness Raising	Ensure that the Director of Public Health is fully briefed on the content of the Annual Status Reports on air quality in relation to the current situation in our local authority area, and actions that have been taken thus far, and what is needed to reduce the health impacts of poor air quality in the future.	Air Quality has been included in section 4 of the borough's JSNA. Air Quality Action Plan working group meetings are chaired by the director of public health and held every two months. Minutes are taken.

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
45	Public Health and Awareness Raising	DPH will be consulted on all relevant air quality projects to liaise with key stakeholders.	Ongoing
46	Public Health and Awareness Raising	In relevant Public Health publications and in the statutory Annual Public Health Report, the Public Health DPH will have responsibility to ensure inclusion of up-to-date information on air quality impacts on the population.	The Kingston Annual Director of Public Health Report 2020-2022 included an Air Quality section. The new Kingston Joint Strategic Needs Assessment (JSNA) 2023 includes an Air Quality section.
47	Public Health and Awareness Raising	Strengthening coordination with Public Health by ensuring that at least one Consultant grade public health specialist within the borough has air quality responsibilities outlined in their job profile (as part of a wider role, not a dedicated air quality post).	The Kingston Consultant in Public Health, along with team members in the Healthy & Safe team, gives input on Air Quality matters as required.

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
48	Public Health and Awareness Raising	Director of Public Health/relevant CHoS to sign off Statutory Annual Status Reports and all new Air Quality Action Plans	Ongoing
49	Public Health and Awareness Raising	Provide a briefing which can be disseminated amongst the Transport team detailing their responsibilities in relation to air quality improvement as well as risks and opportunities relevant to their service area that relate to air quality.	Due to vacancies in the team this project has not commenced. Aim to start later in 2023
50	Public Health and Awareness Raising	Promotion of availability of airTEXT air pollution alert system on the website, doctor's surgeries, hospitals, and schools. Mayor's air quality alerts are to be disseminated using social media.	The Council website promotes the AirTEXT service as well as recommends ways in which residents can reduce their exposure to, and emissions of, air pollution. The Council has also shared pollution episode alerts from the GLA forecasting service.

Measure	LLAQM Action Matrix Theme	Action	Progress ● Emissions/Concentration data ● Benefits ● Negative impacts / Complaints
			Doctor's surgeries, hospitals and schools aim to be contacted in 2023.
51	Public Health and Awareness Raising	Support five schools to join and achieve bronze accreditation in the TfL STARS accredited travel planning programme by providing information on the benefits to schools and supporting the implementation of such a programme.	The Healthy Streets Officer role was disbanded by TfL in June 2022, and the Sustainable Transport Officer post responsible for STARS was vacant , so STARS work has been delayed.

3. Planning Update and Other New Sources of Emissions

Table J. Planning requirements met by planning applications in the Royal London Borough of Kingston Upon Thames in 2022

Condition	Number
Number of planning applications where an air quality impact assessment was reviewed for air quality impacts	24
Number of planning applications required to monitor for construction dust	28
Number of CHPs/Biomass boilers refused on air quality grounds	0
Number of CHPs/Biomass boilers subject to GLA emissions limits and/or other restrictions to reduce emissions	0
Number of developments required to install Ultra-Low NO_x boilers	4
Number of developments where an AQ Neutral building and/or transport assessments undertaken	22
Number of developments where the AQ Neutral building and/or transport assessments not meeting the benchmark and so required to include additional mitigation	9
Number of planning applications with S106 agreements including other requirements to improve air quality	4
Number of planning applications with CIL payments that include a contribution to improve air quality	3
NRMM: Central Activity Zone and Canary Wharf Number of conditions related to NRMM included. Number of developments registered and compliant. Please include confirmation that you have checked that the development has been registered with the GLA through the relevant NRMM website and that all NRMM used on-site is compliant with Stage IIIB of the Directive and/or exemptions to the policy.	N/A
NRMM: Greater London (excluding Central Activity Zone and Canary Wharf) Number of conditions related to NRMM included. Number of developments registered and compliant. Please include confirmation that you have checked that the development has been registered through the NRMM webpage and that all NRMM used on-site is compliant with Stage IIIA of the Directive and/or exemptions to the policy.	22 conditions included 15 registered and compliant 0 unregistered/non compliant and being chased.

The Royal Borough of Kingston upon Thames Development Control Service consults the Environmental Protection Team on all major planning applications as well as some non-major applications that are likely to be of interest. Applications are reviewed by officers within the team in respect of contaminated land, noise and air quality. Typically, one officer coordinates the team's response and records data such as the air quality conditions that were recommended.

The enforcement of air quality conditions is largely the responsibility of the Planning Enforcement Team unless environmental nuisance issues arise. However, NRMM

enforcement is carried out by the LB Merton-led pan-London NRMM enforcement project, funded by the Mayor's Air Quality Fund.

3.1. New or significantly changed industrial or other sources

No new sources identified in 2022.

4. Additional Activities to Improve Air Quality

4.1. The Royal London Borough of Kingston upon Thames Fleet

There are a small number of zero emission and zero emission capable vehicles within the borough's fleet in 2022.

4.2. NRMM Enforcement Project

The Royal London Borough of Kingston upon Thames is continuing to support the NRMM Enforcement project in 2022 – 23.

4.3. Air Quality Alerts

The Council website promotes the AirTEXT service as well as recommends ways in which residents can reduce their exposure to and emissions of air pollution. The Council has also shared pollution episode alerts from the GLA forecasting service.

Appendix A Details of Monitoring Site Quality QA/QC

A.1 Automatic Monitoring Sites

The Council's monitoring stations form part of the London Air Quality Network and QA/QC standards are delivered accordingly. These are considered close, if not equivalent to, the AURN standards. QA/QC is carried out by contractors.

PM_{10} Monitoring Adjustment

The monitoring stations in the Royal Borough of Kingston upon Thames are part of the London Air Quality Network, and the data is collected and managed (including ratification) by ERG (Environmental Research Group).

A.2 Diffusion Tubes

The diffusion tubes used by the Royal Borough of Kingston upon Thames are supplied and analysed by Gradko utilising the 20% triethanolamine (TEA) in water preparation method. A bias adjustment factor of 0.83 for the year 2022 has been derived from the national bias adjustment calculator dated March 2023.

The Royal Borough of Kingston upon Thames did not conduct any co-location studies in 2022, so it was not possible to calculate a local adjustment factor. As a result, the national adjustment factor of 0.83 is applied to diffusion tube monitoring results in this report.

Gradko International Ltd is a UKAS-accredited laboratory and participates in laboratory performance and proficiency testing schemes. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO_2 concentrations reported are of a high calibre. The lab follows the procedures set out in the Harmonisation Practical Guidance. Gradko previously participated in the Workplace Analysis Scheme for Proficiency (WASP) for NO_2 diffusion tube analysis Page 38 and the Annual Field Inter Comparison Exercise. In April 2014, a new scheme, AIR PT13, was introduced. This is an independent analytical proficiency-testing (PT) scheme operated by LGC Standards and supported by the Health and

Safety Laboratory (HSL). AIR PT combines two long-running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme.

Laboratory performance in AIR PT is also assessed by the National Physical Laboratory (NPL) alongside laboratory data from the monthly NPL Field Intercomparison Exercise carried out at Marylebone Road, central London. A laboratory is assessed and given a ‘z’ score. A score of 2 or less indicates satisfactory laboratory performance.

Gradko International Ltd.’s performance for 2022 for 100% of samples submitted by Gradko was deemed satisfactory.

The laboratory has also achieved a “good” precision result for 2022. Tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%, and the average CV of all monitoring periods is less than 10%.

Table K. Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	National	03/23	0.83
2021	National	03/22	0.84
2020	National	03/21	0.81
2019	National	03/20	0.93
2018	National	03/19	0.93
2017	National	03/18	0.89
2016	National	04/17	0.94

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/23

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods

Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet

This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2023

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1:	Step 2:	Step 3:	Step 4:
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	**Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.**
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2022	R	Brighton & Hove City Council	10	37	23	62.8%	G	**0.61**
Gradko	20% TEA in water	2022	UB	Hertsmere Borough Council	12	16	15	7.1%	G	**0.93**
Gradko	20% TEA in water	2022	R	Southampton City Council	12	36	28	30.6%	G	**0.77**
Gradko	20% TEA in water	2022	UC	Southampton City Council	12	28	24	15.4%	G	**0.87**
Gradko	20% TEA in water	2022	R	Southampton City Council	12	34	31	8.4%	G	**0.92**
Gradko	20% TEA in water	2022	R	Worcestershire	11	13	12	4.2%	G	**0.96**
Gradko	20% TEA in water	2022	R	Lancaster City Council	13	34	27	25.8%	G	**0.79**
Gradko	20% TEA in water	2022	R	Lancaster City Council	12	28	24	15.2%	G	**0.87**
Gradko	20% TEA in water	2022		**Overall Factor[3] (27 studies)**				**Use**		**0.83**

A.3 Adjustments to the Ratified Monitoring Data

Short-term to Long-term Data Adjustment

Where data capture is less than 75% and greater than 25% of a full calendar year (between 3 and 9 months), the mean should be “annualised” – i.e. adjusted using the methodology outlined in LLAQM.TG(19) before being compared to annual mean objectives.

In 2022, all non-automatic (diffusion tube) monitoring sites had data capture of 75% or more. No annualisation was required.

One automatic monitoring site was annualised. Site KT4 had a data capture of 49%.

Site KT4 was annualised using automatic monitoring sites KT5 (100% data capture) and KT6 (96% data capture) with an annualisation factor of 1.07.

Distance Adjustment

The continuous NO_2 monitoring site of KT5, as well as the NO_2 diffusion tube monitoring sites 13 and 24, were, exceeding the AQO of 40 µg/m3. Annual mean NO_2 concentrations for these sites were calculated at relevant exposure receptors using the NO_2 O2 fall-off with distance calculator.

Site KT5, 13, and 24 calculated annual mean concentrations are within 10% of the NO_2 annual objective of 40µg/m3 (i.e. above 36µg/m3), which accounts for the inherent uncertainty in monitoring concentration data.

Table L. NO_2 Fall off With Distance Calculations

The results presented in the table below are after adjustments for bias adjustment, annualisation and distance to a location of relevant public exposure. To estimate the concentration at the nearest receptor, the procedure specified in LLAQM. TG(16) has been applied to all monitoring locations that record an annual mean concentration above the NO_2 annual mean objective of 40ug/m3.

The calculation has also been applied to monitoring locations that record an annual mean concentration that is within 10% of the NO_2 annual mean objective (i.e. above 36ug/m3) to account for the inherent uncertainty in diffusion tube monitoring data.

Site ID	Distance (m) Monitoring Site to Kerb	Distance (m) Receptor to Kerb	Monitored Concentration Annualised and Bias Adjusted (µg m^{-3})	Background Concentration (µg m^{-3})	Concentration Predicted at Receptor (µg m^{-3})	Comments
kt5	2.7	1	43.43	21.14	42.3	predicted concentration at receptor within 10% of the aqo
13	1	1.5	40.70	21.66968	39.1	Predicted concentration at Receptor within 10% of the AQO
24	2	2	50.05	21.14465	50.1	Predicted concentration at Receptor within 10% of the AQO

The calculations have been carried out in accordance with LLAQM Technical Guidance in order to provide information on the concentrations at which relevant exposure occurs. The data shows that all of the sites identified above are in exceedance of the annual mean objective.

Appendix B Full Monthly Diffusion Tube Results for 2022

Table M. NO_2 Diffusion Tube Results

Site ID	Valid data capture for monitoring period %[a]	Valid data capture 2022%[b]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean: Raw Data	Annual Mean: Bias Adjusted
1	92	92	-	14.35	24.10	15.31	11.42	10.10	11.20	14.84	17.75	16.50	18.86	24.83	17.55	14.57
2	100	100	**46.14**	30.76	35.48	26.83	26.15	24.91	20.98	29.63	**34.27**	32.12	35.73	38.05	31.75	26.36
3	100	100	38.92	23.62	30.25	22.40	19.69	17.52	14.64	22.08	23.81	24.43	28.48	31.89	24.81	20.59
4	100	100	32.63	17.19	33.27	21.72	15.70	14.73	15.72	20.89	21.70	20.47	22.52	28.48	22.08	18.33
5	100	100	**43.16**	23.99	**43.21**	34.93	25.41	25.04	25.28	32.95	31.22	30.18	30.83	34.05	31.69	26.30
6	100	100	37.25	21.98	29.60	21.47	17.24	16.06	18.98	23.17	23.89	23.52	24.20	29.00	23.86	19.81
7	100	100	**50.26**	34.69	38.44	32.82	28.05	25.69	26.35	29.20	30.83	30.16	33.75	36.59	33.07	27.45
8	100	100	**44.41**	24.25	27.15	27.85	23.07	24.71	24.24	30.64	30.05	26.00	28.52	34.95	28.82	23.92

9	92	92	31.67	17.35	23.69	17.64	13.86	11.74	12.86	7.49	18.90	18.31	21.35	-	17.71	14.70
10	100	100	**45.25**	26.63	37.31	27.80	21.35	18.73	22.30	27.28	28.76	24.19	28.70	34.70	28.58	23.72
11	92	92	33.75	17.95	27.17	19.72	-	11.90	12.14	17.15	20.63	17.84	21.34	28.00	20.69	17.17
12	75	75	**49.92**	12.77	**40.36**	32.52	-	34.15	31.78	37.27	**42.37**	-	-	39.83	35.66	29.60
13	100	100	**61.75**	**45.97**	**51.56**	**44.44**	**40.84**	**49.27**	**42.26**	**50.86**	**50.56**	**48.58**	**50.70**	**51.64**	**49.04**	**40.70**
14	100	100	**47.05**	28.45	**45.28**	34.37	25.92	26.37	29.28	37.64	**38.86**	30.10	28.71	38.71	34.23	28.41
15	100	100	**51.41**	32.23	38.79	37.86	**35.66**	**40.81**	36.50	37.49	**40.44**	33.45	36.37	37.11	38.18	31.69
16	92	92	**46.31**	23.45	30.83	24.67	23.50	23.57	20.58	28.01	32.88	28.00	-	36.25	28.91	24.00
17	100	100	**45.47**	23.95	30.22	26.56	22.35	23.22	20.40	25.37	31.59	27.91	31.74	38.27	28.92	24.00
18	100	100	**42.82**	24.93	34.89	27.33	20.60	25.15	24.05	33.59	36.71	28.74	33.64	36.46	30.74	25.52
19	100	100	37.85	18.24	27.96	19.80	17.91	15.99	13.19	20.77	23.30	20.51	21.80	28.01	22.11	18.35
20	100	100	**40.25**	23.50	27.49	24.96	22.37	23.80	21.47	27.78	29.60	24.90	26.17	32.75	27.09	22.48
21	100	100	38.56	22.29	27.79	23.65	22.31	21.32	24.25	25.60	30.10	23.33	25.26	31.78	26.35	21.87

22	92	92	**56.55**	34.10	**-**	28.30	18.68	28.96	28.08	24.86	35.36	37.31	**41.71**	**44.33**	34.38	28.54
23	100	100	37.90	21.04	37.79	25.76	30.42	16.76	17.76	26.33	26.82	25.10	29.39	32.44	27.29	22.65
24	100	100	**86.21**	**57.12**	**58.01**	**53.89**	**54.25**	**52.19**	**47.24**	***56.01***	**66.22**	**61.91**	**63.92**	**66.61**	**60.30**	**50.05**
25	92	92	-	25.82	35.78	26.71	23.99	22.98	24.09	30.34	29.84	28.96	31.58	35.38	28.68	23.80
26	100	100	39.68	22.52	32.06	22.18	17.12	16.80	18.97	23.13	28.95	26.43	27.91	33.61	25.78	21.40
27	100	100	27.21	14.87	19.52	12.95	9.88	9.28	10.00	12.66	16.73	15.10	18.57	22.62	15.78	13.10
28	100	100	**74.30**	**40.54**	**48.71**	**44.43**	**42.19**	**42.58**	**42.90**	**46.74**	**49.49**	**48.06**	**46.60**	**51.43**	**48.16**	39.98
29	100	100	37.50	23.83	32.48	25.76	22.61	22.84	18.56	25.24	27.99	21.44	31.27	32.60	26.84	22.28
30	100	100	**51.85**	34.15	34.38	26.97	29.01	29.53	29.17	30.40	34.44	31.69	36.66	39.81	34.01	28.22
31	100	100	**49.85**	29.71	**41.10**	34.14	28.65	24.48	28.46	32.98	**37.06**	31.84	36.68	**40.66**	34.63	28.75
32	100	100	33.59	16.18	21.37	20.53	12.32	10.67	12.78	16.00	19.96	18.54	20.33	27.22	19.12	15.87
33	100	100	**48.14**	29.76	38.43	26.44	28.31	28.55	31.29	33.28	36.36	36.74	39.07	36.86	34.44	28.58
34	100	100	**44.12**	28.47	**43.23**	28.44	24.00	23.31	25.49	30.79	34.05	31.13	31.69	35.15	31.66	26.27

35	100	100	**48.80**	23.57	31.39	23.72	19.17	15.56	24.90	21.95	26.99	22.18	31.41	35.28	27.08	22.47
36	100	100	**47.95**	31.75	36.15	26.61	25.16	22.92	19.14	27.97	30.63	26.98	34.61	34.86	30.39	25.23
37	100	100	36.30	18.39	25.82	17.49	14.71	12.88	13.59	17.27	22.50	20.60	25.13	28.60	21.11	17.52
38	100	100	**51.84**	32.68	**45.43**	35.61	31.65	27.54	31.25	36.97	**41.09**	39.13	39.97	**41.28**	37.87	31.43
39	100	100	**56.92**	33.75	**42.56**	37.92	32.48	31.70	33.80	39.50	**41.81**	36.44	**42.01**	**44.20**	39.42	32.72
40	100	100	**50.12**	37.15	39.71	30.39	30.04	30.59	32.83	33.04	35.48	36.67	38.93	37.83	36.07	29.93

Notes

Concentrations are presented as µg m^{-3}.

Exceedances of the NO_2 annual mean AQO of 40 µg m^{-3} are shown in **bold**.

NO_2 annual means in excess of 60 µg m^{-3}, indicating a potential exceedance of the NO_2 hourly mean AQS objective, are shown in **bold and underlined**.

All means have been “annualised” in accordance with LLAQM Technical Guidance if valid data capture for the calendar year is less than 75% and greater than 25%.

(a) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(b) data capture for the full calendar year (e.g. if monitoring was carried out for six months, the maximum data capture for the full calendar year would be 50%).