Air Quality

Annual Status Report for 2021

Date of Publication: May 2022

THE ROYAL BOROUGH OF
**KENSINGTON
AND CHELSEA**

Kensington and Chelsea Council Air Quality Annual Status Report for 2021

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Cover photo taken by Matt McIlroy

This report provides a detailed overview of air quality in Kensington and Chelsea during 2021. 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
O_3	Ozone
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
SO_2	Sulphur Dioxide
TEB	Transport Emissions Benchmark
TfL	Transport for London
WHO	World Health Organisation

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

Note:

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

Table B.   Summary of WHO Air Quality Guideline Values

Pollutant	Metric	Guideline Value (2005)	Guideline Value (2021)*
NO_2	1-Hour Mean	200 µg m^3	-
NO_2	Annual Mean	40 µg m^3	10 µg m^3
PM_{10}	24-Hour Mean	50 µg m^3	45 µg m^3
PM_{10}	Annual Mean	20 µg m^3	15 µg m^3
$PM_{2.5}$	Annual Mean (Stage 1)	10 µg m^3	5 µg m^3
$PM_{2.5}$	Annual Mean (Stage 2)	10 µg m^3	5 µg m^3
$PM_{2.5}$	24-Hour Mean	25 µg m^3	15 µg m^3

These represent the final AQG level recommended by the WHO for countries to achieve globally. There are four interim target values to reach before these concentrations. WHO Global Air Quality Guideline Report available online at https://apps.who.int/iris/bitstream/handle/10665/345329/9789240034228-eng.pdf?sequence=1&isAllowed=y

Figure 1. Kensington and Chelsea Air Quality Management Area Boundary (Entire Borough)
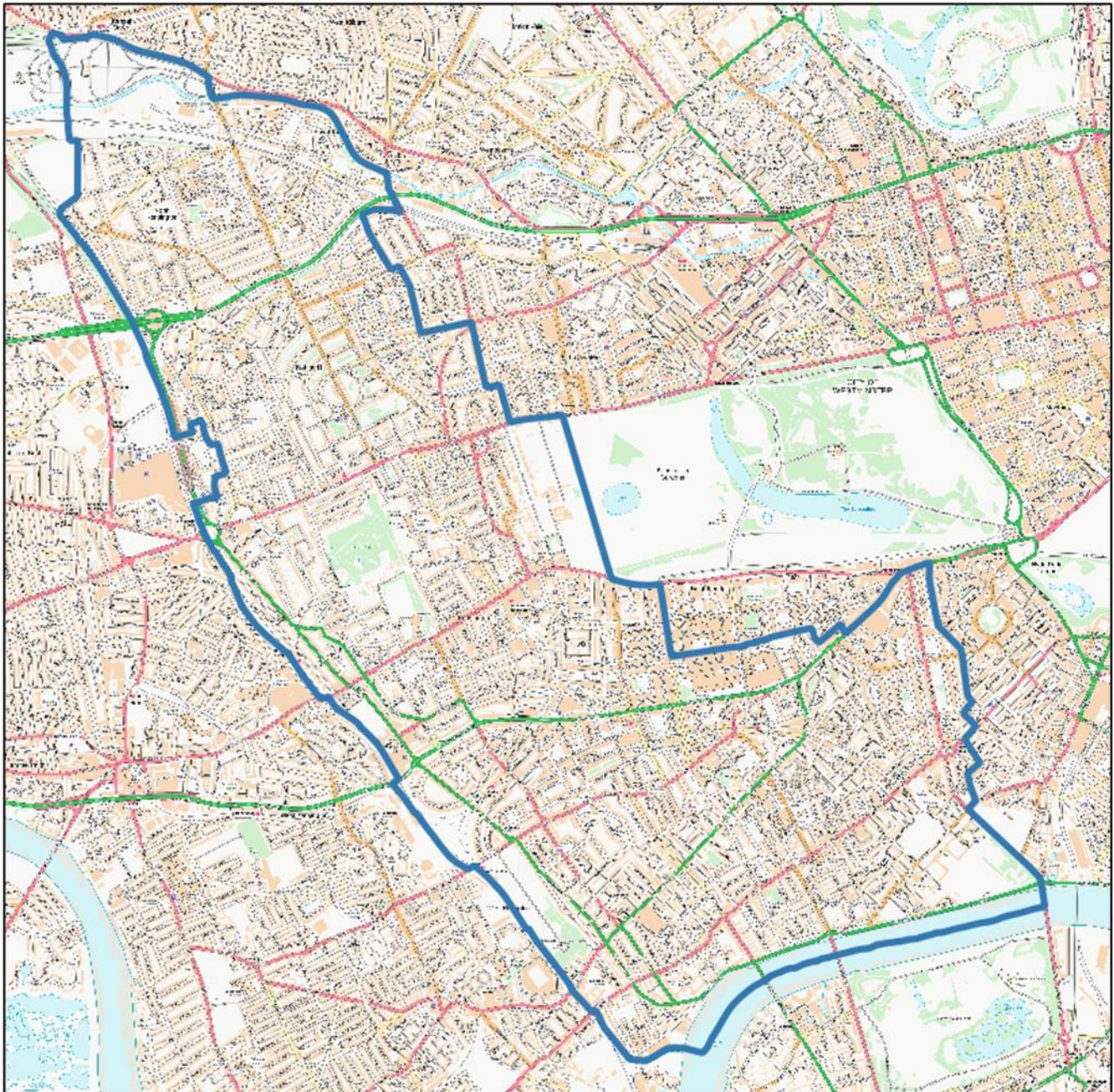
1.   Introduction

In 2021, the world continued to work though the challenges posed by COVID-19 and as the year progressed we moved into a Covid recovery phase. At the start of the year, lockdown measures were still in place before their gradual easement from 8 March 2021 through to 21 June 2021. In January and February 2021, concentrations of nitrogen dioxide were lower at all automatic sites (with the exception of our North Kensington site in February) than in 2020, but these began to rise from March. By May, concentrations were between 4 and 11 µg m^3 higher at our roadside and kerbside sites than in 2020. They remained higher than 2020 until November/December time when they became similar. The annual National Air Quality Objective was met at all automatic monitoring sites except Earl's Court (KC5).

As reported in last year's ASR, the consequences of measures imposed during lockdowns in 2020 was not as positive for particulate matter and concentrations did not fall in the same way that they did for nitrogen dioxide. In 2021, concentrations were fairly similar with the exception of February and March when they were between 4.8-7.5 ug/m^3 higher at both sites (KC1 and KC5) than in 2020. There were also smaller increases in concentrations in July, September and October at KC5. The National Air Quality Objectives were met at both sites. We are still working to meet the WHO 2005 Guidelines Values at KC5.

For the Council, 2021 was the year we were able to update some of our monitoring network. We replaced the carbon monoxide, nitrogen oxide (NOx), sulphur dioxide and ozone analysers at our North Kensington Monitoring Site (KC1) and installed a new cabin, PM$_{10}$ and PM$_{2.5}$ monitor at our Cromwell Road site (KC2). We also replaced the NO$_x$ analyser at Earl's Court. In addition, we purchased three mobile air quality sensors and placed two of these on Kensington High Street and a third on Sedding Street.

As reported last year, the Council's existing Air Quality and Climate Change Action Plan came to an end in 2021. This annual status report therefore contains the final update for our combined Action Plan. We spent the second half of 2021 writing a new standalone Air Quality Action Plan, which was developed alongside the Council's Climate Emergency Action Plan and Biodiversity Action, to ensure the synergies and co-benefits between these environmental priorities were captured. The Council consulted on these plans between December 2021 and February 2022. The new Air Quality Action Plan 2022-2027 was adopted in March 2022 and progress with implementing this plan will be reported on next year.

During the lifetime of this now concluded Air Quality and Climate Change Action Plan, it is clear to see there has been an improvement in air quality in Kensington and Chelsea with annual mean nitrogen dioxide concentrations having almost halved (86-44 µg m^3 at KC5). Concentrations of particulate matter have not decreased as much, though there has been a clear improvement, particularly at KC1 with reductions of 7 µg m^3. We now look forward to delivering our new Air Quality Action Plan as we strive for better air quality and to achieve the World Health Organisation Guideline Values.

1.1   Local Authority Area

Kensington and Chelsea is a densely populated urban environment located to the west of central London. The borough extends from Chelsea Embankment in the south, through Kensington, Notting Hill, and Ladbroke Grove up to Kensal Green to the north. It is bounded by Bayswater, Kensington Gardens and Belgravia to the east and by the West London Railway Line to the west. Kensington and Chelsea has less open space compared to other boroughs (with 17%); however, it 388 open spaces, accounting for over 78 hectares of green space including 28 parks and two out of borough cemeteries. It is home to several major museums and part of the Imperial College campus.

Although the borough is geographically one of the smallest in London, at just over 4.7 square miles, it is the fourth most densely populated areas in the country. The borough is primarily residential in character.

The Valuation Office Agency in 2018 showed that there are approximately 88,700 households and the ONS Annual Population Survey suggests that 26% rent from a private landlord, 14% have a mortgage, 27% own their property and 33% are socially renting.
In addition to residential accommodation, the borough is also home to internationally recognised shopping centres, 12,000 businesses and over 120,000 jobs, three of the most visited museums in the UK and the second largest number of hotel beds in any London borough.

The borough has a large volume of commuter traffic; people both travelling across and into the area, and local residents travelling within and outside the borough. The area is relatively well served by the London Underground network with the Circle, District, Central, Piccadilly and Hammersmith and City Lines running through the borough. Although currently there is no over-ground rail service actually within the borough, the London Overground stations at Shepherds Bush, Kensington Olympia, West Brompton, and Imperial Wharf are easily accessible to residents and visitors in those localities. There is an extensive bus network.

There are 207 km (127 miles) of roads in the Borough. The Westway (A40), Cromwell Road (A4), the Earl's Court one-way system (A3220) and Chelsea Embankment (A3212) are all part of the Red Route network and Transport for London (TfL) is the Highway Authority for these routes they make up 12.5 km of the roads in the borough. The Council is the Highway Authority for all other adopted roads. The available north/south or east/west routes are constrained by bridges which mean that these are heavily trafficked. They are also often major retail areas with heavy pedestrian flows.

2. Air Quality Monitoring

2.1 Automatic Monitoring Stations

We have automated continuous monitoring at five sites within the Borough. Figure 2 below shows the locations of all the automatic monitoring stations and detailed information about each is contained in Table C.

Figure 2. Locations of Automatic Monitoring Sites
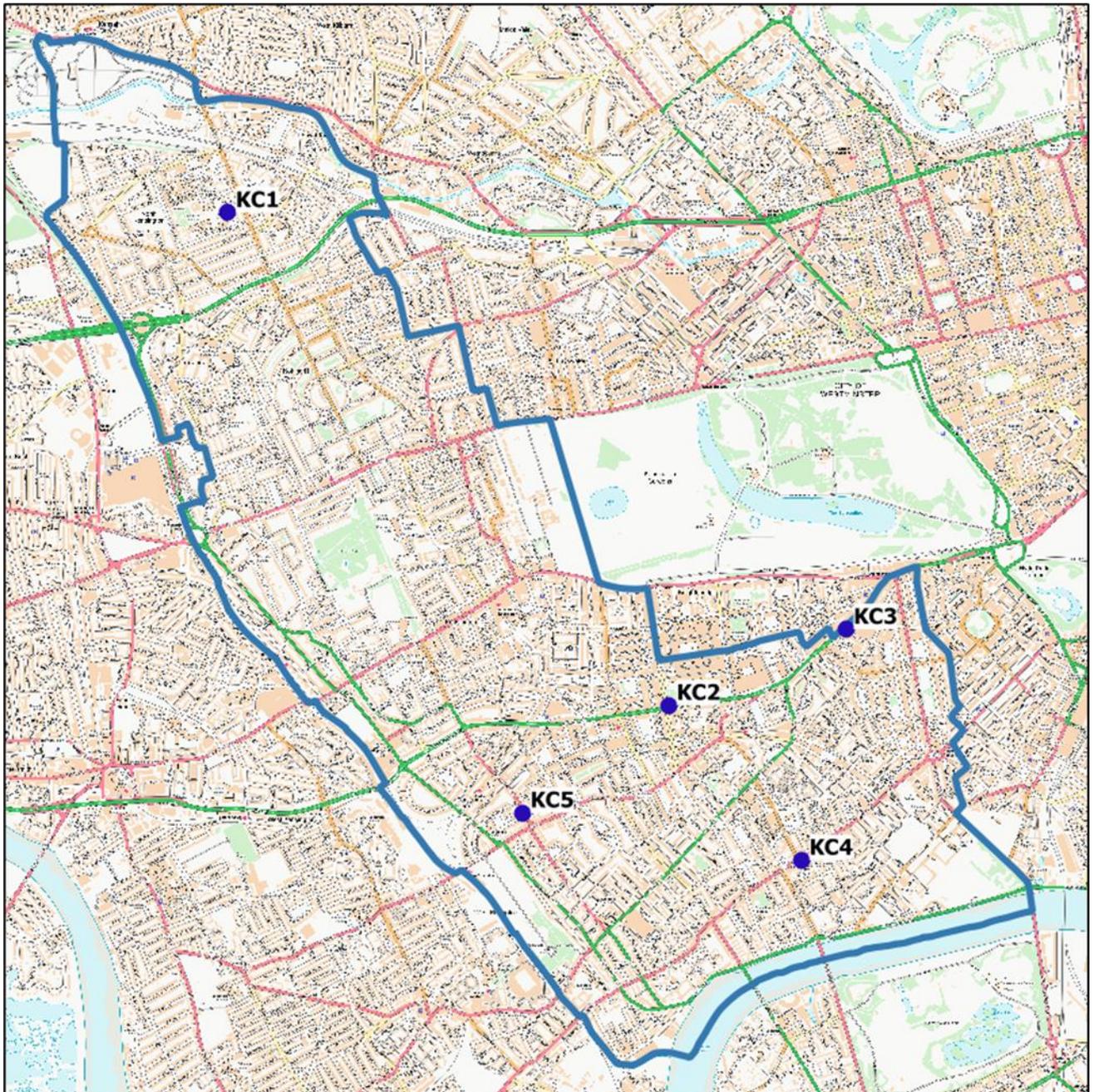
Table C. Details of Automatic Monitoring Sites for 2021

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
KC1	North Kensington	524041	181752	Urban Background, LAQN & AURN Affiliate Site	Y	Approx. 3.5	Approx. 8m to St Charles Square	3	NO_2, CO, PM_{10}, $PM_{2.5}$, SO_2, O_3	Chemiluminescent, FIDAS, GFC, Fluorescence UV, Photometric
KC2	Cromwell Road	526520	178968	Roadside	Y	10	4m to Cromwell Road and 5m to Queens Gate	1.4	NO_2, PM_{10} & $PM_{2.5}$	Chemiluminescent, FDMS
KC3	Knightsbridge	527518	179395	Kerbside	Y	0	0.8m to Hans Road, 4.2m from Brompton Road	2.4	NO_2	Chemiluminescent
KC4	Chelsea	527267	178089	Roadside	Y	0	7.7m from Kings Road	3.4	NO_2	Chemiluminescent
KC5	Earls Court	525695	178364	Kerbside	Y	5.2 (Approx. 4m height)	0.5m to Earls Court Road	1.9	NO_2, PM_{10}	Chemiluminescent BAM 1020 Heated

2.2 Non-Automatic NO$_2$ Monitoring Stations

Another source of data for nitrogen dioxide (NO$_2$) is collected using passive diffusion techniques. The borough participates in the London Wide Environmental Programme (LWEP) offered by Bureau Veritas for the provision and analysis of NO$_2$ diffusion tubes. Further details on the laboratory, method, bias adjustment, and quality control are in Appendix A. Figures 3 and 4 below shows the locations of all the non-automatic monitoring stations within the borough and detailed information about each is contained in Table D.

Figure 3. Locations of Non-Automatic NO$_2$ Monitoring Sites
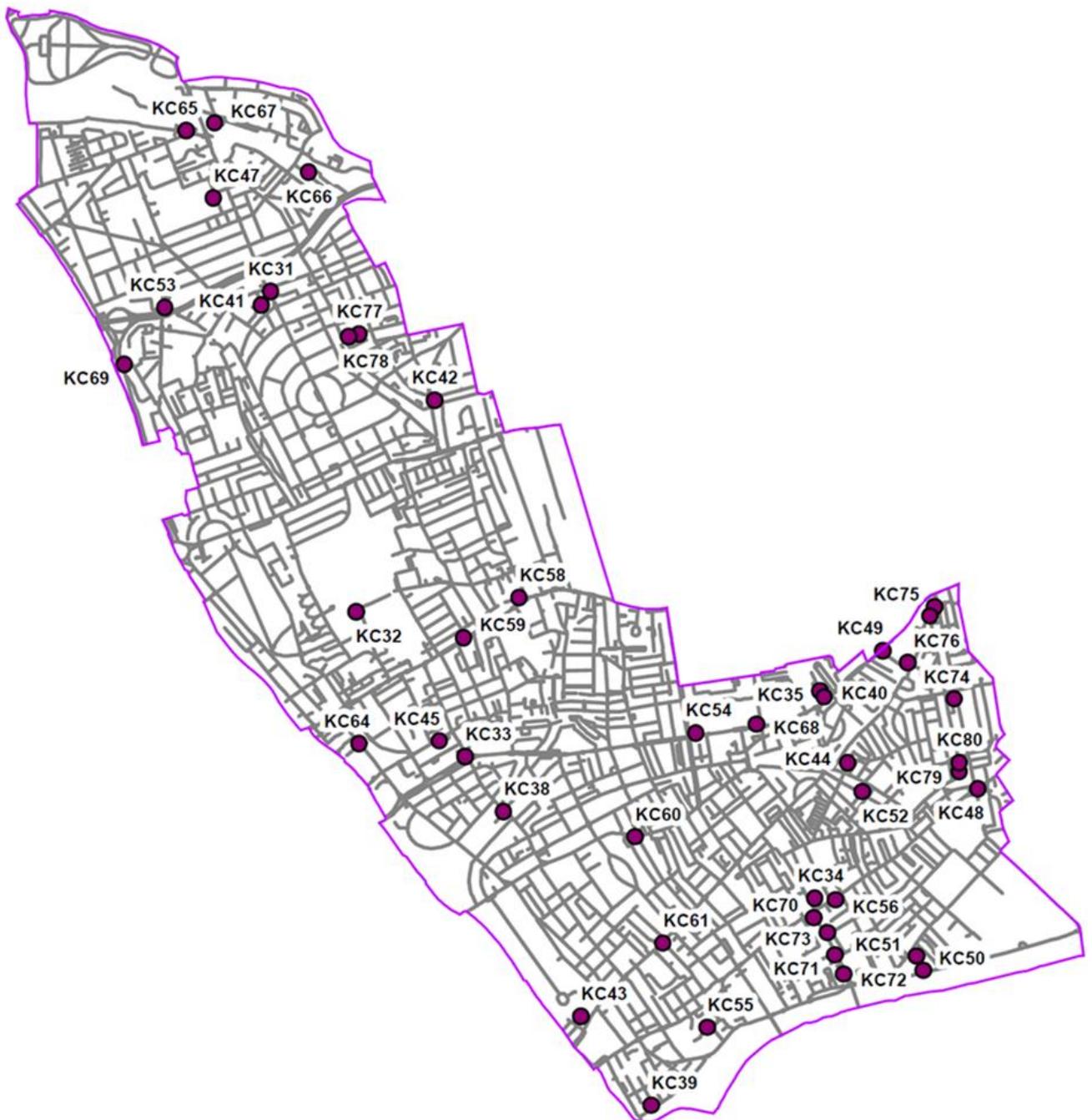
Figure 4.   Location of Kensington High Street Diffusion Tubes
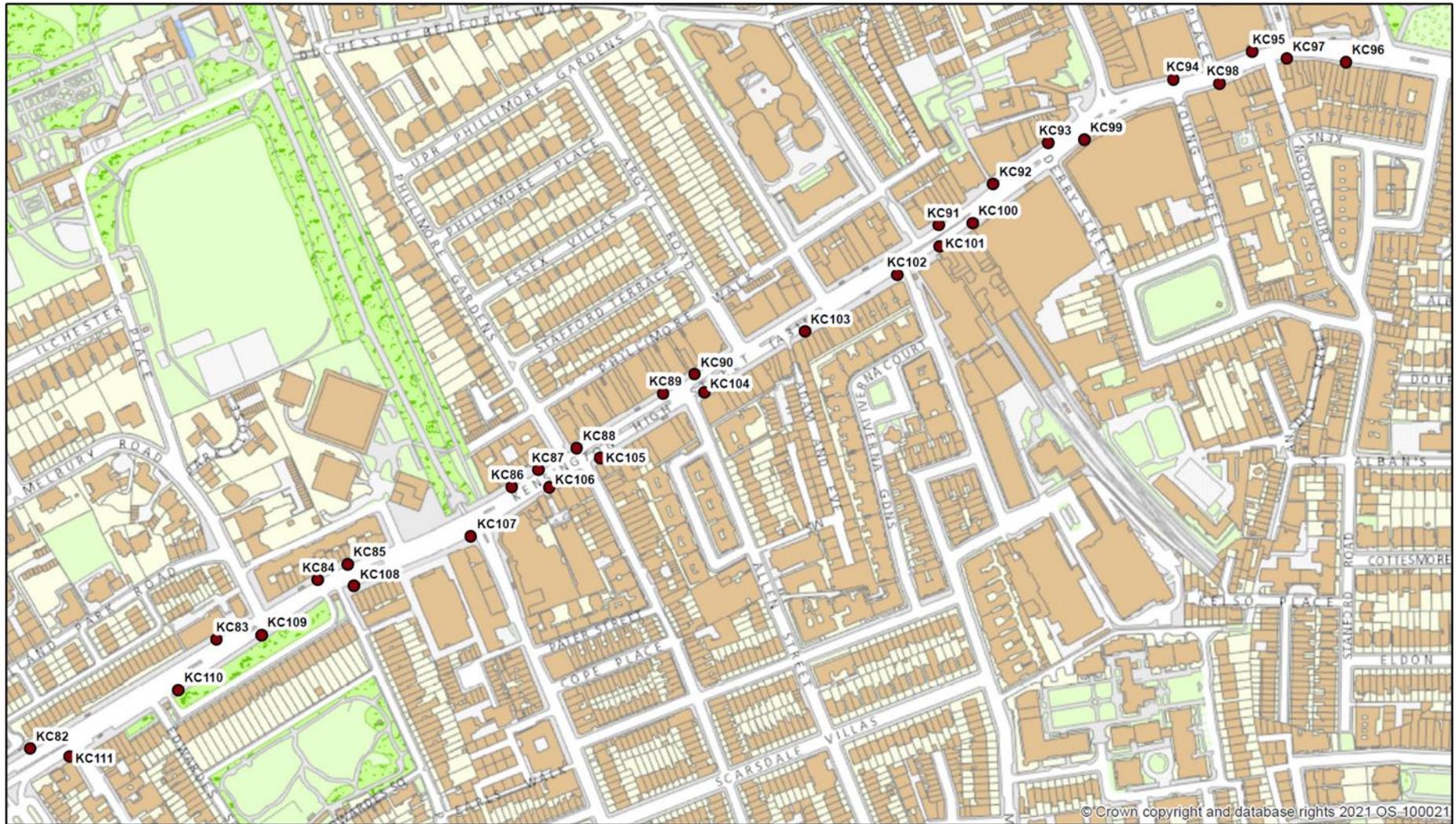
Table D. Details of Non-Automatic Monitoring Sites for 2021

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (N/A if not applicable) (m)	Inlet height (m)	Pollutants monitored	Tube co-located with an automatic monitor? (Y/N)
KC31	Ladbroke Grove / North Kens. Library	524342	181271	Roadside	Y	6	3.5	5	NO_2	N
KC32	Holland Park	524784	179599	Urban Background	Y	5	380	4	NO_2	N
KC33	Cromwell Rd / Earls Court Rd	525355	178841	Roadside	Y	1	2.1	2.1	NO_2	N
KC34	Dovehouse Street	527164	178103	Urban Centre	Y	30	26	2.8	NO_2	N
KC35	Brompton Road / Cottage Place	527192	179185	Roadside	Y	40	8	1.5	NO_2	N
KC38	Earls Court Station	525548	178556	Roadside	Y	1	1.7	2.7	NO_2	N
KC39	Lots Road / Upcerne Road	526317	177022	Roadside	Y	30	8.1	2.5	NO_2	N
KC40	Brompton Square	527214	179153	Urban Centre	Y	20	65	2.7	NO_2	N
KC41	Ladbroke Crescent	524294	181200	Urban Background	Y	8	70	2.2	NO_2	N
KC42	Pembridge Square Library	525191	180705	Roadside	Y	9	6	3.1	NO_2	N
KC43	St Marks Grove	525950	177487	Urban Background	Y	12	38	2.3	NO_2	N
KC44	Donne Place	527335	178810	Urban Background	Y	15	55	2.4	NO_2	N
KC45	Chatsworth Court	525263	178936	Roadside	Y	13	13	2	NO_2	N
KC47	Sion Manning School	524046	181758	Urban Background	Y	10	8.5	2.1	NO_2	Y -Triplicate

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (N/A if not applicable) (m)	Inlet height (m)	Pollutants monitored	Tube co-located with an automatic monitor? (Y/N)
KC48	Sloane Square	528011	178675	Roadside	Y	1	7	3	NO$_2$	N
KC49	Harrods	527516	179395	Urban Centre	Y	1	4	2.5	NO$_2$	Y
KC50	Chelsea Physic Garden (Gate)	527726	177727	Roadside	Y	1	4	2.9	NO$_2$	N
KC51	Chelsea Physic Garden (Met Station)	527690	177800	Urban Background	Y	3	92	1.5	NO$_2$	N
KC52	Sloane Avenue	527411	178659	Roadside	Y	5	2.6	2.4	NO$_2$	N
KC53	Walmer House	523792	181189	Urban Background	Y	20	12.5	2.3	NO$_2$	N
KC54	Cromwell Rd / Natural History Museum	526522	178968	Roadside	Y	10	3.1	2.6	NO$_2$	Y - Triplicate
KC55	Blantyre Street	526608	177429	Urban Background	Y	20	100	3	NO$_2$	N
KC56	Chelsea Old Town Hall	527268	178089	Roadside	Y	14	9	3.1	NO$_2$	Y
KC57	Pavilion St/ Sloane Ave	527889	179145	Roadside	Y	25	3	2.4	NO$_2$	N
KC58	Kensington High Street / Kensington Church Street	525630	179674	Roadside	Y	1	13	2.7	NO$_2$	N
KC59	Kensington High Street / Argyll Street	525342	179464	Kerbside	Y	1	0.7	2.5	NO$_2$	N

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (N/A if not applicable) (m)	Inlet height (m)	Pollutants monitored	Tube co-located with an automatic monitor? (Y/N)
KC60	Old Brompton Road / Draycott Avenue	526231	178425	Kerbside	Y	8	0.7	2.5	NO_2	N
KC61	Fulham Road / Limerston Street	526377	177867	Roadside	Y	20	10	2.4	NO_2	N
KC64	Warwick Road	524825	178902	Roadside	Y	8	3.5	2.6	NO_2	N
KC65	Barlby Road	523899	182113	Roadside	Y	20	0.5	1.8	NO_2	N
KC66	Acklam Road	524541	181893	Railway	Y	18	16	2.5	NO_2	N
KC67	Southern Row	524056	182148	Railway	Y	55	38	2.5	NO_2	N
KC68	Exhibition Road	526863	179060	Kerbside	Y	0.5	0.5	2.1	NO_2	N
KC69	Darfield Way	523587	180893	Urban Background	Y	2	11.7	2.0	NO_2	N
KC70	Oakley Street	527170	177985	Kerbside	Y	4	0.8	2.0	NO_2	N
KC71	Oakley Street	527267	177812	Kerbside	Y	4	0.7	2.0	NO_2	N
KC72	Oakley Street	527330	177716	Kerbside	Y	4	0.8	2.0	NO_2	N
KC73	Oakley Street	527227	177918	Kerbside	Y	4	0.6	2.0	NO_2	N
KC74	Hans Road	527600	179325	Kerbside	Y	3.1	0.3	2.2	NO_2	N

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (N/A if not applicable) (m)	Inlet height (m)	Pollutants monitored	Tube co-located with an automatic monitor? (Y/N)
KC75	Basil Street	527675	179325	Kerbside	Y	3.35	0.7	2.0	NO_2	N
KC76	Basil Street	527691	179390	Kerbside	Y	3.35	0.8	2.0	NO_2	N
KC77	Lonsdale Road	524820	181065	Kerbside	Y	1.7	0.65	2.0	NO_2	N
KC78	Lonsdale Road	524762	181049	Kerbside	Y	3	0.65	2.0	NO_2	N
KC79	Cadogan Gardens	527892	178731	Kerbside	Y	1.5	0.4	2.0	NO_2	N
KC80	Pavilion Road	527917	178755	Kerbside	Y	2.3	1.24	2.0	NO_2	N
KC82	Kensington High Street LP029	524764	179139	Kerbside	Y	0.5	0.5	2.0	NO_2	N
KC83	Kensington High Street LP018	524919	179229	Kerbside	Y	0.5	0.5	2.3	NO_2	N
KC84	Kensington High Street LP011 / Earls Terrace	525002	179275	Kerbside	Y	0.5	0.5	2.0	NO_2	N
KC85	Kensington High Street LP010	525002	179277	Roadside	Y	1.0	0.5	2.0	NO_2	N
KC86	Kensington High Street LP064	525165	179355	Roadside	Y	1.0	0.5	2.0	NO_2	N
KC87	Kensington High Street LP063	525187	179369	Roadside	Y	1.0	0.5	2.3	NO_2	N
KC88	Kensington High Street LP060 / Phillimore Gardens	525219	179387	Kerbside	Y	0.5	0.5	2.0	NO_2	N

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (N/A if not applicable) (m)	Inlet height (m)	Pollutants monitored	Tube co-located with an automatic monitor? (Y/N)
KC89	Kensington High Street LP054	525291	179432	Kerbside	Y	0.5	0.5	2.0	NO_2	N
KC90	Kensington High Street / Stafford Court	525317	179448	Near Road	Y	0.5	5.0	2.0	NO_2	N
KC91	Kensington High Street LP033	525520	179571	Kerbside	Y	0.5	0.5	2.1	NO_2	N
KC92	Kensington High Street LP029	525569	179613	Kerbside	Y	0.5	0.5	2.1	NO_2	N
KC93	Kensington High Street LP025 / Derry Street	525597	179623	Kerbside	Y	0.5	0.5	2.1	NO_2	N
KC94	Kensington High Street LP014 / Young Street	525719	179694	Roadside	Y	0.5	1.0	2.1	NO_2	N
KC95	Kensington High Street LP008 / Kensington Palace Gardens	525786	179717	Kerbside	Y	0.5	0.3	2.0	NO_2	N
KC96	Kensington High Street LP002	525860	179707	Roadside	Y	0.5	1.0	2.0	NO_2	N
KC97	Kensington High Street LP007	525810	179710	Roadside	Y	0.3	0.5	2.0	NO_2	N
KC98	Kensington High Street LP011 / Old Court Place	525755	179687	Kerbside	Y	0.5	0.5	2.0	NO_2	N
KC99	Kensington High Street LP022	525644	179639	Kerbside	Y	0.5	0.5	2.1	NO_2	N

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (N/A if not applicable) (m)	Inlet height (m)	Pollutants monitored	Tube co-located with an automatic monitor? (Y/N)
KC100	Kensington High Street LP032 / High Street Station	525550	179572	Kerbside	Y	0.5	0.5	2.3	NO_2	N
KC101	Kensington High Street LP034 / High Street Station	525523	179552	Kerbside	Y	0.5	0.5	2.1	NO_2	N
KC102	Kensington High Street LP037 / Wrights Lane	525486	179529	Roadside	Y	0.5	1.0	2.1	NO_2	N
KC103	Kensington High Street / Three	525411	179478	Near Road	Y	0.5	5.0	2.5	NO_2	N
KC104	Kensington High Street LP051 / Allen Street	525327	179434	Kerbside	Y	0.5	0.5	2.1	NO_2	N
KC105	Kensington High Street LP059 / Abingdon Road	525239	179379	Kerbside	Y	0.5	0.5	2.1	NO_2	N
KC106	Kensington High Street LP062	525197	179353	Kerbside	Y	0.5	0.5	2.0	NO_2	N
KC107	Kensington High Street LP002 / Earls Court Road	525132	179314	Roadside	Y	1.0	1.5	2.0	NO_2	N
KC108	Kensington High Street LP009 / Earls Court Road	525034	179273	Kerbside	Y	0.5	0.5	2.0	NO_2	N
KC109	Kensington High Street LP015 / Melbury Road	524957	179233	Kerbside	Y	0.5	0.5	2.0	NO_2	N
KC110	Kensington High Street LP021 / Melbury Road	524888	179186	Roadside	Y	0.5	1.0	2.0	NO_2	N
KC111	Kensington High Street LP028	524797	179132	Kerbside	Y	0.5	0.5	2.0	NO_2	N

2.3   Non-Automatic C$_6$H$_6$ Monitoring Stations

There has been no change to the number of C$_6$H$_6$ (BTEX) diffusion tube monitoring sites within the Non-Automatic Monitoring Network. Further details on the laboratory, method, bias adjustment, and quality control are in Appendix A. Figure 5 below shows the locations of all the automatic monitoring stations within the borough and detailed information about each is contained in Table E.

Figure 5. Locations of Non-Automatic C$_6$H$_6$ Monitoring Sites
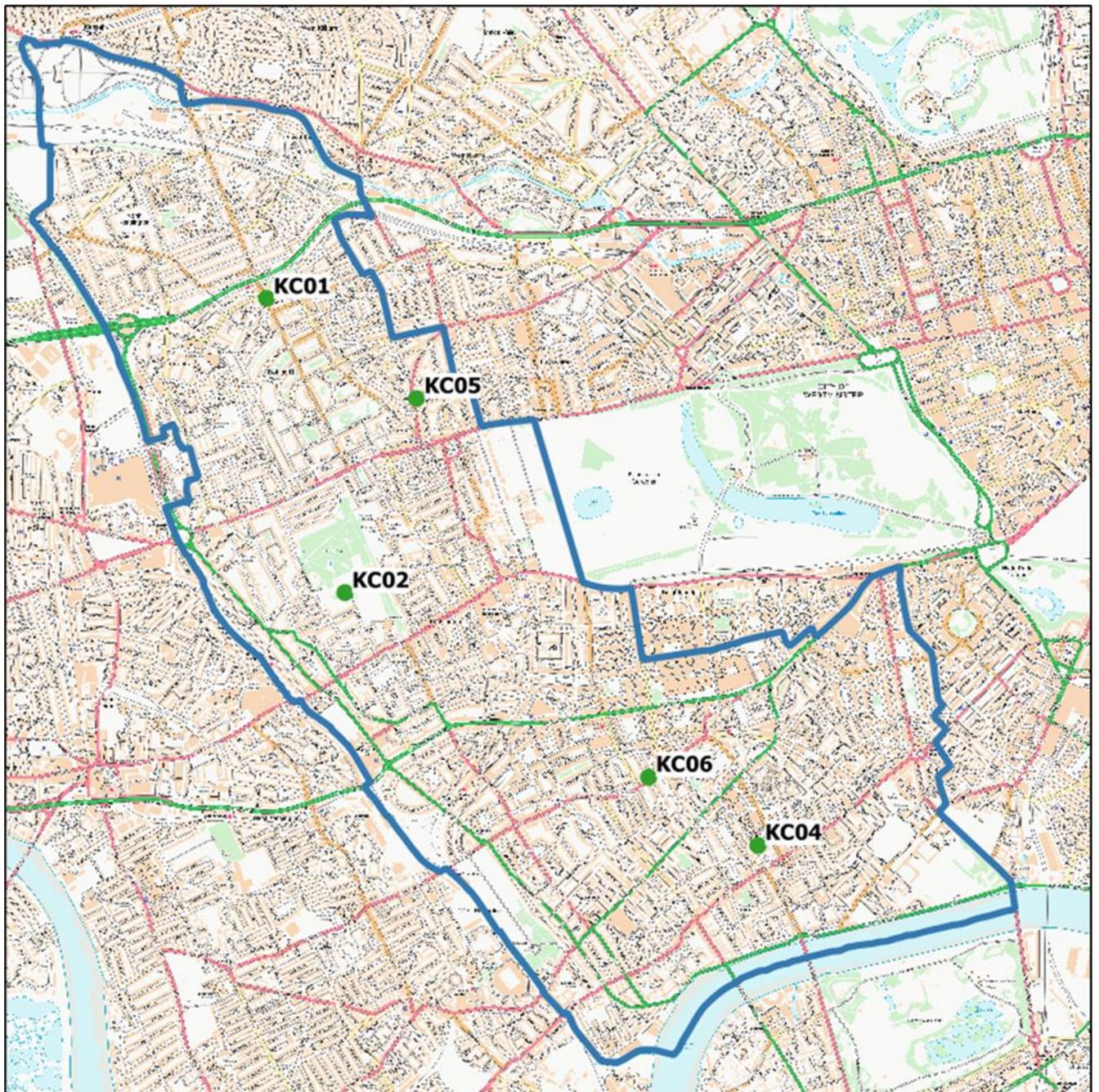
Table E.   Details of BTEX Non-Automatic Monitoring Sites for 2021

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Inlet Height (m)	Pollutants Monitored	Monitoring Technique
KC01	Ladbroke Grove / North Kensington Library	524342	181271	Roadside	Y	6	3.5	5.5	C_6H_6	N
KC02	Holland Park	524784	179599	Urban Background	Y	5	380	4	C_6H_6	N
KC03	Dovehouse Street	527111	178165	Urban Background	Y	30	45	2.2	C_6H_6	N
KC04	Pembridge Square Library	525191	180705	Roadside	Y	9	6	4	C_6H_6	N
KC05	Old Brompton Rd/ Clareville Grove Petrol St	526496	178553	Petrol Station	Y	3	12	N/A	C_6H_6	N

2.4   Comparison of Monitoring Results with AQOs

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. Figures 6-10 display the results graphically.

Table F.   Annual Mean NO$_2$ Ratified and Bias-adjusted Monitoring Results

Site ID	Site type	Valid data capture for monitoring period %[a]	Valid data capture 2021 %[b]	Bias Adjusted and Annualised Data						2021[c] Raw	2021[c] Bias Adjusted & Annualised	2021 (Distance Corrected)
				2015	2016	2017	2018	2019	2020			
KC1	Urban Background	99.44	99.44	32	35	33	29.1	27.38	21	20	N/A	N/A
KC2	Roadside	99.53	99.53	**55**	**58**	**51**	**47.6**	**43.73**	30	30	N/A	N/A
KC3	Kerbside	99.16	99.16	**71**	**80**	**66**	**66.4**	**54.41**	32	34	N/A	N/A
KC4	Roadside	97.96	97.96	**73**	**78**	**63**	59.6	54.98	**40**	39	N/A	39
KC5	Kerbside	96.71	96.71	**91**	**86**	**78**	**78.7**	**55.94**	37	**44**	N/A	38.1
KC31	Roadside	100	100	**49.26**	**55.50**	**52.2**	**42.8**	**42.6**	31.8	32.8	27.3	N/A
KC32	Urban Background	100	100	27.49	29.9	31.5	26.2	23.8	17.2	19.2	15.9	N/A
KC33	Roadside	91.6	91.6	**84.45**	**104.5**	**106.1**	**84.0**	**71.6**	**50.5**	**52.8**	**43.8**	**42.2**
KC34	Urban Centre	100	100	**40.76**	**43.7**	**43.7**	39.0	36.3	26.5	28.3	23.4	N/A
KC35	Roadside	75	75	**75.68**	**80.7**	**77.9**	**58.5**	**56.0**	38.0	**42.0**	34.8	N/A
KC38	Roadside	100	100	**99.0**	**101.0**	**119.2**	**75.8**	**70.3**	**47.1**	**49.4**	**41.0**	**40.0**
KC39	Roadside	100	100	32.5	38.5	34.7	30.6	29.2	22.9	27.3	22.7	N/A
KC40	Urban Centre	100	100	**41.6**	**45.1**	-	32.5	32.0	22.9	25.8	21.4	N/A
KC41	Urban Background	100	100	34.6	38.2	37.7	32.2	30.5	22.4	25.2	20.9	N/A
KC42	Roadside	100	100	**41.2**	**46.2**	**45.4**	38.4	34.5	24.5	24.4	20.3	N/A
KC43	Urban Background	100	100	34.2	36.2	36.6	30.0	29.9	22.4	25.6	21.2	N/A
KC44	Urban Background	100	100	39.6	**46.1**	**41.0**	35.5	33.1	24.0	30.7	25.5	N/A
KC45	Roadside	100	100	**48.6**	**52.6**	**50.3**	**44.9**	**41.9**	28.8	26.6	22.1	N/A

Site ID	Site type	Valid data capture for monitoring period %[a]	Valid data capture 2021 %[b]	Bias Adjusted and Annualised Data						2021[c] Raw	2021[c] Bias Adjusted & Annualised	2021 (Distance Corrected)
				2015	2016	2017	2018	2019	2020			
KC47	Urban Background	100 / 100 / 100	100 / 100 / 100	27.5	34.2	33.3	27.7	27.2	20.52	22.5	18.6	N/A
KC48	Roadside	100	100	63.0	72.3	71.8	58.4	49.9	41.6	44.1	36.6	36.3
KC49	Urban Centre	100	100	69.7	87.5	- e	- e	59.9	39.1	44.2	36.7	36.4
KC50	Roadside	100	100	48.2	56.4	52.7	41.0	45.9	28.5	32.0	26.6	N/A
KC51	Urban Background	91.6	91.6	31.6	36.2	39.5	27.7	31.4	27.0	21.3	17.7	N/A
KC52	Roadside	100	100	52.9	64.5	56.1	49.4	39.4	30.7	34.3	28.5	N/A
KC53	Urban Background	100	100	42.6	47.0	49.0	40.7	38.0	28.6	30.0	24.9	N/A
KC54	Roadside	100 / 100 / 100	100 / 100 / 100	62.9	72.5	70.9	57.3	48.8	36.6	38.6	32.0	N/A
KC55	Urban Background	100	100	35.5	49.0	48.0	40.5	37.5	26.4	29.0	24.0	N/A
KC56	Roadside	100	100	63.7	72.7	68.0	59.9	51.2	40.0	44.0	36.5	34.7
KC57	Roadside	100	100	43.6	56.2	57.2	47.1	42.8	27.0	31.6	26.2	N/A
KC58	Roadside	83.3	83.3	50.9	59.7	62.7	48.0	46.0	36.9	36.2	30.0	N/A
KC59	Kerbside	100	100	70.3	79.0	74.9	66.5	59.2	52.2	47.9	39.8	38.4
KC60	Kerbside	100	100	61.2	73.1	71.3	51.8	50.9	34.1	35.4	29.3	N/A
KC61	Roadside	100	100	51.5	61.0	52.3	45.2	43.6	33.4	36.1	29.9	N/A
KC64	Roadside	100	100	50.6	58.3	46.5	42.5	41.6	33.0	35.9	29.8	N/A
KC65	Roadside	100	100	33.1	41.3	40.9	34.5	33.2	24.6	25.8	21.4	N/A
KC66	Railway	100	100	34.4	55.8	46.2	38.5	33.6	27.3	26.6	22.1	N/A
KC67	Railway	91.6	91.6	36.2	45.1	46.0	36.8	35.3	25.6	27.4	22.7	N/A
KC68	Kerbside	100	100	44.6	51.0	51.9	42.1	39.1	30.7	29.4	24.4	N/A
KC69	Urban Background	100	100	39.3	46.1	47.1	35.8	37.0	24.0	35.2	29.2	N/A
KC70	Kerbside	100	100	-	-	-	55.5	50.1	36.8	34.2	28.4	N/A

Site ID	Site type	Valid data capture for monitoring period %[a]	Valid data capture 2021 %[b]	Bias Adjusted and Annualised Data						2021[c] Raw	2021[c] Bias Adjusted & Annualised	2021 (Distance Corrected)
				2015	2016	2017	2018	2019	2020			
KC71	Kerbside	100	100	-	-	-	**44.0**	**41.6**	30.8	38.5	32.0	N/A
KC72	Kerbside	100	100	-	-	-	**59.6**	**51.5**	35.7	33.0	27.4	N/A
KC73	Kerbside	91.6	91.6	-	-	-	**44.0**	**41.2**	30.2	29.6	24.6	N/A
KC74	Kerbside	100	100	-	-	-	-	38.8	27.8	34.4	28.5	N/A
KC75	Kerbside	92.3	92.3	-	-	-	-	**48.9**	30.9	**40.3**	33.5	N/A
KC76	Kerbside	91.6	91.6	-	-	-	-	**46.2**	30.4	26.2	21.8	N/A
KC77	Kerbside	100	100	-	-	-	-	30.4	23.3	25.8	21.4	N/A
KC78	Kerbside	100	100	-	-	-	-	30.4	25.5	27.7	23.0	N/A
KC79	Kerbside	100	100	-	-	-	-	34.1	25.6	26.0	21.6	N/A
KC80	Kerbside	91.6	91.6	-	-	-	-	35.8	22.0	25.3	21.0	N/A
KC82	Kerbside	100	100	-	-	-	-	-	38.2	**46.9**	38.9	38.0
KC83	Kerbside	100	100	-	-	-	-	-	**-**	46.3	38.4	37.6
KC84	Kerbside	100	100	-	-	-	-	-	**44.6**	**54.9**	**45.6**	**43.8**
KC85	Roadside	100	100	-	-	-	-	-	**41.8**	**46.0**	38.2	36.9
KC86	Roadside	100	100	-	-	-	-	-	36.8	**42.0**	34.9	N/A
KC87	Roadside	91.6	91.6	-	-	-	-	-	38.6	**46.6**	38.6	37.2
KC88	Kerbside	100	100	-	-	-	-	-	**42.0**	**46.6**	38.7	37.8
KC89	Kerbside	100	100	-	-	-	-	-	**50.4**	**61.8**	**51.3**	**48.8**
KC90	Near Road	91.6	91.6	-	-	-	-	-	**-**	**53.6**	**44.5**	**44.1**
KC91	Kerbside	100	100	-	-	-	-	-	**52.4**	**59.3**	**49.3**	**47.1**
KC92	Kerbside	100	100	-	-	-	-	-	**-**	**51.2**	**42.5**	**41.1**
KC93	Kerbside	100	100	-	-	-	-	-	**43.0**	**56.9**	**47.3**	**45.3**
KC94	Roadside	91.6	91.6	-	-	-	-	-	37.4	**53.0**	**44.0**	**43.0**
KC95	Kerbside	91.6	91.6	-	-	-	-	-	**44.8**	**56.9**	**47.2**	**44.7**
KC96	Roadside	66.6	66.6	-	-	-	-	-	**-**	**45.5**	**41.1**	**40.3**
KC97	Roadside	83.3	83.3	-	-	-	-	-	**45.7**	**51.1**	**42.4**	**41.5**
KC98	Kerbside	91.6	91.6	-	-	-	-	-	**46.3**	**53.9**	**44.7**	**43.1**

Site ID	Site type	Valid data capture for monitoring period %[a]	Valid data capture 2021 %[b]	Bias Adjusted and Annualised Data						2021[c] Raw	2021[c] Bias Adjusted & Annualised	2021 (Distance Corrected)
				2015	2016	2017	2018	2019	2020			
KC99	Kerbside	100	100	-	-	-	-	-	**46.4**	**54.5**	**45.3**	**43.5**
KC100	Kerbside	100	100	-	-	-	-	-	**50.3**	**50.5**	**41.9**	**40.6**
KC101	Kerbside	100	100	-	-	-	-	-	**49.1**	**51.3**	**42.6**	**41.2**
KC102	Roadside	100	100	-	-	-	-	-	**44.7**	**52.0**	**43.1**	**42.1**
KC103	Near Road	83.3	83.3	-	-	-	-	-	-	39.1	32.4	N/A
KC104	Kerbside	83.3	83.3	-	-	-	-	-	**44.6**	**44.8**	37.1	36.3
KC105	Kerbside	91.6	91.6	-	-	-	-	-	**40.4**	**47.8**	39.7	38.6
KC106	Kerbside	100	100	-	-	-	-	-	**42.3**	**45.9**	38.1	37.2
KC107	Roadside	100	100	-	-	-	-	-	35.0	**43.7**	36.3	35.6
KC108	Kerbside	100	100	-	-	-	-	-	31.7	37.3	31.0	N/A
KC109	Kerbside	91.6	91.6	-	-	-	-	-	36.9	**42.7**	35.5	N/A
KC110	Roadside	100	100	-	-	-	-	-	34.4	**40.6**	33.7	N/A
KC111	Kerbside	100	100	-	-	-	-	-	34.6	38.3	31.8	N/A

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.

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%.

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%).

2.5   Interpretation of Annual Mean NO$_2$ Results

In 2020 we reported that all of the automatic monitoring sites met the annual mean NAQO and WHO 2005 guideline value. In 2021 however, KC5 (Earl's Court), just exceeded it (see Figure 6 below). The following 12 locations saw small to medium increases in the bias adjusted and annualised NO$_2$ concentration between 2020 and 2021.

Table G.   Sites with an increased NO$_2$ Bias Adjusted and Annualised Concentration in 2021

Site ID	Site Type	2020 (µg m^3)	2021 (µg m^3)	Difference (µg m^3)
KC44	Urban Background	24.0	25.5	+ 1.5
KC69	Urban Background	24.0	29.2	+ 5.2
KC71	Kerbside	30.8	32.0	+ 1.2
KC74	Kerbside	27.8	28.5	+ 0.7
KC75	Kerbside	30.9	33.5	+ 2.6
KC82	Kerbside	38.2	38.9	+ 0.7
KC84	Kerbside	44.6	45.6	+ 1.0
KC89	Kerbside	50.4	51.3	+ 0.9
KC93	Kerbside	43.0	47.3	+ 4.3
KC94	Kerbside	37.4	44.0	+ 6.6
KC95	Kerbside	44.8	47.2	+ 2.4
KC107	Roadside	35.0	36.3	+ 1.3

The most notable reduction in concentrations were identified at the following locations;

Table H.   Sites with a decreased NO$_2$ Bias Adjusted and Annualised Concentration in 2021

Site ID	Site Type	2020 (µg m^3)	2021 (µg m^3)	Difference (µg m^3)
KC59	Kerbside	52.2	39.8	- 12.4
KC104	Kerbside	44.6	35.5	- 9.1
KC51	Urban Background	27	17.7	- 9.3
KC76	Kerbside	30.4	21.8	- 8.6
KC100	Kerbside	50.3	41.9	- 8.4

When compared to the Air Quality Objectives (AQO) and WHO Guideline Values, no new long-term monitoring locations breached the annual mean objective of 40 µg/m^3. Of the diffusion tubes, only two long term monitoring sites KC33 (Earl's Court/Cromwell Road) and KC38 (Earl's Court) (after bias adjustment and annualisation) continued to exceed the Annual Mean Objective, a reduction from 2020 which saw five long term monitoring sites breach the objective.

Of the more recently installed Kensington High Street monitoring locations, seven recorded an increase in Annual Mean NO$_2$ concentrations. This is likely to be, in part, due to the relaxing of COVID restrictions, increase in transport and greater data capture for the locations throughout the monitoring year. The concentrations will be kept under review; however it would be difficult to identify a trend at this stage as more data is required.

Figure 6. Annual Mean NO$_2$ Concentrations (2014-2021): Automatic Monitoring Stations
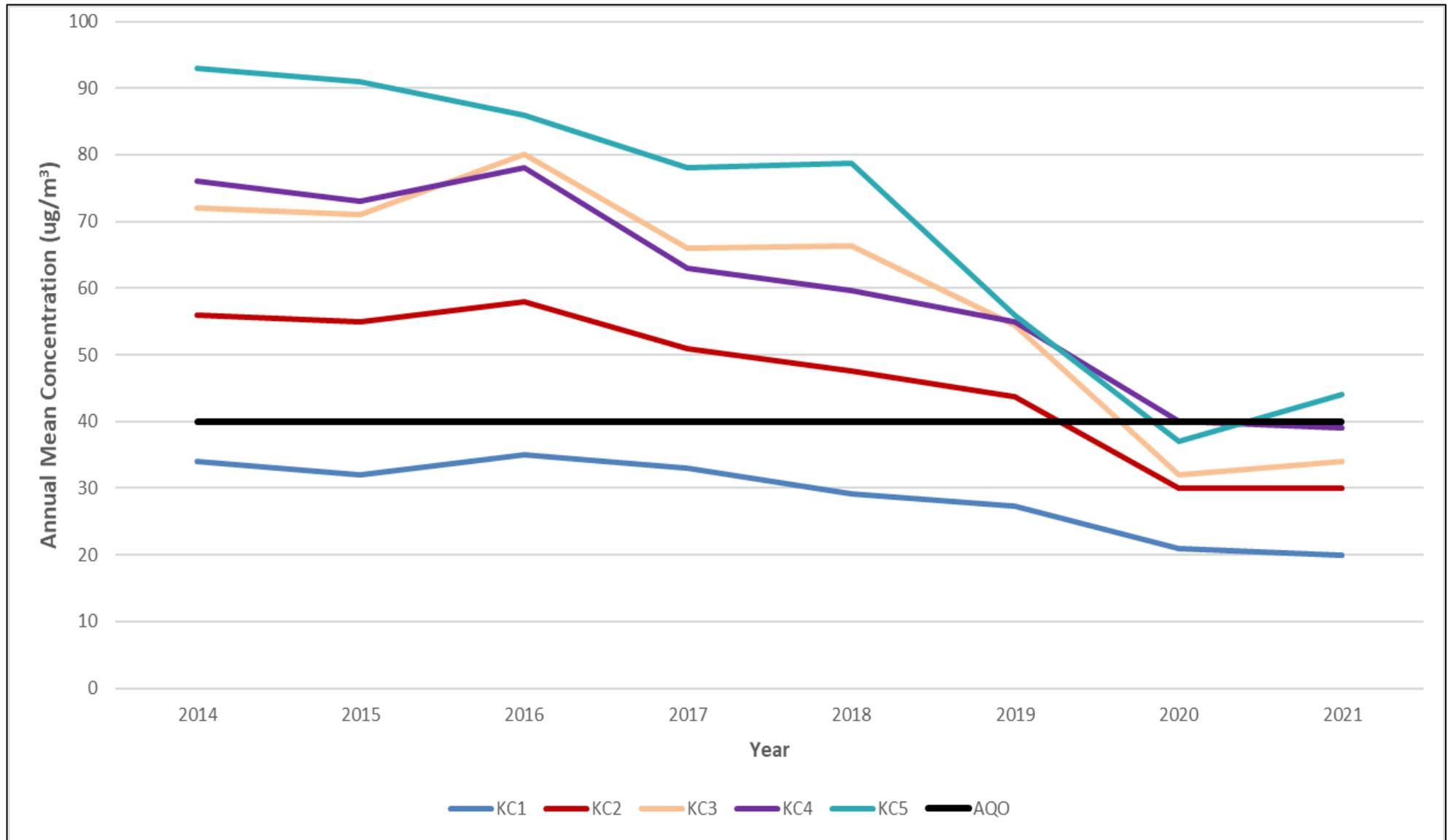
Figure 7. Annual Mean NO₂ Concentrations: Roadside Monitoring Locations
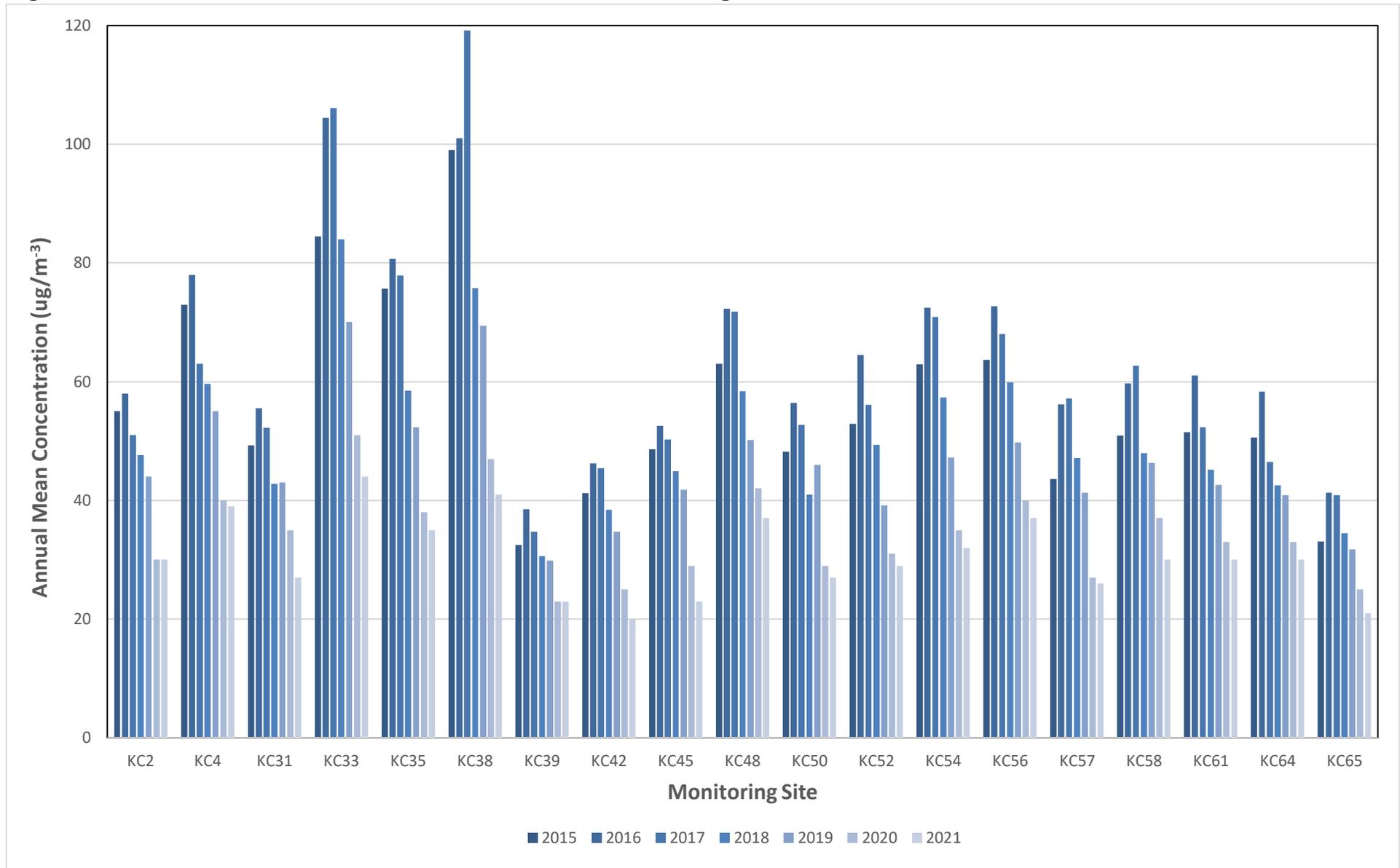
Figure 8.   **Annual Mean NO₂ Concentrations: Kerbside Monitoring Locations**
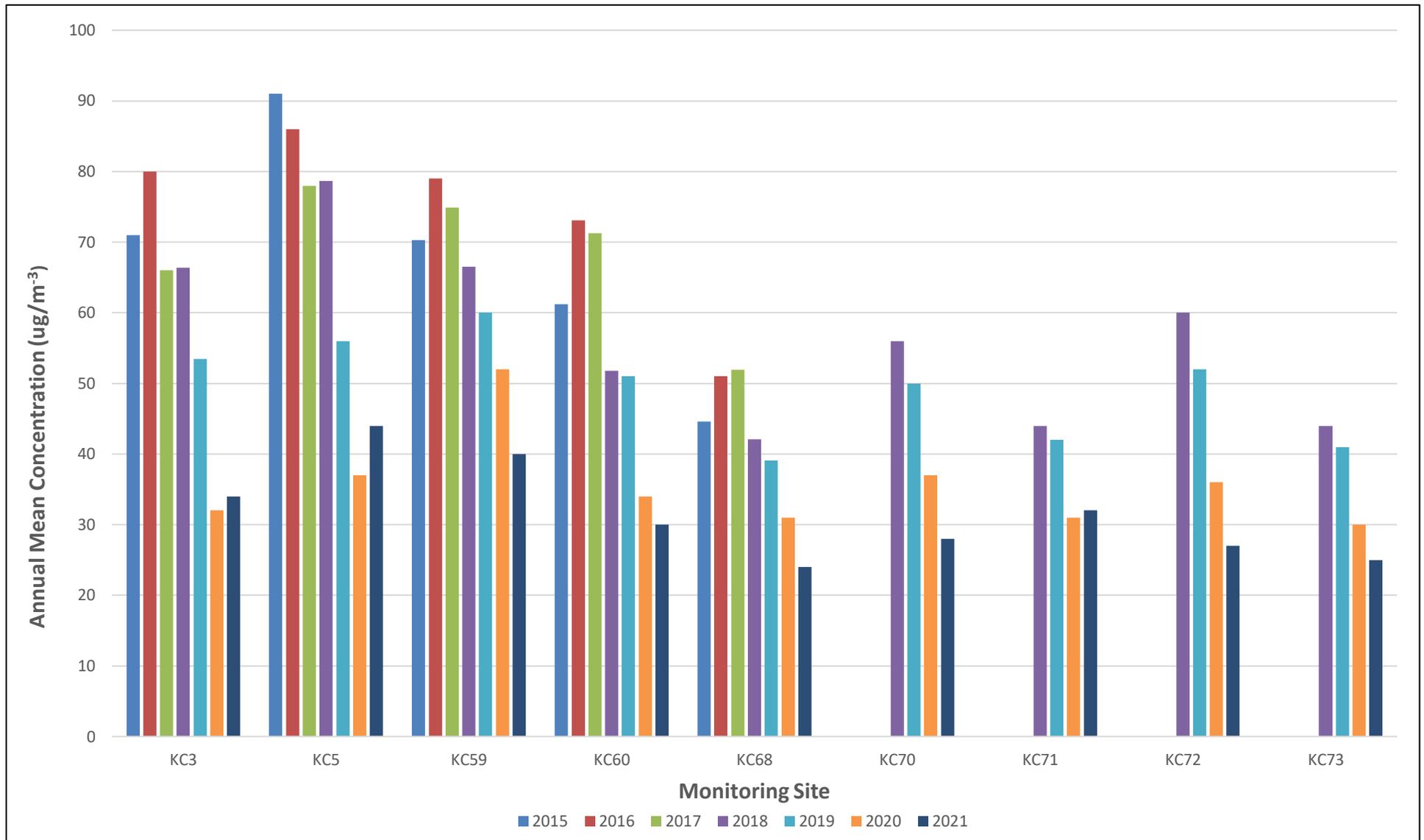
Figure 9.   Annual Mean NO$_2$ Concentrations: Urban Background and Urban Centre Locations
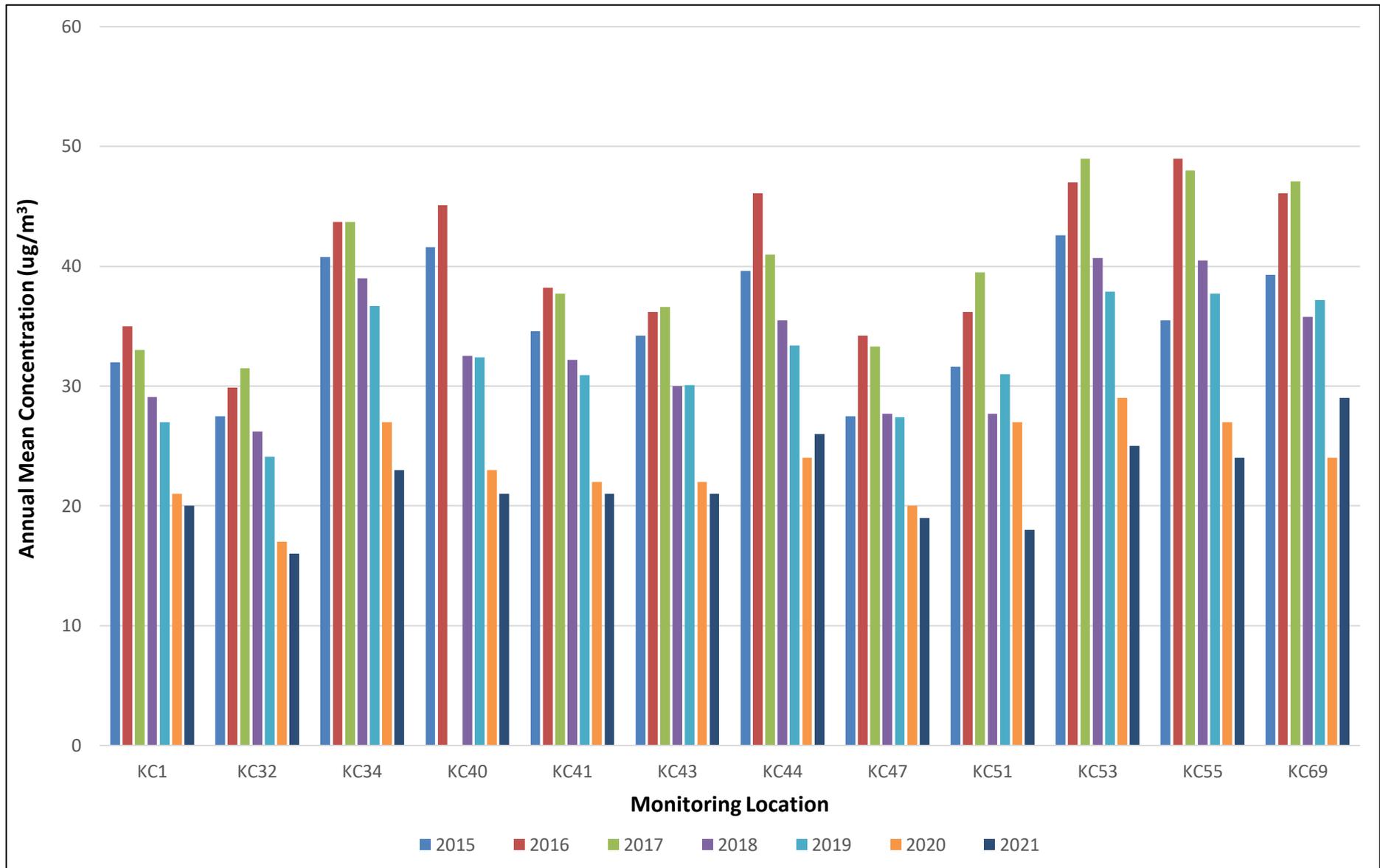
Figure 10.   Annual Mean NO$_2$ Concentrations: Railway Monitoring Locations
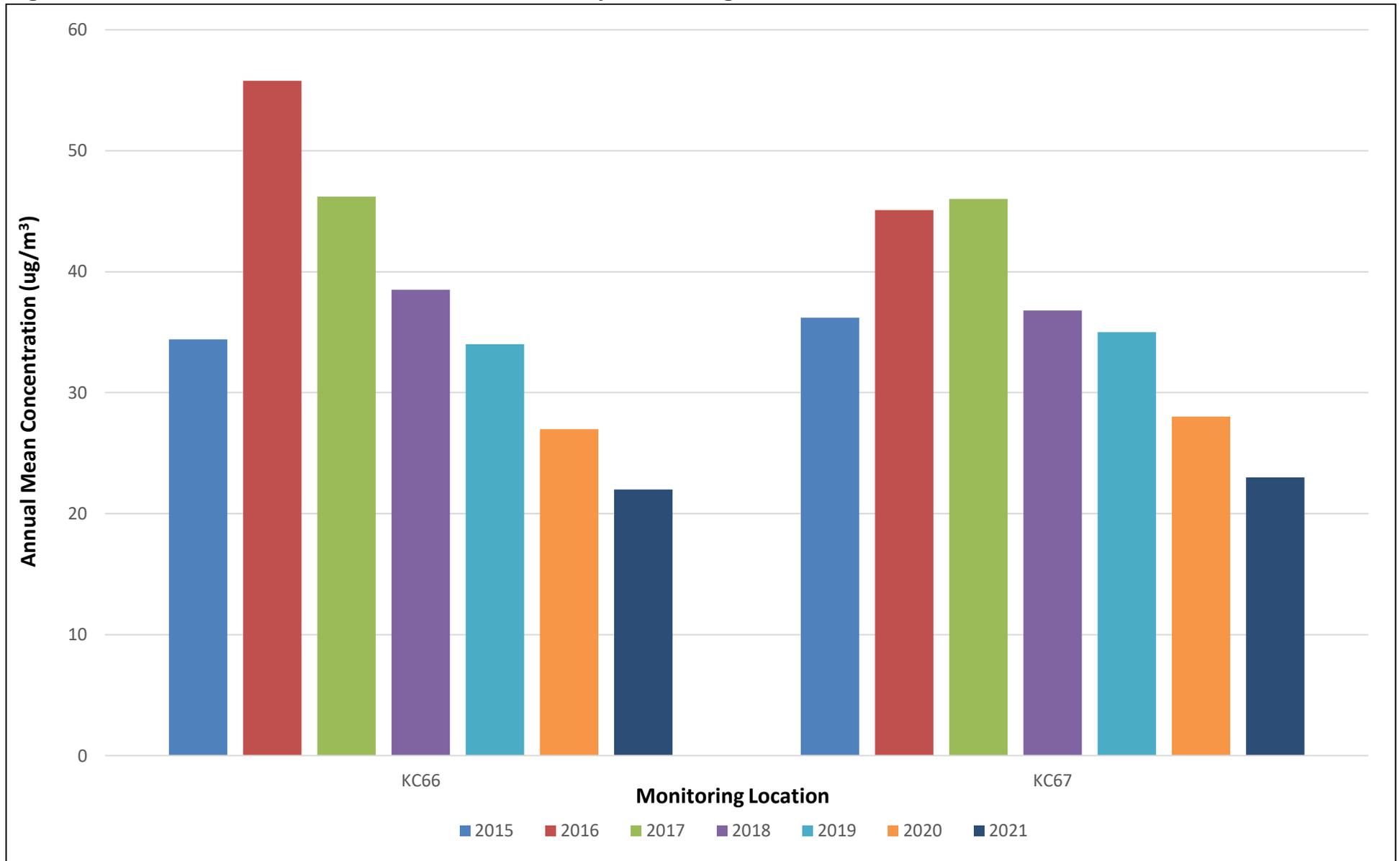
Table I. NO₂ Automatic Monitoring Results: Comparison with 1-hour Mean Objective, Number of 1-Hour Means > 200 μg m³

Site ID	Valid data capture for monitoring period %(ᵃ)	Valid data capture 2021 %(ᵇ)	2015	2016	2017	2018	2019	2020	2021
KC1	99.44	99.44	0	0	1	0	0	0	0
KC2	99.53	99.53	0 (1197)	1	0	0	0	0	0
KC3	99.16	99.16	**97**	**262**	**92**	**43**	15	3	0
KC4	97.96	97.96	9	**54**	4	0	0	0	0
KC5	96.71	96.71	**135**	**120**	**24**	**29**	2	0	0

Notes

Results are presented as the number of 1-hour periods where concentrations greater than 200 μg m³ have been recorded.

Exceedance of the NO₂ short term AQO of 200 μg m³ 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%).

2.6   Interpretation of NO₂ Automatic 1-Hour Mean Objective Results

Compliance with the AQO NO₂ 1-hour mean objective of 200 μg/m³ (not to be exceeded more than 18 times in a year) was achieved at all five automatic monitoring locations during 2021 with no exceedances at all. This is the third year within the seven years of data presented that all locations have achieved compliance with this AQO. KC3 and KC5 had previously exceeded the AQO every year for the period 2015-2018.

The WHO Guidelines also suggest a 1-Hour Objective of 200 μg/m³; however, this is not allowed to be exceeded more than once. In this case all monitoring locations have met the objective. KC1 and KC2 have remained at a consistent number throughout the seven-year period with fewer than five 1-hour NO₂ mean Concentrations in excess of 200 μg/m³ for each year.

Figure 10 overleaf presents the number of 1-hour means in excess of the AQO for the period of 2014-2020. For KC2 in 2015, the actual number of 1-hour means in excess of the AQO have been plotted rather than the 99.8th percentile value, due to the data capture being low (51.2%). As a result of this, at KC2 in 2015, there may have been further exceedances experienced which were not recorded. At KC3, KC4 and KC5, there has been an overall downward trend in concentrations between 2015 to 2020. KC1

and KC2 have remained at a consistent number throughout the seven-year period with only two 1-hour NO_2 mean concentrations in excess of 200 μg/m^3 for each year.

Figure 11.   Number of NO₂ 1-Hour Means > 200 μg/m^3
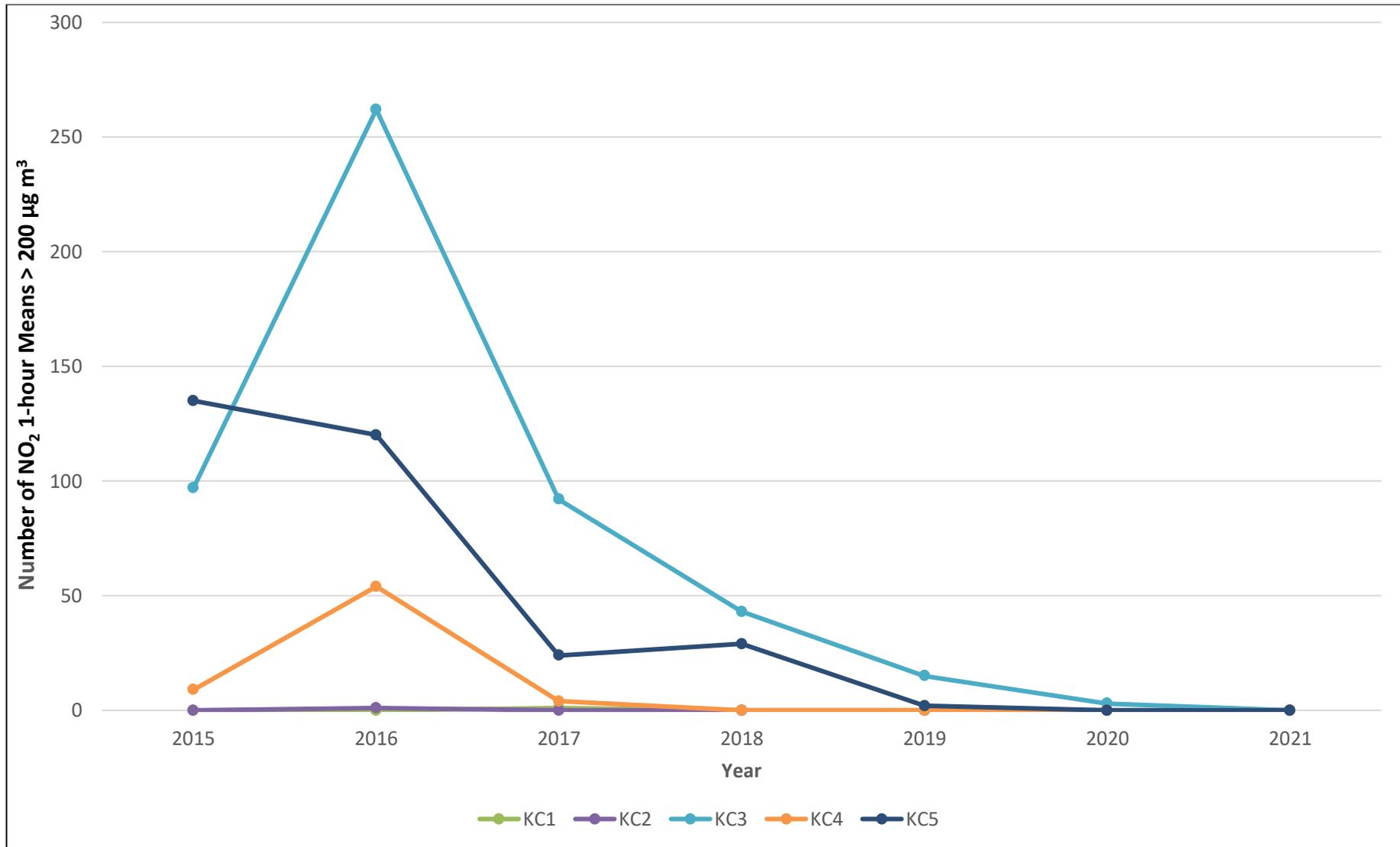
Table J.   Annual Mean PM$_{10}$ Automatic Monitoring Results (µg m^3)

Site ID	Valid data capture for monitoring period %(a)	Valid data capture 2021 %(b)	2015	2016	2017	2018	2019	2020	2021
KC1	99.64	99.64	20	20	17	14	15	13	13
KC2	88.75	59.16	23	22	20	18	-	-	17
KC5	92.20	92.20	27	28	27	25	24	24	25

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 was carried out for six months the maximum data capture for the full calendar year would be 50%).

2.7   Interpretation of Annual Mean PM$_{10}$ Results

Figure 11 presents the annual mean PM$_{10}$ concentrations for the period of 2015-2021 for KC1, KC2 (in part) and KC5. It can be seen that there has been a small gradual decline in concentrations at KC5 between 2014 and 2020 but concentrations plateaued between 2010 and 2020 and rose by 1 µg/m^3 in 2021. The concentrations at KC1 have remained more stable across the period. This is in contrast to the reductions that occurred with concentrations of NO$_2$ in 2021.

Overall, compliance with the PM$_{10}$ annual mean AQO (40 µg/m^3) continued to be achieved at all monitoring sites (as it did 2014-2020). In addition to this, the lowest annual mean concentration in recent monitoring history (2014-2020) was reported at KC1 (shown by the green line below in Figure 12). It should be noted that there was only 60% data capture at KC2 in 2021 as the monitor was only installed in May 2021, no data in 2020 and less than 5% in 2019 due to the instrument malfunction, so beyond 2018 it is not possible to comment on trends. The WHO Guidelines suggest a max value of 20 µg/m^3 for the PM$_{10}$ annual mean, with this in mind KC1 would have met the objective for a fifth year in a row while KC5 is still to reach this level.

Figure 12.   Annual Mean PM$_{10}$ Automatic Monitoring Results

Table K. 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 2021 %[b]	2015	2016	2017	2018	2019	2020	2021
KC1	99.64	99.64	7	10	16	1	5	0	1
KC2	88.75	59.16	4	8	6	0	-	-	1
KC5	92.20	92.20	15	19	18	4 (33.2)	13	10	6

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%).

2.8   Interpretation of PM$_{10}$ 24-Hour Mean Objective Results

Compliance of the PM$_{10}$ short term AQO was achieved at all monitoring locations for 2015-2021. There was one exceedence of the 24 hour mean at KC1 and KC2 in 2021 and while there were 6 at KC5, this is lower than the permitted 35 and the lowest number ever recorded within a year at this site.

The WHO Guidelines suggest a value of 50 µg/m^3 for the PM$_{10}$ 24-Hour Mean, however this is not allowed to be exceeded more than once. With regards to the WHO Guideline value KC5 would not have met this objective.

Figure 13 displays the number of daily means in excess of the short term PM$_{10}$ AQO across the monitoring sites for the period of 2015-2021.

Figure 13.   Number of PM$_{10}$ Daily Means > 50 μg/m³
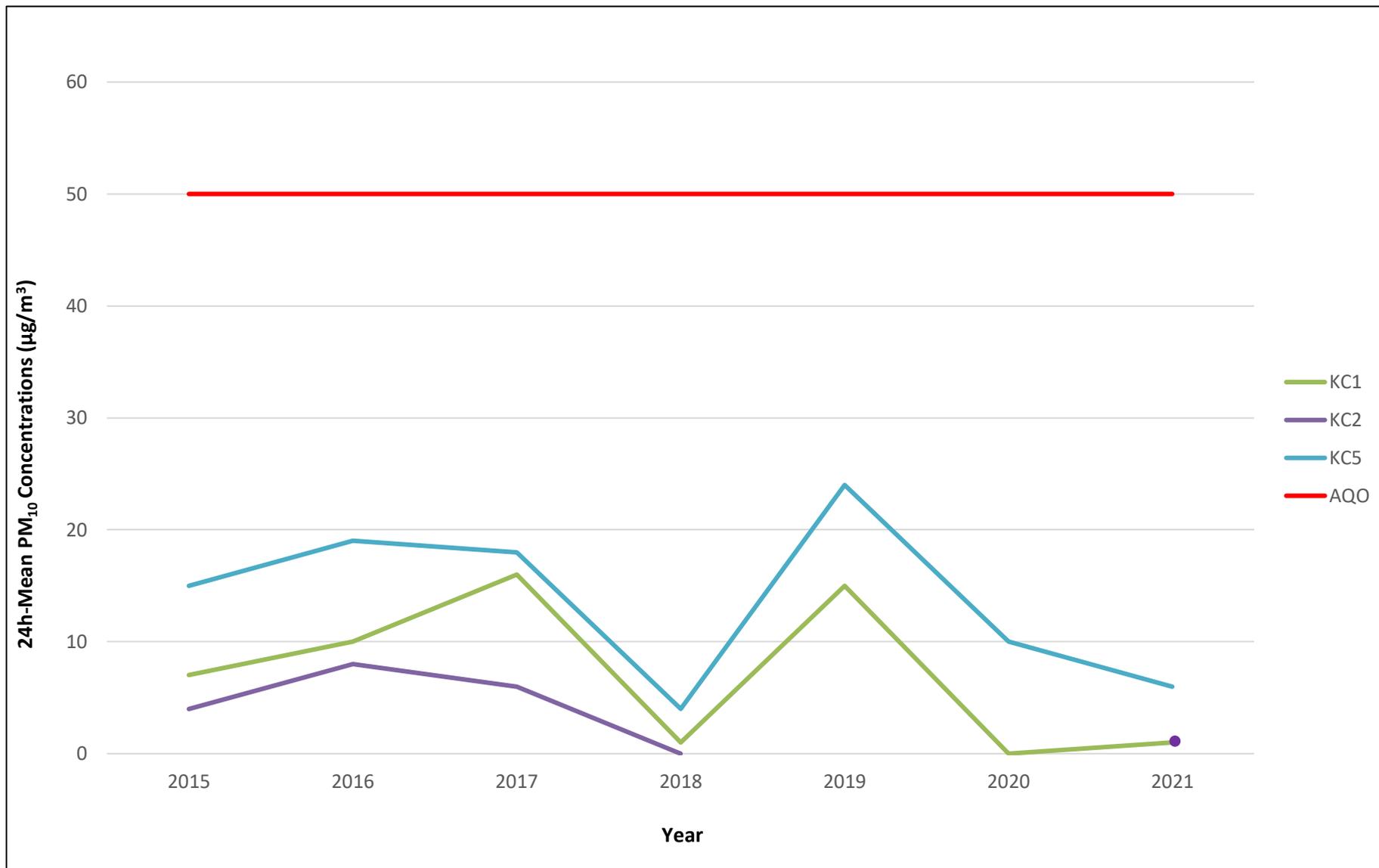
Table L.   Annual Mean PM$_{2.5}$ Automatic Monitoring Results (µg m^3)

Site ID	Valid data capture for monitoring period %[a]	Valid data capture 2021 %[b]	2015	2016	2017	2018	2019	2020	2021
KC1	99.32	99.32	10.9	12.1	12.0	9.2	10	8	9
KC2	91.25	60.54	14.7[c]	17.4[c]	17[c]	-	-	-	6

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%).

(c) Data for 2015, 2016 and 2017 was captured via a FDMS monitor.

2.9   Interpretation of Annual Mean PM$_{2.5}$ Results

Compliance with the PM$_{2.5}$ annual mean NAQO of 25 µg/m^3 was achieved at KC1 during 2021 and the previous six years (2015-2021), although it saw a marginal increase of 1 µg/m^3. The 2005 WHO annual mean Guideline Value is 10 µg/m^3, which KC1 would have met since 2018. Prior to 2015, in 2013 and 2014, the annual mean was 15 and 16 µg/m^3 respectively, so concentrations have reduced significantly since then.

Previously PM$_{2.5}$ monitoring has been undertaken at KC2, however due to an instrument fault, the FDMS that was removed from site in October 2017. Following the removal of equipment, the Council agreed upon a temporary hire agreement to ensure the continuation of PM$_{2.5}$ monitoring; however, this data has not yet been made available. A permanent replacement instrument has now been purchased and the cabin replaced. The new instrument was installed in May 2021 and as such has only achieved 60% data capture for the year. An annual mean at KC2 has been calculated, however due to data capture being less than 75% for the year, it should be treated with caution and is unlikely to truly represent the conditions at site for the year.

Since the upgrade of the PM$_{2.5}$ monitor to a BAM instrument the concentrations registered at KC2 have been consistently lower than those at the background site KC1. This is possibly due to the difference in analyser type from a FIDAS to a BAM. Both

instruments are MCERTS accredited and operate slightly different systems. FIDAS instruments measure 15 minute averaging periods and do not send any data below and including 0, whereas BAM instruments sample hourly and have a negative detection limit of -6.

Due to the BAM having a negative detection limit this will result in some slightly lower readings within the daily figures which will reduce the daily average pollution level, which is exacerbated by the hourly sampling. The data at KC2 does generally peak higher than KC1, however it also has data that drops lower as well.

The BAM has passed quality and maintenance audits so the analyser is operating well. We will keep an eye on the data and continue to review it on a regular basis.

Figure 14 overleaf presents KC1 concentrations between 2015 and 2021. KC2 will be added following further monitoring and once a trend can be identified.

Figure 14.   Annual Mean PM₂.₅ Automatic Monitoring Results
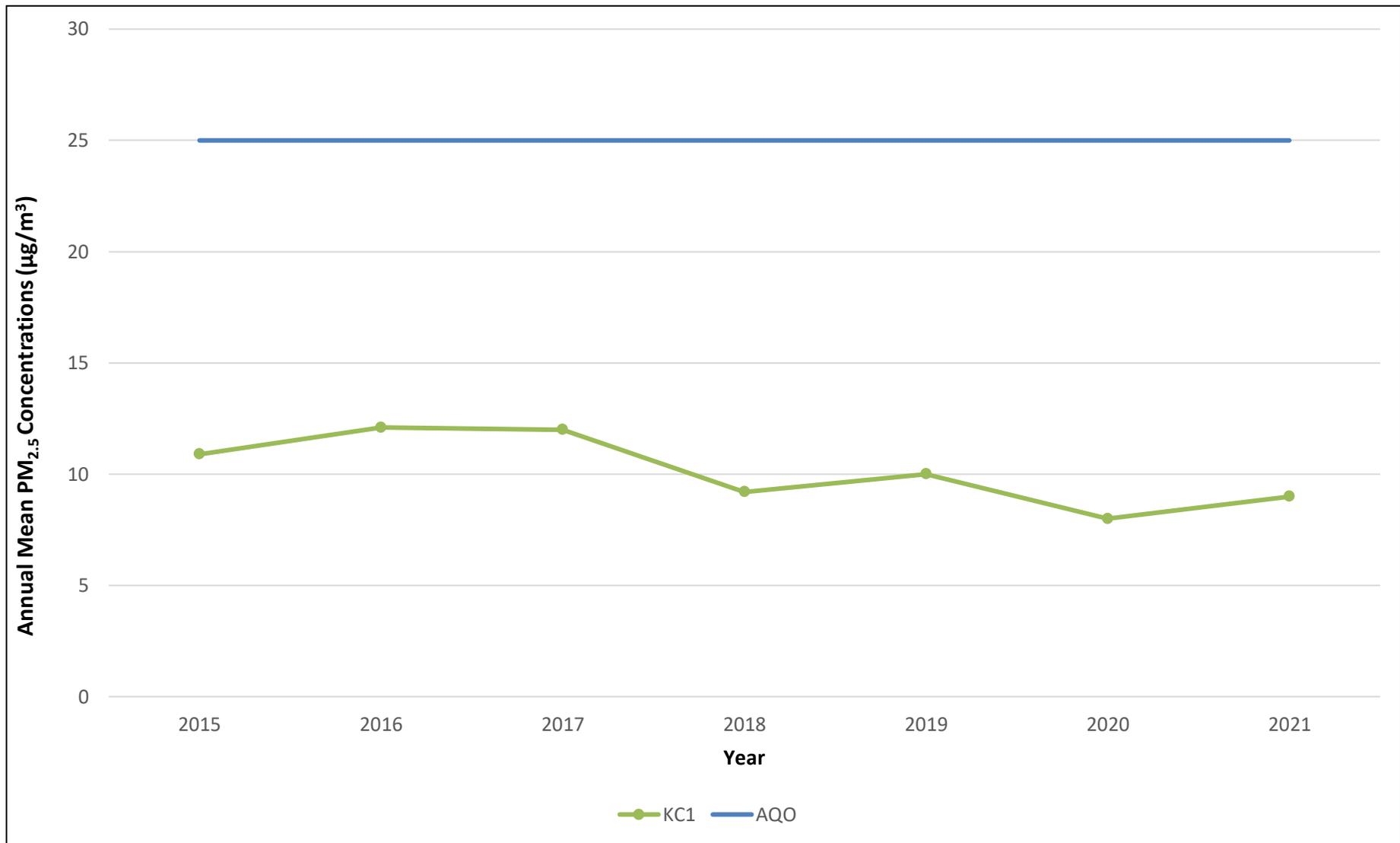
Table M.   2021 SO$_2$ Automatic Monitoring Results: Comparison with Objectives

Site ID	Valid data capture for monitoring period %[a]	Valid data capture 2021 %[b]	Number of 15-minute means > 266 μg m^3	Number of 1-hour mean > 350 μg m^3	Number 24-hour mean > 125 μg m^3
KC1	83.00	68.07	0	0	0

Notes

Results are presented as the number of instances where monitored concentrations are greater than the objective concentration.

Exceedances of the SO$_2$ objectives are shown in bold (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year).

If the period of valid data is less than 85%, the relevant percentiles are 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%).

2.10   Interpretation of SO$_2$ Objective Results

During 2021, as it was during 2018-2020, no mean values at KC1 monitoring site exceeded the 15-minute, 1-hour, or 24-hour SO$_2$ AQO concentration limits. However, the 2021 results should be treated with caution as the SO$_2$ monitor was replaced at the site in June 2021, which entailed a lower data capture for the year (less than 75%).

Table N. O_3 **Automatic Monitoring Results: Comparison with 8-Hour Mean objective, number of O_3 8-Hour Means > 100 µg/m^3**

Site ID	Valid data capture for monitoring period %[a]	Valid data capture 2021 %[b]	2015	2016	2017	2018	2019	2020	2021
KC1	97.60	97.60	**29**	**35**	**48**	**176**	**136**	**308**	**52**

Notes

Exceedances of the O_3 8-hour mean objective (100 µg/m^3 over the permitted 10 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%).

2.11   Interpretation of O_3 Objective Results

The 8-Hour Mean Objective has not been met in 2021, as only 10 breaches of the objective are permitted per annum, although there has been a large reduction in the number of exceedances from 2020.

It is likely that the significant increase in exceedances recorded during 2020 was due to the reduction of fresh NO_x production caused by the lockdown measures of the COVID-19 pandemic. However due to the relaxation of COVID-19 restrictions in 2021 the production of NO_x has increased, allowing for the reduction in O_3 concentrations seen this reporting year.

Figure 15.   Number of O$_3$ 8-Hour Mean Objectives > 100 µg/m^3
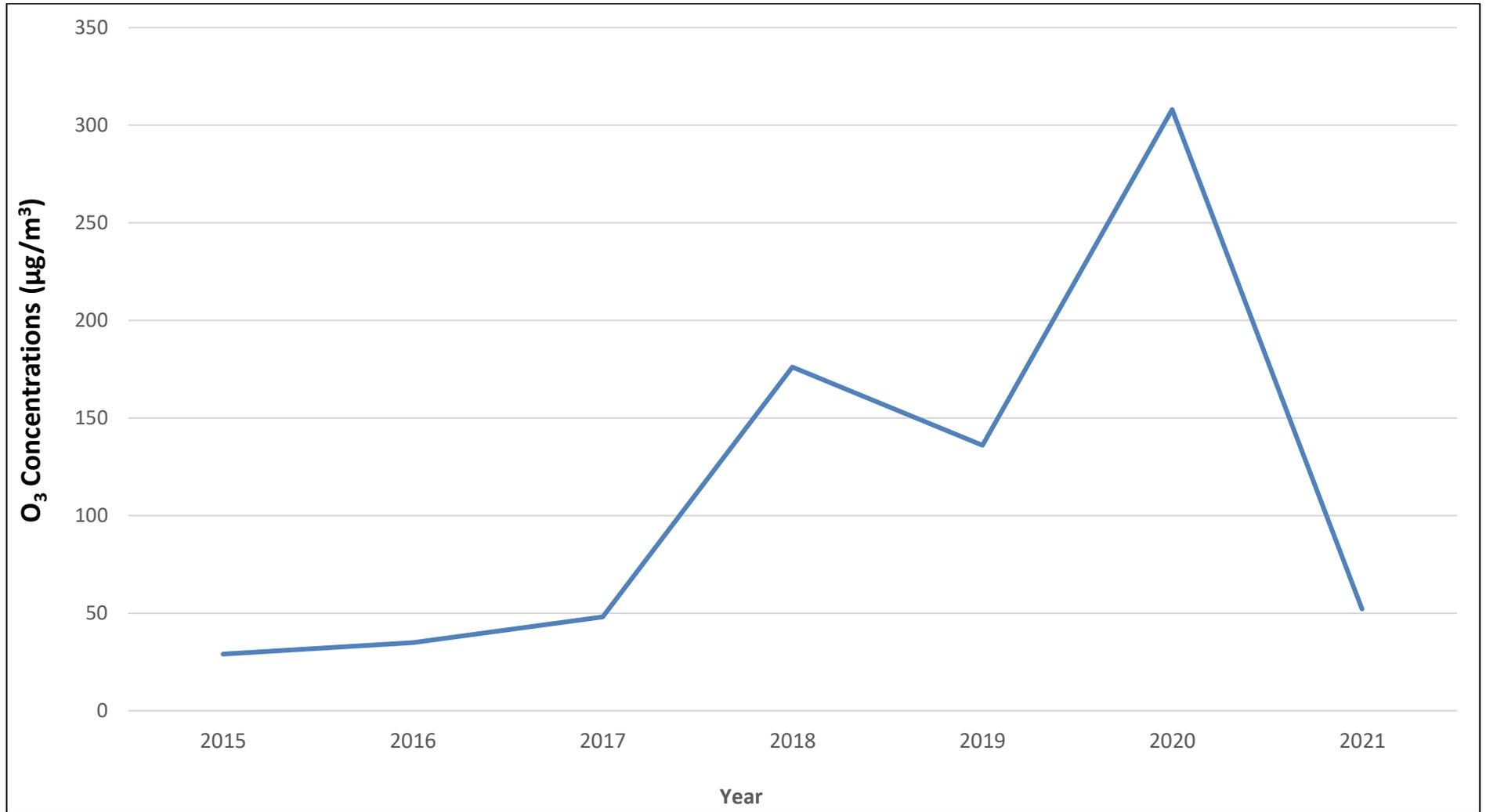
Table O.   Annual Mean Benzene Monitoring Results (µg m^3)

Year	KC01	KC02	KC03 (Site discontinued 2007)	KC04	KC05	KC06
2000	5.1	3.1	11.4	2.6	4.2	-
2001	4.3	2.0	11.0	3.7	2.9	-
2002	4.9	1.8	12.5	2.1	2.6	-
2003	3.9	2.4	9.6	2.5	2.9	-
2004	2.1	1.2	9.5	1.4	1.6	-
2005	2.0	1.3	9.2	1.4	1.8	-
2006	2.3	1.9	9.2	1.7	2.0	5.7
2007	2.2	1.6	Site Discontinued	1.5	1.7	3.2
2008	2.3	1.6	-	1.6	2.0	2.8
2009	2.1	1.6	-	1.7	1.8	2.6
2010	1.6	1.0	-	1.2	1.6	1.7
2011	1.4	1.3	-	1.4	1.9	2.8
2012	1.2	1.1	-	1.0	1.1	1.6
2013	1.0	0.7	-	0.7	0.9	1.2
2014	0.9	0.7	-	0.7	0.8	1.3
2015	1.25	0.78	-	1.0	0.94	1.8
2016	1.18	0.87	-	0.89	0.92	*6.75*
2017	0.57	0.56	-	0.55	0.61	0.73
2018	0.57	0.47	-	0.78	0.53	0.85
2019	0.49	0.38	-	0.42	0.44	0.69
2020	0.53	0.40	-	0.45	0.42	0.71
2021	0.47	0.39	-	0.40	0.40	0.62

2.12   Interpretation of Benzene Monitoring

Benzene (C_6H_6) monitoring is currently undertaken at five locations across the Borough using BTEX diffusion tubes, these include two roadside, two background, and one site in close proximity to a petrol station forecourt. The petrol station has operated Stage Two (in addition to stage one) Vapour Recovery since 2007.

Two AQOs have been set for the assessment of benzene, a running annual mean of 16.25 µg/m^3 (any exceedances within Table M shown in bold) to be met by 31.12.2003, and a more stringent Annual Mean of 5 µg/m^3 (any exceedances within Table M shown in italics) to be achieved by 31.12.2010.

Table M shows that the 2003 AQO has been met since 2000 (the measured annual mean is assumed to be the equivalent of the running annual mean), and since the introduction of the 2010 AQO only one annual mean concentration has been recorded in excess of 5 µg/m^3; at site KC06, located at a petrol station, which recorded an annual mean of 6.75 µg/m^3 in 2016.

The highest annual mean concentration of benzene recorded since 2000 has been at sites close to a petrol station - KC03 (before the petrol station on Warwick Road closed in 2007 and the monitoring site was discontinued) and KC06 which is located close to the petrol station on Old Brompton Road / Clareville Grove.

Aside from the high concentrations monitored at the now discontinued KC03 site, monitored concentrations have been low at all sites. The only exceedance of the 2010 AQO was in 2016 at KC06 and following this high monitored value, the concentration at the location reduced in both 2017 and 2018. Within 2021, as in 2020 and 2019, there were no exceedances of the 2010 AQO at any monitoring location.

2.13   Breathe London Nodes and Vivacity Monitors

Kensington and Chelsea Council is part of the Breathe London Network which currently has nine nodes deployed in the Borough. The network is run by the Imperial College Projects Limited (Imperial College London) and nodes have been provided by their partner Clarity Movement Co and the Mayor of London. All the nodes have been co-located with London Air reference monitors. All scaled and processed data is available to download on the individual Node information pages and through the API. Details of the nodes are presented in Table P.

In 2021 the Council also purchased four mobile sensors to supplement its automatic monitoring network. Details of the nodes are presented in Table P. KCM04 is to be sited in 2022 and was not used during 2021.

The data presented in Figures 17-21 from the mobile sensors give an indication of the local air quality rather than a definitive picture as these are not reference grade instruments.

Table P. Details of Additional Monitoring Nodes

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Height (m)	Pollutants Monitored	Mobile Sensor
BL1	Oxford Gardens Primary School	523720	181240	Roadside	Y	1	10	4	NO_2 & $PM_{2.5}$	Clarity Node-S
BL2	North Kensington	524041	181752	Background	Y	2	5	4	NO_2 & $PM_{2.5}$	Clarity Node-S
BL3	Al Manaar, Acklam Road	524731	181797	Roadside	Y	0.5	1.5	4	NO_2 & $PM_{2.5}$	Clarity Node-S
BL4	St Mary Abbots Primary School	525554	179655	Roadside	Y	1	50	4	NO_2 & $PM_{2.5}$	Clarity Node-S
BL5	Kensington High Street	525231	179383	Urban Traffic	Y	0.5	1	4	NO_2 & $PM_{2.5}$	Clarity Node-S
BL6	South Kensington Underground Station	526823	178830	Urban Traffic	Y	1	0.5	4	NO_2 & $PM_{2.5}$	Clarity Node-S
BL7	Royal Marsden Hospital	526921	178467	Urban Traffic	Y	0.5	5	2	NO_2 & $PM_{2.5}$	Clarity Node-S
BL8	Sloane Street	527831	179524	Urban Traffic	Y	0.5	3	4	NO_2 & $PM_{2.5}$	Clarity Node-S
BL9	Holy Trinity Church of England Primary School	528080	178466	Roadside	Y	0.5	5	1.5	NO_2 & $PM_{2.5}$	Clarity Node-S

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Height (m)	Pollutants Monitored	Mobile Sensor
KCM01	Kensington High Street 1 (VS009)	525726	179690	Urban Traffic	Y	0.5	1	4	NO_2, PM_{10} & $PM_{2.5}$	Vaisala
KCM02	Kensington High Street 2 (VS010)	525273	179415	Urban Traffic	Y	0.5	1	4	NO_2, PM_{10} & $PM_{2.5}$	Vaisala
KCM03	Sedding Street (VS008)	528048	178781	Urban Traffic	Y	0.5	0.5	4	NO_2, PM_{10} & $PM_{2.5}$	Vaisala
KCM04	Holland Park Avenue / Norland Square (VS009)	524338	180083	Urban Traffic	Y	1	0.5	4	NO_2, PM_{10} & $PM_{2.5}$	Vaisala

Figure 16.   Location of London Nodes & Vivacity
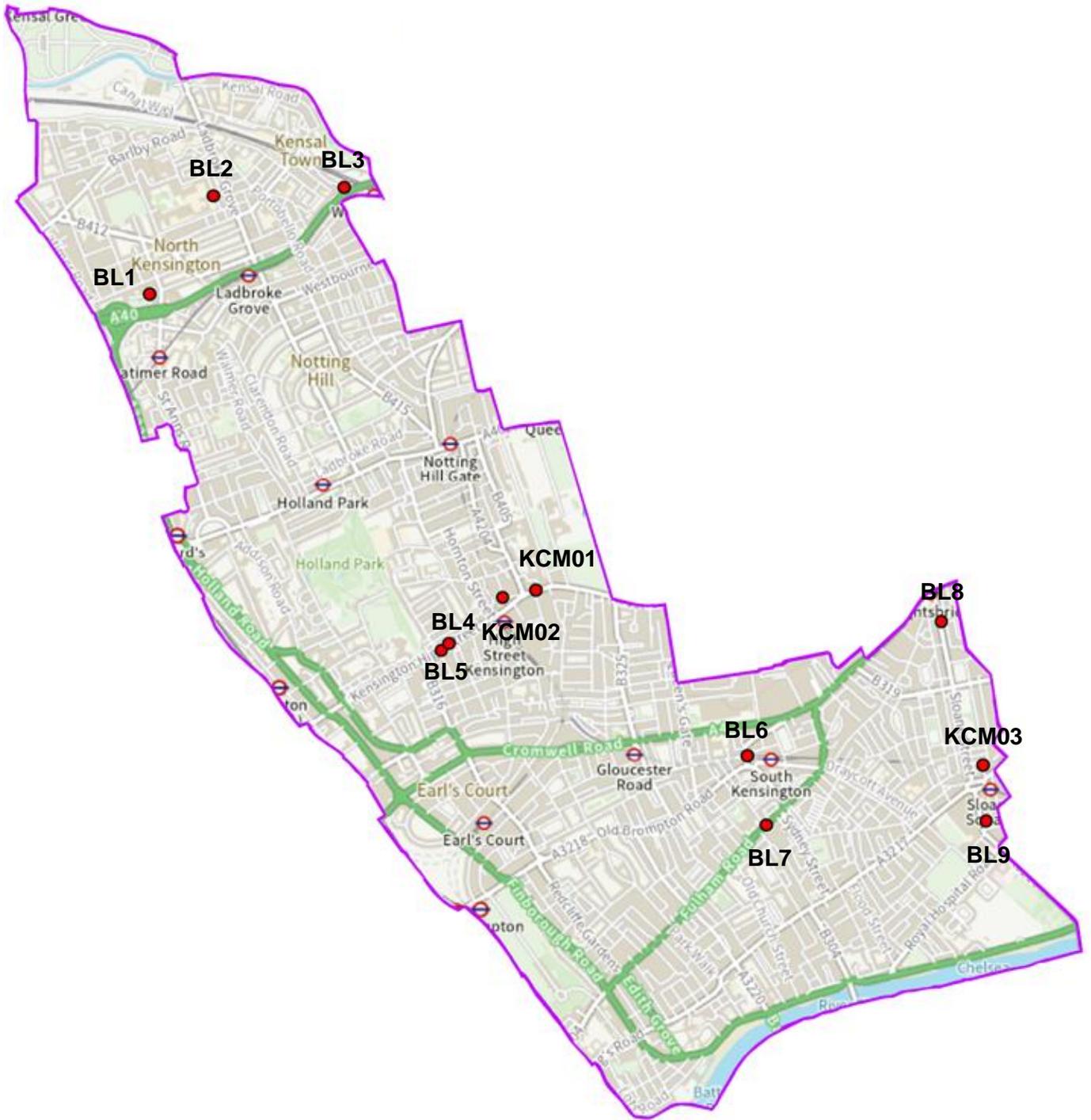
Figure 17. BL1-BL9 Monthly Average NO₂ Concentrations
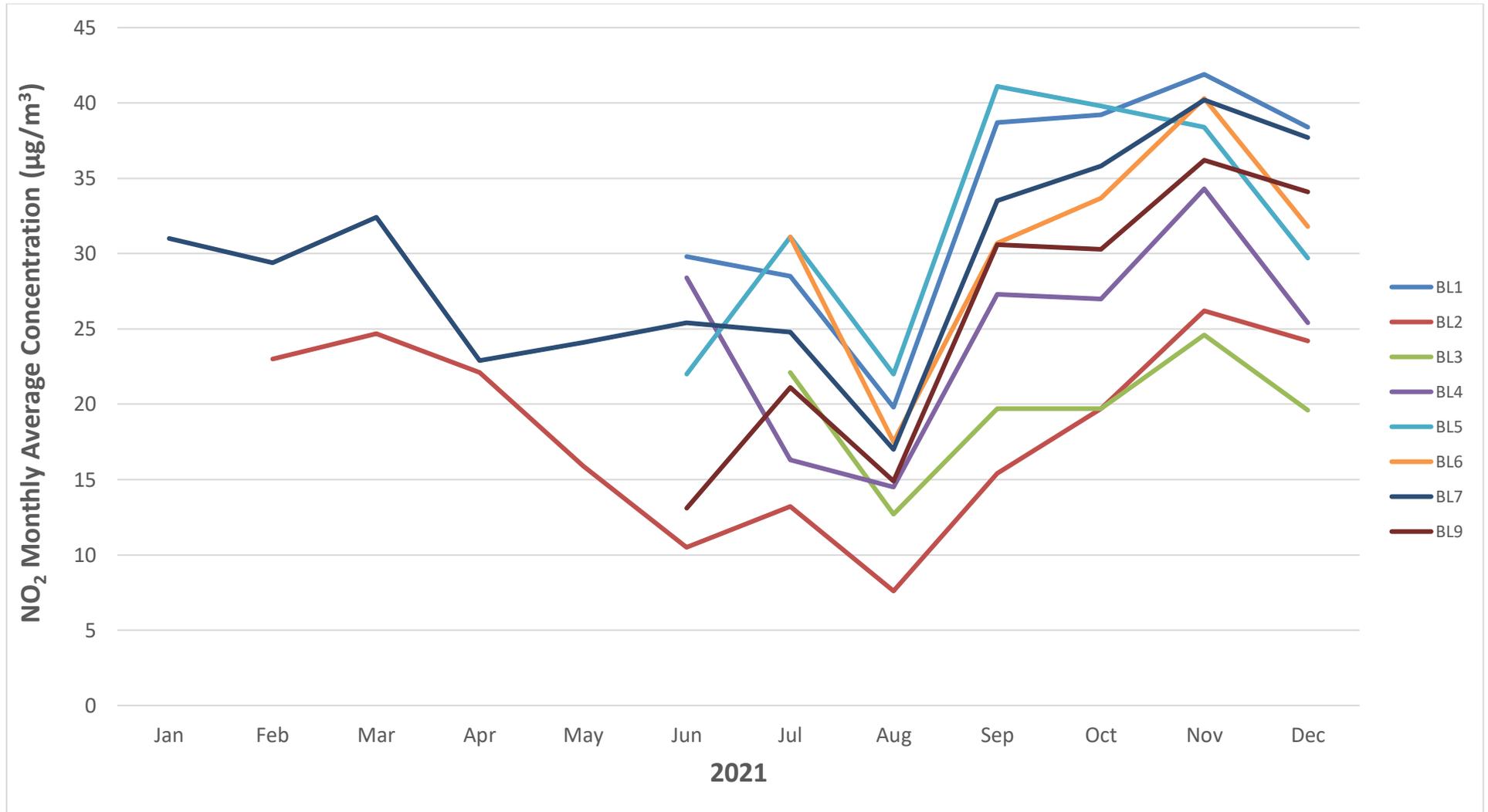
Figure 18. BL1-BL9 Monthly Average PM$_{2.5}$ Concentrations
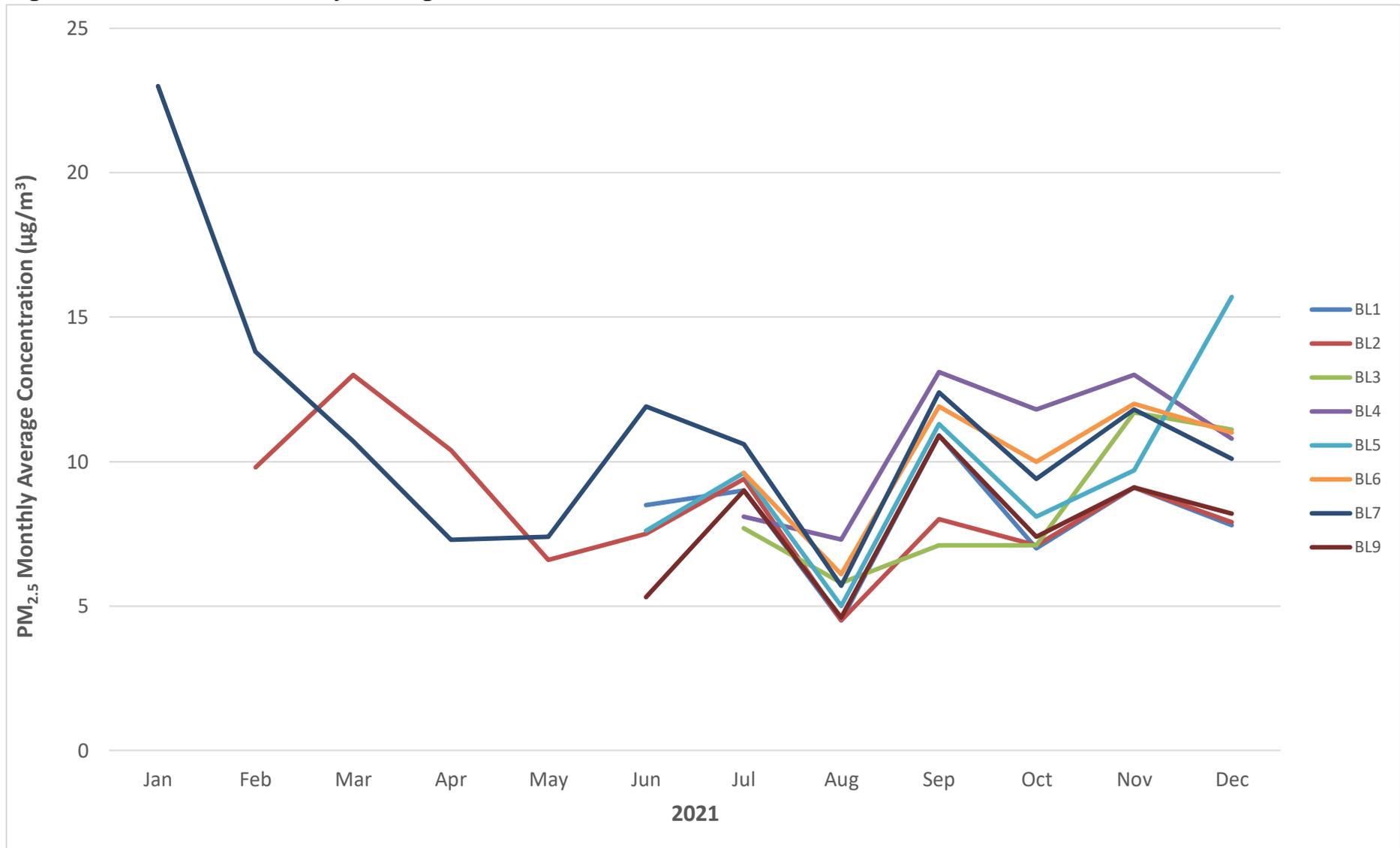
Figure 19.   KCM01, KCM02 and KCM03, Monthly Average NO₂ Concentrations
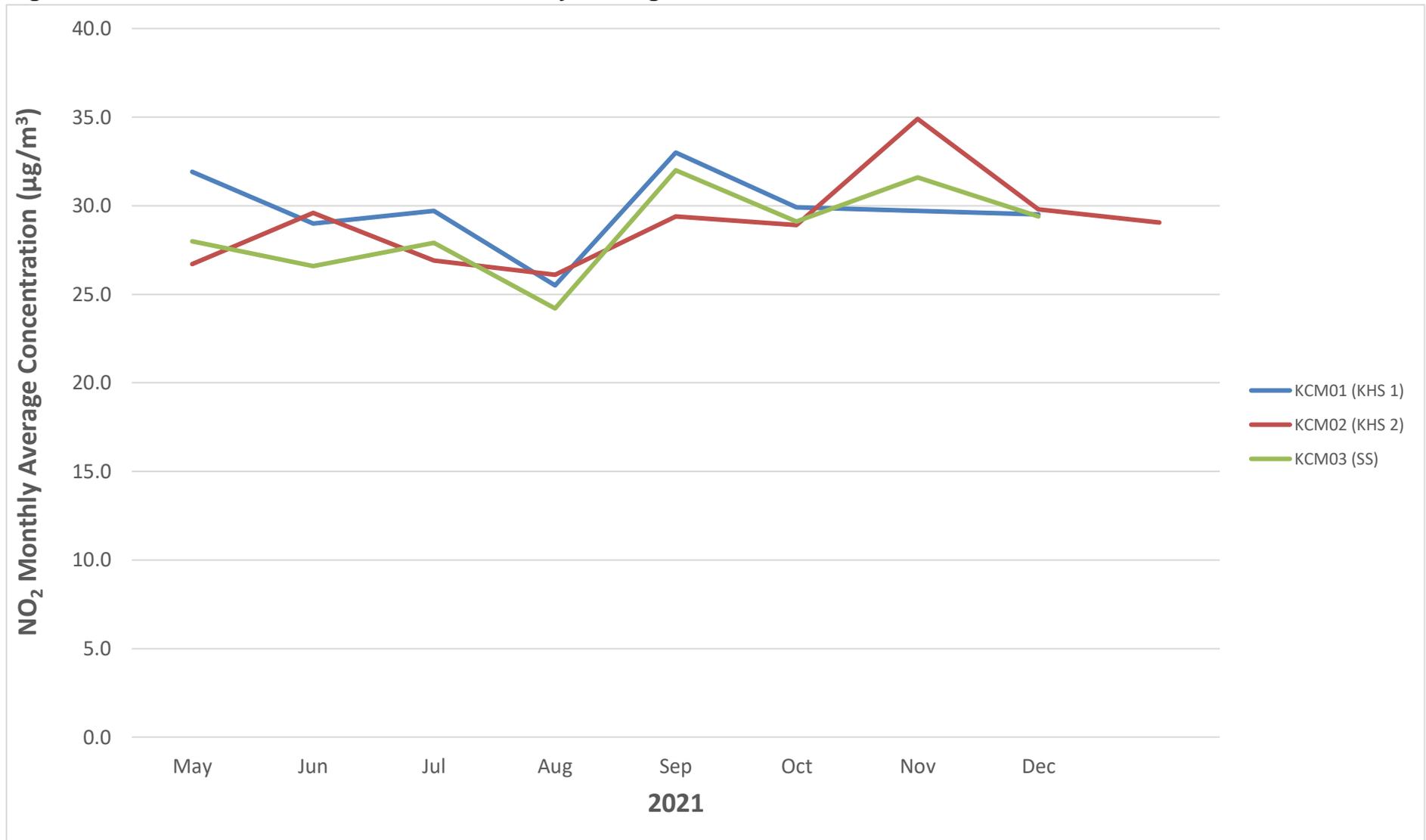
Figure 20.   KCM01, KCM02 and KCM03, Monthly Average PM$_{10}$ Concentrations
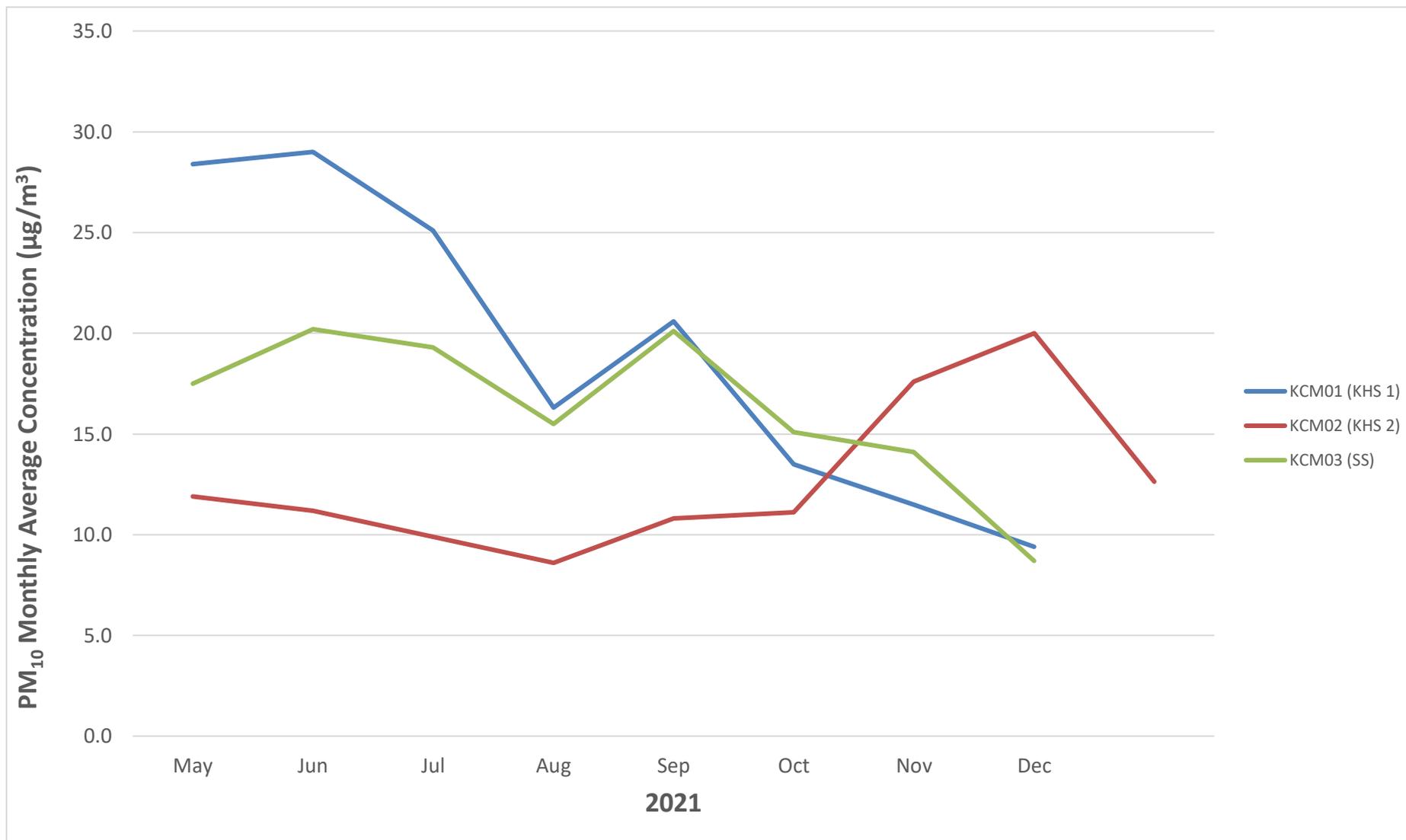
Figure 21.   KCM01, KCM02 & KCM03, Monthly Average PM$_{2.5}$ Concentrations
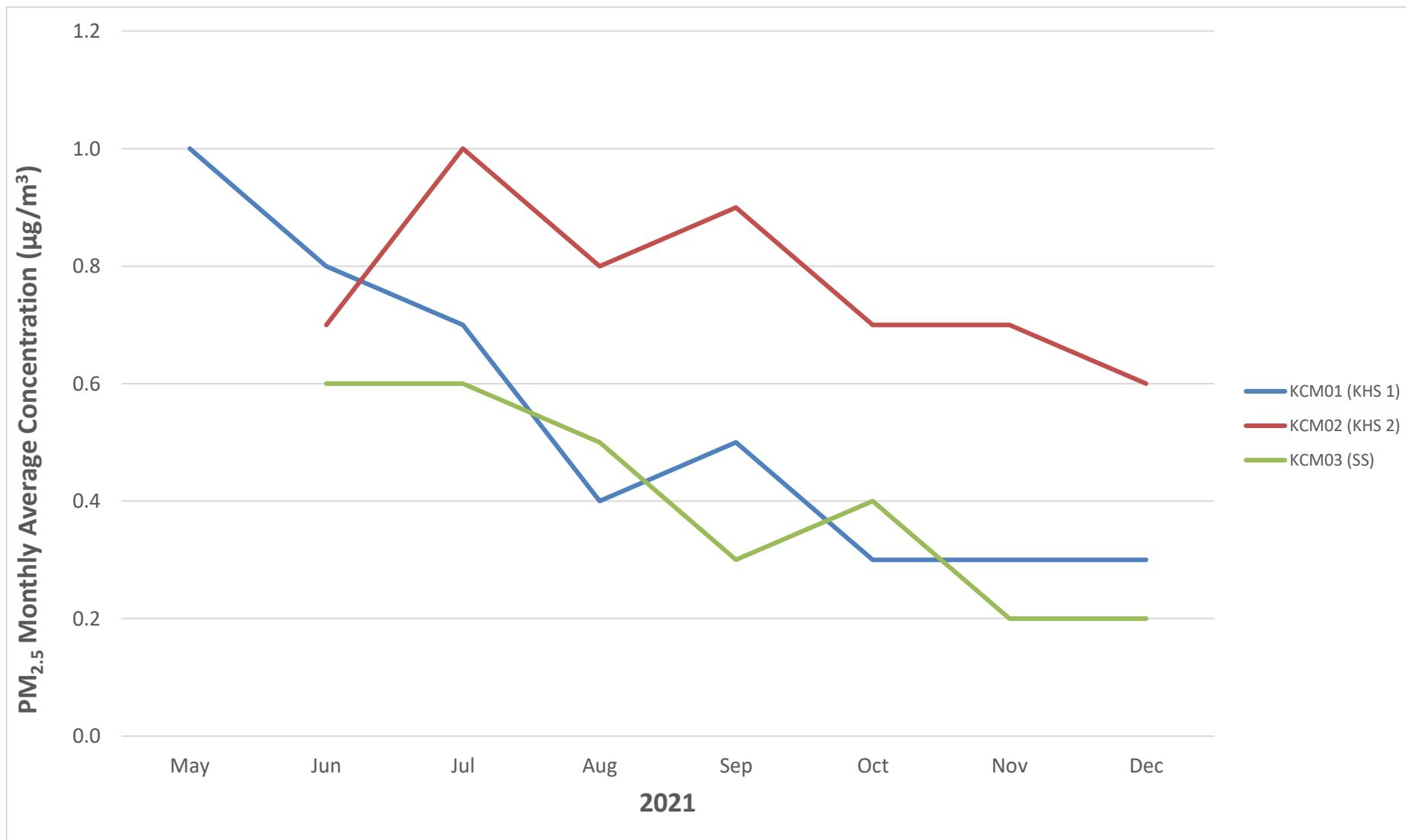
3. Actions to Improve Air Quality

3.1 Air Quality Action Plan Progress

Table Q provides a brief summary of Kensington and Chelsea Council's progress against the combined Climate Change and Air Quality Action Plan, showing progress made this year. This will be the final year these actions are reported on unless they have been transferred or updated into our new standalone Air Quality Action Plan due for adoption in 2022 (further information on the new plan can be found in Section 3.2). A closing report for the Air Quality and Climate Change Action Plan will be produced and made available on the Council website.

Table Q. Delivery of Air Quality Action Plan Measures

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
X0. Maintaining and where possible expanding monitoring networks, and fulfilling other statutory duties	Monitoring and other core statutory duties	Continue to provide air quality pollutant monitoring within the borough and fulfill statutory duties.	**RBKC Automatic Monitoring Sites** • KC1 All Saints College (AURN Background Site); NO_x, PM_{10}, $PM_{2.5}$, SO_2, CO & O_3. • KC2 Cromwell Road; NO_x. • KC3 Knightsbridge; NO_x. • KC4 Chelsea; NO_x. • KC5 Earls Court Road; NO_x & PM_{10}. Sites maintained and serviced by Ricardo & Enviro Technology under three year contract which was renewed in 2021. **Non-Automatic Monitoring Sites** • 56 (no.) Monthly NO_2 Diffusion Tubes (KC31-KC80) • 5 (no.) Monthly BTEX Diffusion Tubes. • 9 Breathe London Clarity Node-S Sensors. • 4 Vaisala Sensors. **Upgrade of Automatic Monitoring Equipment**

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
			In 2021 the Pollution Regulatory Team have overseen the installation of a new NO_x monitor at KC3, new CO, SO_2, O_3 and NOx monitors at KC1 and a new NO_x monitor at KC5. KC2 saw the installation of its new cabin plus a new PM_{10} and $PM_{2.5}$ monitor. **Annual Reporting and Statutory Duties** The Pollution Regulatory Team continues to produce its Annual Status Report, which it submits on an annual basis to the GLA and DEFRA for approval and comment. The Council's combined Air Quality and Climate Change Action Plan came to an end in 2021. A new Air Quality Action Plan has been consulted on and will be adopted in 2022 to reflect the Council's commitment to achieve the WHO Guideline values. This action has been carried forward into the Council's new AQAP.
X1. Support vulnerable hospital discharge patients with heart and lung conditions	Public Health and Raising Awareness	Provide air quality advice and home modifications to discharged hospital patients, particularly those most vulnerable (i.e., children/elderly) with heart and lung diseases.	Not yet started. This action has been carried forward into the Council's new AQAP.
1. Support and promote air quality awareness programmes	Public Health and Raising Awareness	Support and promote the schemes Breathe London, AirTEXT and Walkit to include CityAir/LondonAir and 'Breathe Better Together' principles to provide more information to a wider audience of subscribers.	Public Health has continued to fund airTEXT. This action will be expanded upon and has been taken forward into the Council's new AQAP.
2. Support school and community campaigns to reduce smoking at home	Public Health and Raising Awareness	Carry out air quality campaign through the 'Healthy School Partnership' at primary schools and 'Thrive Tribe' in the community to reduce domestic smoking at home.	The Young Person Smoking Cessation service 'Insight' has continued to give advice and information to young people, school and hostel staff as required throughout the pandemic. There has been an increase in activity of young smokers digitally accessing the smoking advice and prevention services. Insight is currently reporting above average targets. It has also continued to engage with young people remotely and on site from a number of schools (while they were open) through digital workshops.

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
			In 2021, Smoking Cessation and Drug and Alcohol workshops in schools will resume. This action will be carried forward into the Council's new AQAP. Insight has exceeded their advice and information target (including for smoking cessation) in 21/22.
3. Support initiatives to improve outdoor air quality	Localised solutions	Identify local needs including smoke free areas and air pollution abatement through 'Healthy Parks/Playgrounds' initiative.	Not yet started. This action will be expanded upon and has been taken forward into the Council's new AQAP.
X5 Produce policy guidance on the use of e-cigarettes in the workplace	Public Health and Raising Awareness	Develop policy guidance for commercial premises on the use of e-cigarettes in the workplace to improve indoor air quality.	UKHSA produced new evidence on E cigarettes which has been shared with 'One You'.
4 Promote initiatives to reduce smoking at home	Public Health and Raising Awareness	Ensure 'Smoke Free Homes' promoted through the NHS 'Stop Smoking Service'.	This action will be carried forward into the Council's new AQAP. Thrive Tribe (One You) hit their annual quitter target for 2021. In 2021 1281 Smoke Free Home pledges were signed.
5. Support financial saving schemes that aid residents living in fuel poverty	Public Health and Raising Awareness	Support the delivery of the Big Energy Switch 2015, a collective energy switching scheme to help residents negotiate tariffs on gas and electricity and to aid residents living in fuel poverty in line with the 'Healthier Homes' scheme.	In 2021 the Green Doctors Programme delivered in partnership with Groundwork London continued to offer free telephone consultation to support residents to get on top of energy debt, switch provider, access grants and other support to manage their energy use in the home. The Council also published its Green Plan in 2021 which includes reducing fuel poverty as a priority area amongst four other areas such as improving air quality, tackling climate change, increasing biodiversity and reducing waste. Tackling fuel poverty and supporting vulnerable residents to reduce their energy bills and to make their homes warmer is part of the new Climate Emergency Action Plan (2022-2027): • Action 30: Deliver the Green Doctors Programme and continue to offer home energy visits and telephone consultations to provide warmer,

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
			affordable and healthier homes, increase comfort, improve health and wellbeing and reduce bills for RBKC vulnerable residents. Groundwork London held 8 webinars and bitesize training sessions in 2021 for frontline staff from the Council and other community organisations to promote the Green Doctors Programme and to encourage them to make referrals and promote the programme to vulnerable residents. The programme was also promoted via distributing flyers at food banks and local organisations, attending local forum meetings and advertising on Housing Estates via posters.
X7 Encourage cycling as a non-polluting mode of transport and to combat obesity	Cleaner Transport	Promote cycling through GPs, 'GP Navigator', 'Health Trainer' and 'Cycle Coordinator' schemes to improve heart/respiratory health, combat obesity and promote non-polluting transport modes.	Sadly, in 2020, the majority of TfL funding for cycle skills training and other cycling promotion was withdrawn in the wake of the COVID19 pandemic. It is hoped that normal funding streams will resume in 2021-22.
6 Discourage burning of logs and house coal	Emissions from buildings and developments	Launch an initial publicity drive backed up by yearly campaigns in the autumn to highlight pollution caused by burning non-smokeless fuels in household fireplaces backed up with enforcement for persistent offenders.	The borough remains a Smoke Control Area. The Pollution Regulatory Team continues to be an active member in the recently formed Wood Burning Working Group headed by the GLA to further future action on discouraging the burning of solid fuel. Enforcement and Environmental Health Officers have been provided with the GLA's training modules on The Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020. This action has been expanded upon and taken forward into the Councils new AQAP.
7 Support vulnerable residents to reduce energy consumption and bills	Emissions from buildings and developments	Support residents by providing energy efficiency advice and by installing small and low-cost energy efficiency measures to combat climate change. Reduce their energy bills and	The Council has received funding from the Warm Homes Fund which is provided by the National Grid and administered by Affordable Warmth Solutions (AWS) to deliver a fuel poverty (home energy programme) project called Homes4Health during 2018-2021.

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
		carbon footprint, through the Healthy Homes project and through home energy visits by trained green experts.	Since 2018, more than 400 free telephone consultations and home energy visits have been carried out in RBKC. The Council's Homes4Health programme provides free home energy support and visits to residents in Kensington and Chelsea to help them keep warm, make their home energy efficient, save money on their energy bills and improve their health. A single referral to the scheme will provide access to a range of services. This action will form part of the new Air Quality Action Plan due to it synergies with action required for Climate Change to reduce carbon emissions (and fuel costs).
8 Promote case studies of higher- standard insulation and heating systems for existing buildings in the borough	Emissions from buildings and developments	Promote exemplar case studies about sustainable retrofit and regeneration schemes within the borough that have improved insulation and heating systems, and which have exceeded the minimum standards set out in Building Regulations.	Around 9 case studies about sustainable retrofit and regeneration schemes have been developed and promoted in 2021 and early 2022: • Case study about Lancaster West Refurbishment & Notting Dale Heat Network published in July 2021 on the Local Government Association website: https://www.local.gov.uk/case-studies/kensington-chelsea-lancaster-west-refurbishment • Case study about emissions based parking permits was published in January 2021 on the Local Government Association website: https://www.local.gov.uk/case-studies/emissions-based-parking-permits • Website page for Lancaster West's first low energy home Verity close which allows users to see all the low carbon measures that are part of the refurbishment: https://www.wearew11.org/en/lancaster-west-s-first-low-energy-home • Case study about Lancaster West Estate Major Retrofit Assessment published: https://www.buildtestsolutions.com/case-studies/lancaster-west-estate-major-retrofit-assessment • Case study about Treadgold House being the first Council owned housing block to go carbon neutral published in January 2022: https://www.wearew11.org/en/treadgold-house • Case study and photographs displayed during COP26 as part of the Local Government Association exhibition stand in Glasgow (October 2021 –

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
			November 2021) to promote the North Kensington Community Energy Project. • Case study about a new listed building consent order which gives permission for solar panels to be installed on most Grade II and Grade II* listed buildings, without the need for individual listed building consent was published on the Local Government Association website in April 2022. • Case study about the Notting Dale Heat Network published in July 2021 on the Mitsubishi Electric website: https://les.mitsubishielectric.co.uk/the-hub/from-public-pariah-to-exemplar-of-good-practice • Website page for residents created with information about the Notting Dale Heat Network: https://www.wearew11.org/en/heat-network
X12 Improve the energy efficiency of the six main Council's buildings	Emissions from buildings and developments	Deliver energy efficiency projects in six of the Council's main facilities (Town Hall, Chelsea Old Town Hall, Pembroke Road, Carlyle building, Violet Melchett and Pembroke Road car park).	Project Works to other properties are in various stages of delivery and the performance outcomes together with the significantly reduced occupancy levels due to Covid-19 cannot yet be demonstrated. This action will form part of the new Air Quality Action Plan due to it synergies and co-benefits with action required for Climate Change as well as improving air quality.
X13 Improve the use of space in council buildings to increase occupancy and reduce overall energy demand	Emissions from buildings and developments	Improve the use of Council buildings making them more sustainable, flexible, and cost- and space-efficient, so that the remaining sites are more energy efficient. This includes the closure of unsuitable and energy inefficient Council sites.	Project Works to other properties are in various stages of delivery and the performance outcomes together with the significantly reduced occupancy levels due to Covid-19 cannot yet be demonstrated. This will feature in the Climate Change Action Plan. The Air Quality Action Plan will signpost to this.
9 Continue to insulate the heating systems in schools	Emissions from buildings and developments	Deliver and support Flange & Valve insulation projects to the remaining eleven schools to reduce carbon emissions and improve energy efficiency.	29 community and denominational schools out of the 32 included in the Council's 2030 carbon neutral target had flange and valve insulation installed. This initiative was carried out as part of the Council's climate change and energy efficiency programme or by the schools themselves. Since declaring a climate emergency and committing to become a net zero carbon organisation by 2030, the Council recognises that it needs to go beyond small measures such as flange and

Measure	LLAQM Action Matrix Theme	Action	**Progress** • Emissions/Concentration data • Benefits • Negative impacts / Complaints
			valve insultation for heating systems. In December 2021, the Council signed up to the GLA's Retrofit Accelerator Framework and included the 32 community and denominational schools to go through a whole deep retrofit / fabric first approach for decarbonisation. The remaining schools that require flange and valve insulation will be assessed through the Retrofit Accelerator Programme.
10 Make sure that boilers in schools are set up and controlled to better adapt heating to each school's needs	Emissions from buildings and developments	Deliver heating health check projects to many schools.	In 2021 no heating health checks were carried out in schools. The Council signed up to the GLA's Retrofit Accelerator Framework in 2021 and included 32 community and denominational schools to go through a whole deep retrofit / fabric first approach for decarbonisation. These are the schools included in the 2030 carbon neutral scope. Via this programme, the Council aims to support schools with replacing their existing gas boilers with low carbon heating alternatives instead of doing like for like replacements. Seven schools which are in urgent need of boiler replacement have been prioritised via this programme for the first phase in 2022. Several site visits have been carried out to the schools in North Ken which were badly affected by flooding in the summer of 2021 and temporary boilers have been put in place to ensure their heating system are functional. Old fossil fuel reliant heating systems will be replaced with low carbon heating systems such as heat pumps or hybrid systems and old BMS systems will be upgraded. This action is also part of the new Climate Emergency Action Plan (2022-2027): • Action 11: Deep and holistic retrofit of school buildings by switching heating from gas to heat pumps and district heating and installing energy efficiency measures.
11 Continue to install LED energy- efficient lighting in schools	Emissions from buildings and developments	Deliver energy efficiency lighting projects within schools to increase the use of LEDs and reduce CO_2.	Most of the schools included in the Council's 2030 carbon neutral target had their LED lighting system installed. In 2021 to align with the Council's climate emergency declaration, the Council decided to adopt a holistic approach towards decarbonising all the 32 community and denominational schools included in its carbon scope.

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
			In December 2021, the Council signed up to the GLA's Retrofit Accelerator Framework and included all the 32 community and denominational schools. The programme will target the remaining schools that could benefit from switching to LED lighting. This action also features in the new Climate Emergency Action Plan (2022-2027): • Action 12: Electricity efficiency improvements (lighting and ventilation appliances).
X18 Introduce more energy efficient street lighting	Emissions from buildings and developments	Introduce more energy-efficient street lighting.	The focus of the street lighting team is still with replacing end of life lighting columns. But we have still managed to convert 38% of our street lights to LED. We also now have over 530 lighting columns converted to house on street car charging points. In 2021/ 2022 we have reduced our energy by a further 1,635 tonnes.
12 Embed climate change and sustainability topics in the schools' curriculum	Public Health and Raising Awareness	Organise the Children's Parliament on the Environment, deliver energy champions and climate change workshops/sessions and carbon reduction initiatives in schools.	As part of the pre-engagement for the three Council's environmental action plans (Air Quality Action Plan, Climate Emergency Action Plan, Biodiversity Action Plan) a Schools' Summit was organised in July 2021 with seven schools' representatives attending. In 2021 the Council organised a new Children's Environmental Parliament event in partnership with Urbanwise London. Five RBKC schools signed up to the project in 2021 and benefited from four educational sessions delivered by Urbanwise London. At the end of the project in March 2022, approximately 100 children gathered in the Council Chambers to present their project findings and solutions at an awards ceremony. So far, we have engaged with more than 500 pupils and school staff and more than 20 primary schools in Kensington and Chelsea have participated over the years. The schools that participated in 2021 are:

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
			• Colville Primary School with a project about Portobello Market and the green recovery opportunities after covid19. • Marlborough Primary School with a project about Thames River pollution. • St Cuthbert's and St Mathias Primary School did a project about biodiversity and community gardening. • St Joseph's Primary developed a project about climate change. deforestation and future plans for carbon capture. • St Mary's Primary with a project about the Grand Union Canal Pollution. In 2021 we offered climate change drama workshops - ReCreate delivered by Repowering London to primary schools and five RBKC schools were approached. ReCreate is a 5-session education programme for primary pupils about climate change and sustainability. The programme uses drama to engage students in an age-appropriate way on the topic, whilst delivering National Curriculum learning outcomes. One school (Bousfield Primary) signed up to the programme and benefited from receiving 5 sessions which culminated in a theatre play in front of the whole school. Over 60 pupils benefited from the sessions and more than 100 children attended the theatre play at the end of the project. We will continue to offer these drama workshops to schools in 2022. Embedding climate change and sustainability into the schools' curriculum is featured as an action in the Council's new Climate Emergency Action Plan (2022-2027): • Action 15: Embed climate change and sustainability in the schools' curriculum.
13 Develop planned programme of communal boiler upgrades and renewals within council housing	Emissions from buildings and developments	Complete the review of communal boilers from council housing and develop a planned programme of replacements and upgrade works. When possible, install individual controlled heating within flats.	A communal boilers action programme with a target of retrofit all sites by 2030 has been developed by the Council's Housing Team. Feasibility studies have been carried out at a number of sites that currently have gas fired communal heating systems. The aim is to replace these with low carbon technologies. A consultant was procured to design a net carbon zero for Chelsea Farm and Jean Darling (sheltered accommodation), and Whitchurch & Blechynden

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
			(part sheltered, part general needs). Waiting to award subject to section 20 consultation with residents. Build in holistic approach on upgrading communal boilers. Various surveys and studies in line with boiler programmes (i.e., thermal imaging on building envelope and UKPN power infrastructure) enabled an energy efficient and feasible holistic approach going forward. Applying Green Heat Network Fund where applicable.
14 Install ultra-low-nitrogen oxide (NOX) boilers in council housing	Emissions from buildings and developments	Install ultra-low pollution boilers in next phase of boiler replacement in social and council housing	Hydrogen ready boilers have been suggested as an option to replace domestic gas boilers in properties with individual standalone heating systems i.e., Wandon Road.
15 Incorporate energy efficiency improvements into the Council's planned social housing renewal programme	Emissions from buildings and developments	Incorporate energy efficiency improvements into the planned renewal programme, for example: upgrade windows from single glazed to double glazed and improve the insulation standard for TMO properties when renewing roofs.	Successfully secured £4.75 million funding through Social Housing Decarbonisation Fund Wave 2, retrofitting properties at Pond House, Grove House, Adair and Hazlewood Towers, Clarendon Walk, Talbot Walk and Bramley House, to improve their energy efficiency and reduce carbon emissions. Measures including to install roof insulation, double or triple glazed windows, external wall insulation and a BioSolar roof. In tender process of procuring a contractor to replace /upgrade communal, including emergency lighting systems, to various blocks throughout the borough. Completed borough wide building envelope study and carried out thermal imaging surveys phase one. These survey results will support future retrofit schemes on delivering a holistic approach on energy saving and carbon reduction. Over 32% of homes on the Lancaster West have now been internally refurbished, which includes new heating and hot water systems, smart thermostats, energy efficient lighting and replacing gas with electric induction cookers. On average, the EPC rating have improved by 8 points from the internal refurbishment of existing homes. £50m of additional funding that has been secured for Lancaster West to go carbon-neutral by 2030 in 2021, in response to the council's declaration of a climate

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			emergency in 2020. £19.4m million of additional funding has been secured from the UK Government's Social Housing Decarbonisation Fund (SHDF) Demonstrator programme in 2021, specifically for Hurstway Walk, Testerton Walk, Barandon Walk, Morland House, Talbot Grove House, Camelford Walk and Camelford Court. This brought the total amount of additional funding secured to more than £50 million in 2021 for the purposes of improving energy performance for the Lancaster West Estates.
16 Explore the opportunity to install renewable energy technologies in the council's social housing (e.g., solar panels)	Emissions from buildings and developments	Through additional or external funding Renewables will be considered and explored but insulation and energy efficiency will be a higher priority. It will be undertaken when it is a practical and affordable solution.	Primary study of borough wide solar PVs has been carried out, investigating potential roof areas where PV panels can be installed. This study will be tied in with the communal boiler upgrades, as the electricity generated will be fed into the plant room as a priority.
17 Ensure that major building sites minimise dust and emissions including those from on-site mechanical plant	Emissions from buildings and developments	Apply the new London Plan – The Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance and require low-emission NRMM with appropriate Euro standards on major redevelopment sites.	The Council has been part of the Pan London NRMM Project since the projects outset and continues to support its work. Planning Conditions continue to require developers to sign up to the NRMM website to register their development site and proposed NRMM equipment. Cleaner Construction for London undertook 36 site audits in Kensington and Chelsea in 2021 (between April 2021 and March 2022, 34 audits took place). Of the 36, 2 sites were self-compliant, 2 sites had completed work and 32 had no NRMM on site. The Councils Construction Management Team continues to proactively monitor much of the construction in the borough, working alongside colleagues in Noise and Nuisance and Streetscene dd. These teams aim to provide a reactive service to handle complaints from residents. The Council continues to require Air Quality (Dust) Management Plans, Air Quality Monitoring and Construction / Demolition Environmental Plans in line with the Mayor's SPG and other Best Practice Guidance are submitted for Major Developments in the borough via the planning regime. The Pollution Regulatory

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			Team has worked alongside Planning to help produce an Air Quality focus section for the new Local Plan and will look to incorporate this into a new AQ SPG. This action has been taken forward into our new Council AQAP.
18 Ensure that the planning system minimises impact of new development during operation	Emissions from buildings and developments	Utilise the planning application process to assess the implementation of energy strategies in major developments and make air quality and climate change recommendations.	The Local Plan was adopted in September 2019. https://www.rbkc.gov.uk/planning-and-building-control/planning-policy/local-plan/local-plan-2019. Policy CE5 relates to air quality and policy CE1 to climate change and achieving zero carbon. The Council recently published its Greening SPD which aims to reduce the overall impact of development both during construction and operation. It also aims to help addressing climate change impacts. It gives detailed guidance to both developers and residents on the measures they can implement to reduce the building's carbon footprint. This guidance is not only for new development but also for existing development (retrofitting). The following chapters refer to addressing the impact of the development during operation. Chapter 3: circular economy Chapter 4: energy hierarchy and whole life-cycle approach Chapter 5: reduce energy demand Chapter 6: heat networks (be clean) Chapter 7: renewable energy (be green) Chapter 8: monitoring (be seen) Chapter 9: retrofitting existing buildings Chapter 10: air quality Chapter 11: urban greening Chapter 12: minimising flood risk Chapter 13: biodiversity
19 Use the planning system to ensure that emissions from energy	Emissions from buildings and developments	Make informed decisions on planning applications about 'Decentralised Energy' (DE)	The Local Plan was adopted in September 2019. https://www.rbkc.gov.uk/planning-and-building-control/planning-policy/local-plan/local-plan-2019.

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and heat sources in new developments are minimised		networks, 'Combined Heating Power' (CHP), biomass and biofuel, by considering the balance between air quality and carbon reduction benefits. Assess and make recommendations.	Policies CE1 and CE5 refer to DE, CHP, and biomass. Both policies combined would help make a more balanced decision of the site's suitability for the use of CHP due to air quality impacts and if carbon saving targets can be met using different methods with a lesser impact to local air quality. The Council recently published its Greening SPD which aims to reduce the overall impact of development both, during construction and operation. It also aims to help addressing climate change impacts. It gives detailed guidance to both developers and residents on the measures they can implement to reduce the building's carbon footprint. This guidance is not only for new development but also for existing development (retrofitting). The Council's Draft Greening SPD includes the following chapters which could have a positive impact on energy and emissions. Chapter 3: circular economy Chapter 4: energy hierarchy and whole life-cycle approach Chapter 5: reduce energy demand Chapter 6: heat networks (be clean) Chapter 7: renewable energy (be green) Chapter 9: retrofitting existing buildings
20 Ensure any new homes forming part of major developments to be zero carbon	Emissions from buildings and developments	Apply the London Plan Policy 5.2 and utilise the Local Plan to request residential elements of all major schemes to achieve 100% reduction on site; if not possible, a minimum 35% reduction of regulated carbon emissions on-site and offset all remaining carbon emissions up to 100%.	To accord with the requirements of the London Plan, from the 1 April 2017, the Council fully implemented the zero carbon standard through the creation of a Carbon Offset Fund. This fund will be used for carbon reduction initiatives which will benefit residents and the community. The Local Plan contains policy CE1 which requires non-residential development of 1,000 square metre or more to meet BREEAM very good with 60 per cent of the unweighted credits available in the energy, water and materials sections and conversions and refurbishments of 1,000sq.m or more non-residential development achieve BREEAM very good rating. For residential development we follow the London Plan policy.

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			The New London Plan was adopted in March 2021 and includes a new policy, Policy SI 2: Minimising greenhouse gas emissions, which requires major development to be net zero-carbon. The New London Plan will be adopted in March 2021 and includes a new policy, Policy SI 2: Minimising greenhouse gas emissions, which requires major development to be net zero-carbon. The Council recently adopted the Greening SPD which aims to reduce the overall impact of development both, during construction and operation. It also aims to help addressing climate change impacts. It gives detailed guidance to both developers and residents on the measures they can implement to reduce the building's carbon footprint. This guidance is not only for new development but also for existing development (retrofitting). The Greening SPD provides guidance on achieving zero-carbon in chapters: Chapter 4: energy hierarchy and whole life-cycle approach Chapter 5: reduce energy demand Chapter 6: heat networks (be clean) Chapter 7: renewable energy (be green) Chapter 9: retrofitting existing buildings.
21 Improve walking and cycling access to White City	Cleaner Transport	Provide new direct pedestrian and cycle routes by means of a bridge and a subway between the White City Opportunity Area and Norland and Notting Barns wards.	The bridge project remains frozen given that a landing site in our borough has not been secured. The Council is awaiting fresh development proposals to come forward that could unlock a bridge landing site. The Underpass project continues to progress, albeit slowly. The talks around the Asset Protection Agreement involving Network Rail and LBHF are ongoing. Once these conclude Imperial are in a position to progress at speed. The detailed design is now complete. Planning applications are expected as soon as the asset protection agreement concludes.

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22 Continue to reduce the Council's vehicle emissions	Borough Fleet	Deliver the Council's Green Fleet Strategy and Action Plan and implement the green procurement process to lease ultra-low emission vehicles and introduce a travel hierarchy with active travel at the core of it.	In 2021 we identified further locations at Council offices where workplace charging points can be installed (4 additional spaces identified at Pembroke Road Offices). However, the installation of these charging points can only take place after the existing electrical infrastructure is upgraded. An internal Fleet working group has been set up in 2021 to develop a plan for electrifying the Council's Fleet. The Procurement Team has developed a Procurement Strategy and tender specifications for appointing a new vehicle lease contractor. These include requirements from the Green Fleet Strategy. The Council is also reviewing the arrangements necessary for creating a new Green Fleet Manager Role which will oversee the fleet and ensure that this aligns with the commitments made in the Green Fleet Strategy. We have worked with the local NHS trusts to develop a joint travel survey for staff which will be launched in 2022. This survey will identify how RBKC, and NHS staff are travelling for business purposes. There are currently 11 fully electric and 13 hybrid vehicles part of the Council's Fleet. These vehicles replaced petrol or diesel vehicles. Eco driving training sessions were organised for 2021 for the Council's Housing Management Fleet but did not go ahead as planned due to issues with the supplier's availability. The Council's new Climate Emergency Action Plan (2022-2027) is featuring new actions designed to reduce vehicle emissions from the Council's operations: • Action 38: Reduction in Council's and contractors Fleet Operation Emissions – fleet journeys to be replaced by public transport or active travel. • Action 39: All electric Council and contractors' fleet by 2030 • Action 40: Deliver Eco-driving training sessions • Action 41: Implementation of travel hierarchy across the Council to encourage active travel and establish a Council wide pool bike service • Action 42: Grey Fleet review

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			• Action 43: cleaner transport provisions within procurement.
23 Continue to reduce emissions from our contractor's waste collection and street cleaning vehicles	Borough Fleet / Cleaner Transport	Work with our contractor SITA to reduce emissions from its fleet.	Work has begun, led by Property Services, liaising with UKPN regarding the implementation of the electric vehicle charging infrastructure. Until this work is complete, we are unable to transition over to electric waste vehicles. The plan is for the first tranche of electric vehicles to be delivered in 2024, subject to the infrastructure being in place.
24 Work with contractors to green their fleet and comply with ULEZ	Borough Fleet / Cleaner Transport	Include requirements for contractors to use low and ultra-low emission vehicles as part of their operations and ensure their fleet is ULEZ compliant.	Completed. The fleet became ULEZ compliant at the tail end of 2020.
X34 Maintain an up-to-date Council Travel Plan	Cleaner Transport	Undertake staff survey and site audits and revise the travel plan.	No Council Travel Plan staff survey was undertaken in 2021 as the large majority of staff were continuing to work from home due to Covid19. Officers did however work with the HR team to permit applications to the Cycle to Work Scheme at any time to support staff wishing to travel by bike with capacity on public transport reduced. Previously the Cycle to Work Scheme could only be applied for in short periods offered twice a year.
25 Increase public awareness to reduce engine idling	Cleaner Transport / Public Health and Raising Awareness	Reduce idling of engines by raising awareness of public health and environmental benefits in addition to using enforcement powers to issue fines to those who persist. Carry out campaigns targeted at the public, fleet managers and council drivers, e.g., including a pamphlet in permit renewal paperwork. Erect temporary signage in target areas.	Figures for 2021 are as follows: • Number of complaints received - 101 • Number of interactions recorded by Contracts and Enforcement Officers - 99 • Number of interactions recorded by Parking Enforcement Officers - 684 • Number of FPNs issued – 0 There were zero FPNs served, as every person asked to switch off their engine by an authorised officer, did so. The offence is refusing to switch off an engine when asked to do so by an authorised officer. RBKC has continued to be part of the pan-London behaviour change campaign Idling Action London helping to reduce the amount of localised air pollution in the borough, though the programme has concluded in March 2022. We have held two School Workshop events in 2021 at Colville Primary School and Fox Primary with one more

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			at St Cuthbert's in 2022 . We also carried out online training for drivers asking them to take the pledge to stop idling. Four internal fleets have received this training , as well as the traders on the markets operating within the borough. In 2021, Enforcement Officers had 105 interactions regarding idling engines which are a mixture of complaints, sign requests and officers proactively recording. NSL gave out 706 warning leaflets in the same period. 100% of drivers switched off their engines when asked to do so, therefore no FPNs were issued during this period. We have been working to strengthen the idling enforcement legislation to provide more of a deterrent to idling drivers and incite long term behavioural change. Following the example of some other London boroughs, this involves creating a borough wide Traffic Management Order allowing enforcement officers to issue Penalty Charge Notices which change the parameters of issuing notices plus more substantial fines. The Parking Contracts Team is considering whether it will introduce this borough wide TMO in the coming months.
X38 Review of effectiveness of parking permit fee structure in encouraging the uptake of cleaner vehicles	Cleaner Transport	Review Parking Policy banding to encourage choice of lower-emission vehicles.	The key decision report with the new parking permit pricing structure was approved and implemented from 1 April 2021. https://www.rbkc.gov.uk/howwegovern/keydecisions/decision.aspx?DecisionID=5520 In 2022/23, we will compare the makeup of the resident parking permit fleet pre and post the change to assess the effectiveness of the change as we will have full year of data to review from 1 April 2022.
X39 Increase number of on-street charging points for electric vehicles	Cleaner Transport	Expand the availability of on-street charging points for electric vehicles.	We have installed and commissioned 331 more lamp column chargers and 32 new Source London charging points. Practically all households (over 99 per cent) are within 200 metres of a charging point and 94 per cent are within 100 metres.
X40 Encourage car clubs to go electric	Cleaner Transport	Explore with car club operators the potential for introducing or increasing the number of electric cars or hybrid electric vehicles in their fleets.	Zipcar Flex currently operate 30% of their fleet as EVs and this continues to translate to an average of 11 EVs within the borough on a daily basis. This number is expected to grow in 2022. Our other operators, Ubeeqo and Enterprise continue to explore how they will transition to an electric fleet at a future date.

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X41 Encourage children to walk or cycle to school	Cleaner Transport	Double the number of schools with Silver or Gold accredited School Travel Plans and promote walking and cycling to school as part of a combined effort to tackle childhood obesity. Introduce advice on engine idling in promoting and creating travel plans.	The Council launched trials of four new School Street closures from April 2021 at: • Edge Street (Fox Primary and Hawkesdown House Schools) • Draycott Avenue (Marlborough Primary School) • Sedding Street (Holy Trinity CofE School) • St Charles Quare (All Saints Catholic College) Further details can be found at www.rbkc.gov.uk/school-streets.
X42 Use cycle training to promote more cycling	Cleaner Transport	Encourage greater use of cycling, by increasing the number of free cycle training sessions for residents, visitors, and workers in the borough.	Sadly, funding for cycle training in 2021 remained extremely limited. Nonetheless, 203 training sessions were delivered to adults and 855 to children. So far, funding restrictions seem set to continue for 2022-23.
X43 Help the Mayor of London to create cycling grid of specially designed routes	Cleaner Transport	Work with the Mayor of London to improve cycle routes in London by introducing the Cycling Grid.	No progress due to TfL funding restraints.
26 Open up more one-way streets to cyclists using both directions.	Cleaner Transport	Continue to convert one-way streets to two-way operation for cycling.	No progress was made in 2021 but the following one way streets will be made into two-way cycling: • Nevern Square • Trebovir Road • Park Walk • Pavilion Road
27 Create safe areas for cyclists at traffic lights	Cleaner Transport	Consider opportunities for introducing Advanced Stop Lines for cyclists when reviewing traffic signals.	We have approved schemes for three sets of signalised junctions at: • Beaufort Street/Fulham Road • Old Brompton Road/Drayton Gardens • Chelsea Bridge Road/Royal Hospital Road/Lower Sloane Street/Pimlico Road.

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			ASLs will be added or upgraded at all of the Beaufort Street/Fulham Road and Chelsea Bridge Road/Royal Hospital Road/Lower Sloane Street/Pimlico Road locations. Old Brompton Road/Drayton Gardens already has an existing ASL.
28 Support residents to take action in their local areas and implement community energy projects	Localised solutions	Encourage and empower residents to help tackle climate change and reduce energy consumption in their local areas and homes. Stimulate attitude and behaviour change through community energy projects and energy workshops/training.	The Council continues to work with Repowering London to develop the North Kensington Community Energy Project (NKCE). Funding was awarded via the Community Energy Fund to carry out solar feasibility studies at 3 schools (All Saints College, St Charles RC and St Francis of Assisi) and at two housing estates (Silchester Estate and Henry Dickens Estate). NKCE plans to continue developing future schemes across the borough, with ambitions to install 1MW of community owned solar in the next 4 years. The project has been recognised nationwide and we were awarded the Community Renewable Energy Project Award in 2019 and the Climate Coalition Inspirational Community Project award in 2020. NKCE group has been meeting every two weeks in 2021 and the volunteers have been attending several community events to promote the scheme. A mapping of potential sites have been carried out and a site visits for the North Ken MP on the roof of the Westway Leisure Centre has been organised in the summer of 2021 to see the solar panels. 50,000 has been allocated through the GLA Future Neighbourhood Funding to develop a pilot community energy project on a social housing estate. A Greener Living Day event has been organised in 2021 by the NKCE volunteer group and three others are planned for 2022 and 2023 to be delivered as part of the Notting Dale Future Neighbourhood 2030 programme.
29 Support and encourage the development of community energy enterprises/co-ops	Localised solutions	Support community groups to come together and generate clean local electricity and put profits back to the community through solar installation and ethical investment.	The Council continues to work with Repowering London and NKCE to identify buildings that can be included in the community energy projects. Funding was awarded via the Community Energy Fund to carry out solar feasibility studies at three schools (All Saints College, St Charles RC and St Francis of Assisi) and at two housing estates (Silchester Estate and Henry Dickens Estate). 50,000 has

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			been allocated through the GLA Future Neighbourhood Funding to develop a pilot community energy project on a social housing estate. This action is also featured in the Council's new Climate Emergency Action Plan (2022-2027): • Action 34: Support community energy schemes such as the award winning North Kensington Community Energy with ambition to install 1MV of community owned solar in the next four years offering public buildings owned by the Council.
30 Encourage and increase the renewable uptake and green energy in the borough	Emissions from buildings and developments	Deliver and facilitate pan-London solar schemes which support residents to install solar panels.	In 2021 the Council was part of the Mayor of London's Solar Together scheme. This is a group-buying scheme which offers residents the opportunity to purchase high-quality solar panels (PV) and battery storage at competitive prices. As part of this scheme, 204 registrations were received which comprised of 194 homeowners registering for solar PV and 10 for battery storage. Out of all the registrations received in 2021, 27 accepted their offer for solar PV and 3 accepted their offer for battery storage. This action is also featured in the Council's new Climate Emergency Action Plan (2022-2027): • Action 36: Continue to participate in and promote the GLA's Solar Together scheme, a group-buying initiative, which brings households together to get high-quality solar panels at a competitive price.
31 Identify and train green champions in the community	Public Health and Raising Awareness/Reducing Emissions from Buildings	Identify and sign up green champions/leaders and residents' groups within the borough to initiate and support the delivery of energy reduction and energy generation projects or provide energy advice to their local community.	A paid community champion from the local North Ken community has been appointed to support with delivering the North Kensington Community Energy. This job opportunity was filled by a local resident who started in June 2021. The Council's Climate Change Team has been working closely with key community groups such as Dalgarno Community Centre, Al Manaar Mosque, churches and community champions schemes to identify active green champions in the borough. The North Kensington Community Energy volunteer group has around 20 active people who meet regularly every two weeks. Through the Homes4Health fuel poverty

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			service, free fuel poverty and energy advice training have been delivered by Groundwork London to frontline staff to more. More than 15 frontline and community workers have been trained.
32 Understand better the sources and quantities of greenhouse gas emissions across the borough	Emissions from buildings	Analyse the sources and quantities of greenhouse gas emissions across the borough.	In 2021 the Council analysed the borough-wide greenhouse gas emissions based on the newest data sets released by BEIS in July 2021. BEIS published carbon emissions data for each local authority by sector on a yearly basis, but it has an 18-month lag. The latest data set available which was released in the summer of 2021 and provided data for the period between 2005-2019. In 2019 the borough-wide emissions have been estimated to be 855 ktCO2e. Compared to 2018 the borough's total greenhouse gas emissions decreased by 4.66% and compared to 2005 we decreased by 39%. The biggest source of emissions borough-wide remains commercial and industrial electricity use (electricity used in hotels, restaurants, shops, hospitals). The second largest source of GHG emissions is the gas consumption from the residential buildings. Emissions per capita in 2019 were 5.47 tonnes of CO2e. In 2021, Aether consultants produced the Carbon Neutral Pathways Report for RBKC which included: a greenhouse gas (GHG) inventories for the borough and the Council; decarbonisation pathways to reach the carbon neutral targets economic and social analysis and means to track progress towards the targets. The Council has been working with Aether to better understand what sources of emissions should be included in the 2030 and 2040 carbon scope and how to best monitor this.
33 Support local businesses and large organisations to reduce emissions from their operations	Emissions from developments and buildings	Offer environmental advice and sources of technical information to local businesses and large organisations on how to improve energy efficiency of their building operations.	In 2021 the Council developed an environmental charter for businesses which will be launched in 2022 as part of the new Climate Emergency Action Plan. This charter contains specific climate change and sustainability commitments aimed at helping businesses to reduce their carbon emissions and signposting to resources and support available that can be accessed by local businesses. The Climate Change Team will be developing with Aether consultants a technical guide for businesses and institutions in the borough on how to measure their carbon footprint, analyse data and report on carbon performance.

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			Two big institutions environmental events were organised in 2021 and 2022 as part of the engagement and consultation for three Council's Action Plans: Air Quality Action Plan, Climate Emergency Action Plan and Biodiversity Action Plan. Organisations such as the NHS, Science Museum, Imperial College, South Kensington Estates, Cadogan Estates and local businesses attended and provided feedback on their own journey to net zero and their own climate change targets and environmental commitments. The Climate Change Team have delivered two climate change presentations ant the Chamber of Commerce and North Kensington Business Forum in 2021. The Royal Borough of Kensington and Chelsea has recently been awarded funding from the Mayor of London's Future Neighbourhoods Fund to deliver a visionary strategy and implement pioneering environmental projects to transform the Notting Dale ward into an exemplar model of sustainability and innovation. One of the initiatives included in the Notting Dale 2030 Future Neighbourhood is to support local businesses in North Ken. An eco-cargo bike will be offered through a community sharing system to local organisations to use. The following actions have been developed to support businesses going forward: • Action 32: Develop an environmental charter for businesses. • Action 64: Support businesses to reduce their emissions from deliveries. • Action 134: Build a strong partnership with a wide range of institutions in the borough such as universities, NHS, museums, theatres, businesses etc
34 Encourage visitors to major venues to walk or cycle.	Cleaner Transport	Work with major destination venues in line with the Healthy Workplace Charter to reduce trips using private and public transport by promoting active travel (walking and cycling), using customised maps, and adapting existing publicity materials.	No progress due to TfL funding constraints.

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35 Support businesses to reduce their emissions from deliveries	Delivery Servicing and Freight	Support businesses to combine and rationalise deliveries (of 100 – 400 Kg loads) using low/zero emissions vehicles and local distribution hubs for final stage deliveries.	
36 Continue to work with our main contractors to reduce their energy consumption	Borough Fleet	Work in detail with the Council's main contractors (SITA, Quadron, Bellrock, Atlas) to reduce their overall energy consumption related to the Council's operations (building use and vehicle fleets).	Work has begun, led by Property Services, liaising with UKPN regarding the implementation of the electric vehicle charging infrastructure. Until this work is complete, we are unable to transition over to electric waste vehicles. The plan is for the first tranche of electric vehicles to be delivered in 2024, subject to the infrastructure being in place. The main contractors have been included in the Council's 2030 carbon neutral targets. In 2020 and 2021 as part of developing the Carbon Neutral Pathways report, the carbon emissions and environmental footprint of the Council's main contractors have been analysed by the appointed Aether consultants. A list of initiatives and recommendations have been provided by the consultants and these will be addressed and implemented through the Climate Emergency Action Plan. An internal Working Group has been set up to develop environmental clauses for all major procurement/contracts and a Social Value Strategy which includes sustainability elements. A Sustainability/Environmental impact section has been embedded in the Key Decision report template. The following contractors have been included in 2021 as part of the 2030 carbon neutral scope and in the Council's ongoing monitoring of in-house carbon emissions: GLL Leisure Centres contractors: their baseline emissions were assessed at 1.2 ktCO2e in 2018/19. Their first interim target has been set for 2023/24 when they need to achieve 35% reduction on their greenhouse gas emissions. Their second interim target is for 2026/27 when they need to achieve 55% reduction. Their final target is for 2030/31 when they need to achieve 83% reduction.

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			Suez (Waste Disposal Contractor): their 2018/19 baseline emissions were 1.1 ktCO2e. Their first interim target for 2023/24 requires them to reduce their emissions by 37%. By 2026/27 Suez is expected to reduce their emissions by 59% and their final target for 2030/31 requires them to achieve 89% reduction. Other contracted services such as Ideverde (park maintenance contractors), Atlas FM (facilities management contractor), HCT (transport contractor) had their baseline emissions estimated at 0.2 ktCO2e in 2018/19. Their interim target for 2023/24 requires a 37% reduction in emissions. Their second interim target for 2026/27 requires a 59% reduction and their final target for 2030/31 requires 89% reduction. The Council's Waste Contractor Suez are trialling an EV refusing vehicle to determine its feasibility for the waste collection services. In 2024, Suez will replace around eight of its existing diesel refuse trucks with electric trucks. Ongoing works are taking place to upgrade the existing electrical infrastructure at Pembroke Road Offices.
37 Continue to develop the Community Kitchen Garden scheme	Localised solutions	Continue to develop the Community Kitchen Garden scheme which encourages residents and community groups to grow seasonal fresh fruit and vegetables. Local production eliminates deliveries (zero food miles) and helps tackle childhood obesity.	Kitchen gardens expanded at Notting Wood Estate with additional food growing beds. A rebuild at Portland Road kitchen garden to increase the number of plots to be completed by June 2022. Irrigation now installed at Norland Road kitchen garden and rebuild of plots completed. New kitchen garden now installed at Chelsea Manor Court. Tor Gardens kitchen garden build postponed due to maintenance works on estate – build to resume once works completed. Potential new kitchen garden sites identified at Hortensia Road and St Mark's Grove in Chelsea. Residents' consultation to be arranged with RBKC Housing as sites are located within RBKC social housing. Review of all kitchen garden waiting lists currently being undertaken and under used plots reclaimed to be offered to residents registered on kitchen garden database. Requests for plots have reduced since last Covid lockdown.

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38 Commercial production of fresh fruit, vegetables and flower seedlings through the charitable Cultivating Kensington and Chelsea gardens in the borough	Localised solutions	Overseeing the operations of the Cultivating K&C and support volunteers in establishing policies and systems. All profits from sales to the community kitchen garden clubs.	Operations at Cultivating Kensington and Chelsea (CKC) are currently paused while the charity reviews its operations. The glasshouses will be used by the community gardeners in the interim for training and volunteering opportunities. CKC trustees will make a decision to close the charity down or continue operations towards the end of 2022.
39 Increase recycling by Council staff members	Public Health and Raising Awareness	Refresh the promotion of recycling to members of Council staff.	In 2021 new recycling posters were distributed across the Council offices at Kensington Town Hall to remind staff about the correct recycling practices. A recycling workshop was delivered for 15 cleaning staff members at Kensington Town Hall in January 2022. Since most Council staff was still working from home in 2021, no new recycling campaigns have been done. Information about recycling and single-use plastics has been published for staff on the Council's internal intranet pages.
40 Increase the municipal recycling rate by 2%	Public Health and Raising Awareness	Deliver communication campaigns for residents, improve recycling infrastructure on estates, waste crew training and work with Commercial Waste Team to increase business recycling capture.	2021 was another difficult year to increase recycling and it is estimated that the municipal recycling rate has dropped about 1% over the year. Going forward the priorities are to expand our programme of waste reduction and recycling events, increase food waste collections and create 2 new posts to focus on doorstepping and recycling monitoring.
41 Review and model different waste collection systems	Localised solutions	Assess whether introducing a borough-wide food waste collection will be environmentally beneficial to identify solutions to improve waste collection rounds.	This work was covered as part of the Climate Change Team's Net Zero work. We are moving ahead with plans to roll out food waste further as it is likely to be a statuary requirement in the Government's Environment Bill
42 Deliver carbon reduction initiatives/campaign within the Council's	Emissions from developments and buildings	Implement and deliver the Greening the Office initiative and the Green Champions Scheme in Pembroke Road	In November 2021 during the COP26 Conference of the Parties, several climate change initiatives and events have been organised internally as part of Greening the Office initiative. The aim was to promote climate change, sustainability, and behavioural change amongst Council staff.

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
offices to emissions and change		and at the Kensington Town Hall.	The initiatives included: • Virtual climate change and sustainability quiz and talk about the Council's Green Plan and Climate Emergency declaration and Climate Emergency Action Plan. This was attended by 19 members of staff including senior officers. • An online green pledge and competition/challenge for Council staff was organised between Monday 1st of November and Friday 12th of November 2021. The Council's Climate Change Team shared information and green pledges linked to the Council's Climate Emergency declaration and the Green Plan. Staff members were asked to adopt a pledge and share pictures with their actions. As a result of this campaign, a clothes collection box was installed at Kensington Town Hall to allow staff to share their unwanted clothes and to promote messages about the impacts of fast fashion. • Two Scoping Workshops for internal staff with more than 60 members of staff attending have been organised as part of developing the Council's Carbon Neutral Pathways Report. • Carbon Literacy training has been organised and attended by 33 Council officers in February 2022.
43 Develop a Single Use Plastic policy and action plan	Localised solutions	Develop and deliver an action plan to minimise and phase out where feasible, the use of non-essential single-use plastics across the Council's operations and buildings, its contractors/suppliers, in schools and across the borough.	During lockdown, due to the COVID19 office restrictions and the majority of Council staff working from home, this initiative was put on hold. Therefore, it was not possible to organise any new campaigns or initiatives to promote the Council's Single-use Plastic Policy Statement and Action Plan. This will be now picked up as part of the new Climate Emergency Action Plan. The new Climate Emergency Action plan (2022-2027) features this as an ongoing action: • **Action 84:** Phase out single-use plastics within the Council's operations.
44 Increase the size of the existing Counters Creek Victorian sewer system	Localised Solutions	In partnership with Thames Water, facilitate work to increase the size of the existing	Thames Water confirmed that a strategic sewer was no longer needed and agreed to the following:

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
		Counters Creek Victorian sewer system to cope with flash flooding from intense rainstorms.	• Sustainable drainage systems to reduce surface water run-off entering the sewers (most of the schemes are in the London Borough of Hammersmith and Fulham except for Arundel Gardens); • anti-flooding (FLIP) devices to stop the sewers surcharging into lower properties; and, • a local sewer improvement (pumping station in Queensdale Road to reduce local flood risk). The Council publicly scrutinised Thames Water's decision regarding the strategic sewer. It successfully lobbied Ofwat to ensure further monitoring and research of the Counters Creek continues for the next Business Plan. Ofwat added two new performance commitments regarding the Counters Creek: • to produce a report about the risk of the catchment by the end of July 2023. The report should outline a long-term strategy for alleviating flooding in the area; • to report annually on how they are managing the network to ensure long-term resilience and reduce flood risk for customers, and how they are progressively developing their understanding of flood risk in the catchment. Further updates are provided on our webpage: https://www.rbkc.gov.uk/planning-and-building-control/planning-policy/flooding/counters-creek-project. Ofwat's final determination included two new performance commitments for Thames Water regarding the Counters Creek: • to produce a report about the risk of the catchment by the end of July 2023. The report should outline a long-term strategy for alleviating flooding in the area • to report annually on how they are managing the network to ensure long-term resilience and reduce flood risk for customers, and how they are progressively developing their understanding of flood risk in the catchment

Measure	LLAQM Action Matrix Theme	Action	**Progress** • Emissions/Concentration data • Benefits • Negative impacts / Complaints
45 Support the delivery of Sustainable Drainage Systems (SuDs) both in new developments and through retrofitting	Localised solutions	Support the delivery of Sustainable Drainage Systems (SuDs) both in new developments and through retrofitting, to absorb and divert as much rainwater as possible away from the sewers during periods of heavy rainfall.	The Local Plan 2019 can be found here: https://www.rbkc.gov.uk/planning-and-building-control/planning-policy/local-plan/local-plan-2019. Policy CE2(g) refers to the provision of SuDS and has strengthened the requirement for SuDS. Planning and Place successfully bid for £500k of levy funds to implement SuDS in the Council's social housing from the Thames Regional Flood and Coastal Committee. A draft design was produced in 2020 and is currently being consulted with the residents in 2021. The draft design can be seen here: https://planningconsult.rbkc.gov.uk/consult.ti/PortobelloSuDS/consultationHome The Council recently adopted its Greening SPD which aims to reduce the overall impact of development both, during construction and operation. It also aims to help addressing climate change impacts. It gives detailed guidance to both developers and residents on the measures they can implement to reduce the building's carbon footprint. This guidance is not only for new development but also for existing development (retrofitting). The adoption of the Greening SPD will take place in the spring 2021. The Draft Greening SPD provides guidance on how to implement SuDS policy (CE2g) in chapter 12 (minimising flood risk.
X61 Retrofit SuDs in existing properties	Localised Solutions	Install SuDs such as rainwater retention features in existing properties.	The Council recently adopted its Greening SPD which aims to reduce the overall impact of development both, during construction and operation. It also aims to help addressing climate change impacts. It gives detailed guidance to both developers and residents on the measures they can implement to reduce the building's carbon footprint. This guidance is not only for new development but also for existing development (retrofitting). The adoption of the Greening SPD will take place in the spring 2021. The Draft Greening SPD provides guidance on how to implement SuDS policy (CE2g) in chapter 12 (minimising flood risk.
46 Mitigate against increases in area of impermeable land by stopping the paving of front gardens	Localised solutions	Use the planning control process to reduce the loss of front gardens by resisting paving.	Policy CE2i of the Council's Local Plan resists the increase in impermeable areas not just in front gardens but all landscaped areas. Policy CE2g(i) also encourages the increase of permeable areas when providing SuDS. https://www.rbkc.gov.uk/planning-and-building-control/planning-policy/local-plan/local-plan-2019.

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
			Information regarding the permitted development rights for using permeable surfaces when paving front gardens has been included at the end of the Council's SuDS webpage: https://www.rbkc.gov.uk/planning-and-building-control/planning-policy/flooding/sustainable-drainage-systems
47 Promote the use of the Council's SuDs tool for small developments	Localised Solutions	Continue to promote the use of the Council's SuDs tool for small developments.	The SuDS tool was decommissioned in March 2019. Very detailed information on how to meet our policy on SuDS for minor and major applications was uploaded on our SuDS webpage: https://www.rbkc.gov.uk/planning-and-building-control/planning-policy/flooding/sustainable-drainage-systems. The SuDS uptake has continued as SuDS are required by policy CE2g and CL7i of the Local Plan. The recently adopted Greening SPD provides guidance on how to implement our SuDS policy (CE2g) in chapter 12 (minimising flood risk).
48 Promote green infrastructure (walls, roofs) and other eco-initiatives in schools	Localised solutions	Further develop school participation in green infrastructure and eco-initiatives that enhance the curriculum, involve parents and lead to reduction of car use in collaboration with the Healthy School Partnership.	Finalising handover of Phase 1 of the Bee Superhighway and updating asset register of new habitats. Delivery in 2021 included over 15 new habitat sites or biodiversity enhancements, including wildflower meadows and installation of bug hotels. 12 engagement activities were delivered as part of the project, engaging 378 people. The interactive map is still in the development phase, but we hope to have it online later in the summer. The Bee Superhighway project was awarded a 2021 Defra Bees' Needs Champions Award in recognition of the number of habitats created, and the public engagement programme providing free wildflower seeds for residents. Phase 2 of the project is currently under development, with targets set as part of the Biodiversity Action Plan. Ecology Service school engagement for the 21/22 financial year: 244 forest school sessions, and 94 environmental education sessions, engaging 5,832 pupils in outdoor sessions.
49 Support the development of food	Localised solutions	Work with schools to encourage and support them in	Food growing support in the form of teaching in five RBKC schools continues to be delivered by Hammersmith Community Gardens Association.

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
growing gardens in schools		the delivery of food growing gardens.	Since Covid restrictions have been lifted contact teaching has now resumed in schools.
50 Support the development of community food waste composting initiatives	Localised solutions	Encourage and support the development of small-scale community food waste composting initiatives.	Alternative composting regimes are being trialled in community kitchen gardens using aero bins and hot composters instead of open composters. This is to reduce issues with rodents and discourage plot holders from adding inappropriate material into the composters.
51 Review planning applications to ensure that biodiversity is improved, not damaged by new build and refurbishment	Other	Check/review planning applications to ensure that development impacts on the borough's ecology are minimised and to maximise biodiversity gains from development by creating new habitat through green roofs.	Borough-wide habitat survey commissioned for 2022. Any updates to SINC designations or biodiversity recommendations will be conveyed to Planning and site managers to update as required. Biodiversity Action Plan 2022-2027 has been completed and approved by full Council. It is due for official launch in June 2022. Discussions are ongoing with Planning Dept. re. actions relevant to planning, e.g. introduction of Biodiversity Net Gain requirements, confirmation of UGF for the borough. Ecology Service Manager to attend pre-application meetings to support maximising biodiversity opportunities, and sense-check external ecological consultant reporting. Ecology Service Manager attending opportunity area meetings e.g. Earl's Court, to ensure biodiversity considerations. This is on a trial basis to review level of ecological resourcing needed to support planning applications – to be reviewed with Planning team in 4 months.
52 Require developers to contribute to local air quality improvements	Other	Increase air quality action fund contributions to directly provide a resource for air quality specialists and to achieve actual air quality improvements.	£36K of S106 funding for AQ was secured in 2021-2022. CIL is collected into a corporate central budget. The allocation of CIL is determined by finance through Capital Strategy and Asset Management Board and the Leadership Team through the Capital Programme (to be spent on infrastructure).
X74 Push for the borough to be included in the Ultra-Low Emission Zone (ULEZ)	Cleaner Transport	As part of the TfL/GLA Engagement Group, enter discussions with the new Mayor of London on the potential to increase the air quality benefits in the borough of the ULEZ	The expanded ULEZ zone began in October 2021.

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
		proposal, and/or tightening the LEZ.	
X75 Support TfL in ensuring the entire borough is part of the 'Cycle Hire' scheme	Cleaner Transport	Support the expansion of the Cycle Hire scheme north of the Westway.	No progress due to TfL funding constraints.
X76 Work with TfL to reduce emissions from buses in the borough	Cleaner Transport	Lobby and work with TfL to ensure that all bus routes through the borough are ULEZ-compliant and explore options for hybrid buses to run in pure electric mode through the most polluted areas.	We now have seven routes in the borough which operate with fully electric vehicles (routes 23, 70, 94, 319, 360, C1 and C3,). The route 7 is fully Hydrogen. There has been a delay in making the route 49 electric but we expect the route to operate with an electric bus later in 2022. Of the 33 routes in the borough only one will remain a non-hybrid Euro 6 Diesel until 2023. All remaining routes are Euro 6 Hybrid.
X77 Work with TfL to deliver Crossrail stations in the borough	Cleaner Transport	Work with TfL on delivery of Crossrail 2 station in the King's Road area.	There seems no imminent prospect of Crossrail 2 being taken forward.
X78 Lobby TfL for increased public transport links in the borough	Cleaner Transport	Continue to work with Crossrail sponsors on feasibility of a Kensal Portobello Crossrail station at Canal Way.	We are continuing to correspond with Network Rail and Transport for London on the Council's aspiration to deliver a station on the Elizabeth line at Kensal Canalside. We understand from our dialogue that the delivery of a station within the next 15 years is not considered feasible.
X79 Lobby TfL and the Mayor of London to reduce emissions from taxis	Cleaner Transport	Lobby TfL/Mayor of London to make the decommissioning scheme for 10 year old taxis mandatory.	We continue to work with TfL on taxi problems around the borough.
54 Lobby TfL and the Mayor of London to raise taxi drivers' awareness of techniques to reduce emissions	Cleaner Transport	Lobby TfL/Mayor of London to establish eco-driving training as a requirement for all taxi and private cab drivers.	We continue to engage with the Taxi Driver representative bodies as well as the Taxi team at TfL to raise issues over idling and illegal ranking in residential areas
55 Lobby the government for higher environmental building standards	Reduce Emissions from Developments and Buildings	Continue lobbying the Government so that Local Authorities are allowed to set	In 2020, the Council responded to the Future Homes Standard consultation: changes to Part L and Part F of the Building Regulations for new dwellings. The Council recognised and supported the fact that the London Plan successfully

Measure	LLAQM Action Matrix Theme	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
		higher environmental standards for new buildings and major refurbishments that are higher than the current building regulations (Housing Standard Review).	required higher standards than those being consulted upon. We explained that lowering those standards would not help meeting the Government's 2050 net zero carbon targets nor would it help the Council's climate change emergency targets. We requested that local planning authorities were not restricted from setting higher energy efficiency standards for dwellings. We argued that the principal performance metric should be the actual energy used in the home (regulated and unregulated) rather than carbon emissions or primary energy and we lobbied for the Fabric Energy Efficiency Standard (FEES) not to be removed. Earlier in 2021 the government made the decision to continue to allow local planning authorities to set their own energy efficiency targets. The Council recently adopted its Greening SPD which aims to reduce the overall impact of development both, during construction and operation. It also aims to help addressing climate change impacts. It gives detailed guidance to both developers and residents on the measures they can implement to reduce the building's carbon footprint. This guidance is not only for new development but also for existing development (retrofitting).

3.2. Air Quality Action Plan 2022 - 2027

The previous Air Quality and Climate Change Action Plan came to an end in 2021. A new standalone Air Quality Action Plan has been produced and after a public consultation was adopted by the Council In March 2022. The new plan has been produced in conjunction with new Climate Change and Biodiversity action plans, although standalone each plan has synergies and crossover actions in order to support the implementation of the other. The new plan will be reported on as of the 2023 Annual Status Report.

4. Planning Update and Other New Sources of Emissions

Table R. **Planning requirements met by planning applications in Kensington & Chelsea in 2021**

Condition	Number
Number of planning applications where an air quality impact assessment was reviewed for air quality impacts	28
Number of planning applications required to monitor for construction dust	15
Number of CHPs/Biomass boilers refused on air quality grounds	0 (None Received)
Number of CHPs/Biomass boilers subject to GLA emissions limits and/or other restrictions to reduce emissions	0 (None Received)
Number of developments required to install Ultra-Low NO_x boilers	1
Number of developments where an AQ Neutral building and/or transport assessments undertaken	15
Number of developments where the AQ Neutral building and/or transport assessments not meeting the benchmark and so required to include additional mitigation	0
Number of planning applications with S106 agreements including other requirements to improve air quality	1
Number of planning applications with CIL payments that include a contribution to improve air quality	Not available
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.	0
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 at www.nrmm.london and that all NRMM used on-site is compliant with Stage IIIA of the Directive and/or exemptions to the policy.	22 conditions included 17 registered and compliant 0 unregistered/uncompliant and being chased.

Planning Applications requiring air quality comments are either forwarded directly to the Pollution Regulatory Team or through to the EH Plan inbox which is checked on a regular basis. Kensington and Chelsea participate in the Pan-London NRMM project which sees NRMM Officers visit construction sites to ensure their compliance

with guidance and legislation. This is often in conjunction with the Councils CREST and Noise and Nuisance Teams who oversee construction dust / noise complaints and issues**.**

4.1 New or significantly changed industrial or other sources

No new sources identified.

5. Additional Activities to Improve Air Quality

5.1   Royal Borough of Kensington and Chelsea Fleet

There are currently 127 vehicles in total within the RBKC fleet (including Housing), out of which 11 are fully electric and 13 are hybrid vehicles. Electric vehicles represent 8.66% and hybrid 10.23% of the total fleet. In total electric and hybrid vehicles represent 18.89% of the total fleet.

5.2   NRMM Enforcement Project

Between April 2021 and March 2022, the following audits occurred.

Table S.   Compliance Information from NRMM 2022 Financial Year Report

Compliance Information	
Total Audits	34
*Self-compliant	1
**Compliant	0
Non-compliant	0
No NRMM	32
Site Complete	1
Pending	0
Engagement Status	
Cold-Engaged	30
Not Cold-Engaged	4

Kensington and Chelsea will continue to support the NRMM Enforcement Project in 2022 into 2023.

5.3   Air Quality Alerts

Kensington and Chelsea supports airTEXT which is a free air quality alert service. Alerts can be provided by SMS text message, email and voicemail for 3-day forecasts of air quality, pollen, UV and temperature across Greater London. The alerts are based on forecasts of expected ambient air quality over the next three days, to enable you to plan ahead. They also provide health advice and actions to take in reference to the different alerts. The website can be accessed at https://www.airtext.info/ or the application downloaded from the Google Play or Apple Store to your mobile phone.

Appendix A   Details of Monitoring Site Quality QA/QC

A.1   Automatic Monitoring Sites

Data Management and Local Site Operator (LSO) duties for RBKC's Automatic Monitoring Station Network for the period of 2021 was undertaken by Ricardo Energy and Environment, who have been in employment by RBKC since November 2017. All real-time data from the monitoring stations was independently collected and validated on a daily basis. A combination of automatic and manual checks was utilised to assess data, identify, and diagnose potential equipment faults and adjust data to take account of calibration tests. Automatic overnight calibrations were supplemented with regular manual calibrations of analysers. The procedures used conform to EU standards that are a requirement of the AURN.

All data is also formally ratified and available online by accessing the Air Quality England Website and selecting Kensington & Chelsea within the menu bar. During this process, the validation decisions can be ratified with the benefit of hindsight and using greater information, such as service records, calibration records and the results of station audits. Station audits are carried out by Ricardo Energy and Environment's in house audit team.

In addition, due to the PM_{10} / $PM_{2.5}$ monitoring undertaken at the North Kensington monitoring site being affiliated to the AURN/LAQN monitoring network, independent calibration and audits are completed for the FIDAS monitors by Defra appointed contractors.

PM_{10} Monitoring Adjustment

PM_{10} monitoring is completed within the borough at three monitoring sites: KC1 with a FIDAS, KC2 with an FDMS, and KC5 with a 1020 heated BAM (installed May 2019). As per LLAQM guidance[1], through independent data validation completed by Ricardo Energy and Environment, the BAM data is corrected by dividing the raw data by 1.035. Monitoring data from the FDMS and FIDAS monitors do not require correction during their data validation stage.

All fully validated monitoring PM_{10} data is available through the Air Quality England Website.

A.2   Diffusion Tubes

The NO_2 diffusion tubes for the year 2021 were supplied and analysed by Gradko with the 50% Triethanolamine (TEA) in acetone preparation method utilised. Gradko is a UKAS accredited laboratory that follows the procedures set out by Defra within Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users, and strict internal QA/QC procedures to ensure that concentrations reported are as accurate as possible. In addition, Gradko participate in two independent QA/QC schemes to ensure their performance is constantly independently reviewed.

1)   AIR-PT

AIR is an independent proficiency-testing (PT) scheme that is operated by LGC standards and supported by the Health and Safety Laboratory (HSL). AIR-PT began in April 2014 and combined two long running PT schemes: LGC Standards STACKS

PT scheme, and the HSL WASP PT scheme. AIR is a recognised performance-testing programme for labs undertaking NO_2 diffusion tube analysis as part of a wider UK NO_2 monitoring network. The AIR-PT results for Gradko during 2021 are presented in Table A.1 below.

Further information on proficiency testing can be found at Defra's Local Air Quality Management webpages under QA/QC framework for NO_2 diffusion tube monitoring.

Table A.1 Gradko Performance within AIR-PT for NO_2 Diffusion Tubes – 2021

AIR PT AR042	AIR PT AR043	AIR PT AR044	AIR PT AR045
January – March 2021	TBC	TBC	TBC
25%	TBC	TBC	TBC

Notes
TBC denotes that the results have yet to be published on the DEFRA website.

2)   Network Field Inter-Comparison Exercise

Gradko International also takes part in the NO_2 Network Field Inter-Comparison Exercise, operated by the National Physical Laboratory (NPL), which complements the AIR-PT scheme in assessing sampling and analytical performance of diffusion tubes under normal operating conditions. This involves the regular exposure of a triplicate set of tubes at an Automatic Urban Network site (AURN) site where continuous chemiluminescent analysers measure NO_2 concentrations.

The inter-comparison exercise is completed at the Marylebone AURN monitoring station. Of particular interest is the bias of the diffusion tube measurement relative to the automatic analyser that gives an indication of accuracy. Performance criterion have been established for participating laboratories in line with the Air Quality Directive 2008/50/EC requirement for indicative monitoring techniques, as the 95% confidence interval of the annual mean bias which should not exceed ±25%.

In conjunction with this, a measure of precision is determined by comparing the triplicate co-located tube measurements, commonly referred to as the coefficient of variation (CoV). This value is useful for assessing the uncertainty of results due to sampling and analytical techniques. The NPL performance criterion for precision is that the mean coefficient of variation for the full year should not exceed 10%, should this be achieved the precision is given a score of 'good'.

Gradko operates well within the required level of performance in terms of accuracy and precision, as shown by the results presented in Tables A.3.

Table A.2 Gradko NO_2 Network Field Inter-Comparison Results for 2021

Annual Mean Bias		Precision	
Performance Target	Gradko Annual Mean Bias	Performance Target	Gradko Precision
±25%	TBC	10%	Good

Benzene Diffusion Tubes

All Benzene tubes were analysed by a Gradko International who are a UKAS accredited laboratory using desorption scanning gas chromatography/mass spectrometry (GC/MS). This method of analysis gives unequivocal identification of BTEX peaks. The analysis is carried out in accordance with the Gradko International Laboratory Quality Procedure GLM 4.

The accuracy of the Laboratory measurements was monitored by participation in the Laboratory Measurement Proficiency Scheme.

The measurement method used in the Benzene survey were consistent with the sampling, analysis, and QA/QC requirements of EN 14662-4: 2005 Ambient Air Quality – Standard Method for Measurement of Benzene Concentrations – Part 4: Diffusive Sampling followed by Thermal Desorption and Gas.

Factor from Local Co-location Studies

RBKC are part of the London Wide Environmental Programme (LWEP) for which a number of co-location studies are completed across seven London Boroughs. During 2021 triplicate diffusion tube monitoring was completed at two Automatic Monitoring sites within the borough: North Kensington – KC47 and Cromwell Road – KC54. The bias adjustment factor calculated for the North Kensington and Cromwell Road Monitoring Stations are presented in Figure A.1.

The co-location study result was included within the LWEP bias adjustment calculations as presented in Table A.3 due to passing both data capture and diffusion tube precision checks.

Figure A.1 North Kensington Bias Adjustment Factor

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data Capture
1	06/01/2021	03/02/2021	31.0	31.5	31.0	31	0.3	1	0.8	26.6	100	Good	Good
2	03/02/2021	03/03/2021	28.2	23.8	28.7	27	2.7	10	6.7	23.9	90	Good	Good
3	03/03/2021	31/03/2021	25.3	24.4	24.0	25	0.7	3	1.7	24.9	100	Good	Good
4	31/03/2021	05/05/2021	20.1	21.5	21.8	21	0.9	4	2.2	22.5	100	Good	Good
5	05/05/2021	02/06/2021	19.4	19.7	19.0	19	0.4	2	0.9	16	100	Good	Good
6	02/06/2021	30/06/2021	15.2	15.2	14.8	15	0.2	1	0.6	12	100	Good	Good
7	30/06/2021	04/08/2021	16.8	17.1	16.9	17	0.2	1	0.5	13	100	Good	Good
8	04/08/2021	01/09/2021	12.8	13.6	13.2	13	0.4	3	1.0	10	100	Good	Good
9	01/09/2021	29/09/2021	23.6	24.2	22.2	23	1.0	4	2.6	19	100	Good	Good
10	29/09/2021	03/11/2021	24.6	25.0	24.9	25	0.2	1	0.4	19	100	Good	Good
11	03/11/2021	01/12/2021	28.3	25.4	24.0	26	2.2	9	5.5	26	100	Good	Good
12	01/12/2021	05/01/2022	24.5	26.1	23.4	25	1.4	6	3.4	21.5	100	Good	Good
13													

Diffusion Tubes Measurements | **Automatic Method** | **Data Quality Check**

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey --> Good precision | Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	**KC47 Sion Manning**

Precision	12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 12 periods of data
Bias factor A 0.88 (0.82 - 0.95)
Bias B 14% (6% - 22%)
Diffusion Tubes Mean: 22 μgm^{-3}
Mean CV (**Precision**): 4
Automatic Mean: 20 μgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 20 (18 - 21) μgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A 0.88 (0.82 - 0.95)
Bias B 14% (6% - 22%)
Diffusion Tubes Mean: 22 μgm^{-3}
Mean CV (**Precision**): 4
Automatic Mean: 20 μgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 20 (18 - 21) μgm^{-3}

Jaume Targa, for AEA
Version 04 - February 2011

Figure A.2 Cromwell Road Bias Adjustment Factor

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Period	Diffusion Tubes Measurements									Automatic Method		Data Quality Check	
	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data Capture
1	06/01/2021	03/02/2021	38.6	42.3	37.5	39	2.5	6	6.3	33.4	100	Good	Good
2	03/02/2021	03/03/2021	42.0	43.4	37.3	41	3.2	8	8.0	33.6	100	Good	Good
3	03/03/2021	31/03/2021	39.1	40.9	38.9	40	1.1	3	2.8	32.6	100	Good	Good
4	31/03/2021	05/05/2021	37.6	36.5	38.4	38	0.9	2	2.3	31.4	100	Good	Good
5	05/05/2021	02/06/2021	36.0	22.7	33.6	31	7.1	23	17.6	24	70	Poor Precision	Poor Data Capture
6	02/06/2021	30/06/2021	32.0	31.4	32.6	32	0.6	2	1.5	24	100	Good	Good
7	30/06/2021	04/08/2021	33.5	32.6	33.9	33	0.6	2	1.5	24	100	Good	Good
8	04/08/2021	01/09/2021	30.6	30.3	30.8	31	0.2	1	0.5	23	100	Good	Good
9	01/09/2021	29/09/2021	44.8	44.1	44.1	44	0.4	1	0.9	21	100	Good	Good
10	29/09/2021	03/11/2021	43.8	43.9	42.6	43	0.7	2	1.8	34	100	Good	Good
11	03/11/2021	01/12/2021	44.4	44.4	45.1	45	0.4	1	1.1	31.7	100	Good	Good
12	01/12/2021	05/01/2022	41.0	39.0	39.3	40	1.1	3	2.7	35.4	100	Good	Good
13													

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey --> **Good precision** | **Good Overall DC**

Site Name/ ID:	**KC47 Sion Manning**

Precision   11 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 11 periods of data
- Bias factor A   0.76 (0.67 - 0.88)
- Bias B   32% (13% - 50%)
- Diffusion Tubes Mean: 39 μgm^{-3}
- Mean CV (**Precision**):   3
- Automatic Mean: 29 μgm^{-3}
- Data Capture for periods used: 100%
- **Adjusted Tubes Mean: 29 (26 - 34) μgm^{-3}**

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 11 periods of data
- Bias factor A   0.76 (0.67 - 0.88)
- Bias B   32% (13% - 50%)
- Diffusion Tubes Mean: 39 μgm^{-3}
- Mean CV (**Precision**):   3
- Automatic Mean: 29 μgm^{-3}
- Data Capture for periods used: 100%
- **Adjusted Tubes Mean: 29 (26 - 34) μgm^{-3}**

Jaume Targa, for AEA
Version 04 - February 2011

Figure A.3   Local Bias Adjustment Factor

Bias Adjustment Factor

<div style="color:red">Click here to access the latest National Diffusion Tube Bias Adjustment Spreadsheet</div>

<u>Enter data into the pink cells</u>

i) Enter National Bias Adjustment Factor	0.83	

ii) How many co-located diffusion tube sites are there in your Local Authority area?	2	*Follow instructions in STEP 3a and STEP 3b Local Bias Adjustment tabs to calculate local factor, then return to this tab to define which factor to use for data processing*
Local Bias Adjustment Factor	0.83	*Review bias adjusted annual mean results below and define which factor to use for data processing*

iii) Which bias adjustment factor will be used for data processing?	Local	*Proceed to STEP 4 - Fall off with Distance tab*

Discussion of Choice of Factor to Use

Historically a single BAF derived from the North Kensington Monitoring Station (NKMS) Urban Background co-location site, was used to correct raw Diffusion Tube data. The NKMS BAF is considered to represent the best local BAF for Urban Background Diffusion Tube monitoring locations and monitoring locations away from busy roads in the borough.

Table A.3   Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	03/22	0.83
2020	Local	06/21	March 0.88 May 0.89 Jan, Feb, Apr, Jun-Dec 0.95
2019	Local	09/20	Non-Urban Background: 0.87 Urban Background: 1.01
2018	Local	06/19	0.98
2017	Local	03/18	1.15
2016	Local	-	1.15
2015	Local	-	1.07
2014	Local	-	1.03

A.3   Adjustments to the Ratified Monitoring Data

Short-term to Long-term Data Adjustment

In regard to the 2021 diffusion tube data set, the data capture for 2021 was below 75% at three monitoring sites along Kensington High Street: KC96, KC97 & KC104.

Annualisation of the monitoring sites has been completed in line with Box 4.8 and 4.9 within LLAQM.TG(16)1 and full working details are presented in Table A.6 and Table A.7. In completing the annualisation process, data has been taken from a number of automatic monitoring sites that are part of the LAQN/AURN. In line with LLAQM.TG(16)1 the monitoring sites that have been used lie within a radius of approximately 50 miles of the sites to be annualised and have a data capture of 85% or above.

All monitoring stations that were used are background monitoring stations and as such are not influenced by local sources of air pollution such as road traffic emissions at roadside monitoring sites. The monitoring sites that were used are listed in Table A.5.

Distance Adjustment

In line with LLAQM.TG(16) distance correction has been applied to NO_2 monitoring sites that are not sited at locations of relevant exposure as detailed within the LLAQM Guidance documents. The NO_2 Fall-Off with Distance Calculator (v4.2) has been used to predict the NO_2 concentration at a location of relevant exposure; the calculations are presented below, with the predicted concentrations also presented in Table M.

To complete the NO_2 fall off with distance calculations a background value for each monitoring location is required. Background NO_2 concentrations for 2020 have been derived from the Defra Background Map database that has a current baseline of 2018.

Distance correction has been completed for all Roadside and Kerbside monitoring locations and not the Urban Background and Urban Centre locations. In addition, distance correction was unable to be completed at a number of Diffusion Tube monitoring sites due to the 2020 monitored NO_2 concentration being higher than the 2019 background concentration as derived from the Defra Background Maps.

Table A.4   Short-Term to Long-Term Monitoring Data Adjustment

Site ID	Annualisation Factor Sion Manning	Annualisation Factor Horseferry Road	Annualisation Factor Ealing Vale	Annualisation Factor Bloomsbury	Av. Annualisation Factor	Raw Data Annual Mean ($\mu g/m^3$)	Annualised Annual Mean ($\mu g/m^3$)
KC96	1.0473	1.1256	-	1.0145	1.0625	46.0	48.9
KC97	0.8891	0.8929	-	0.8909	0.8910	51.8	46.1

Table A.5   NO$_2$ Fall off With Distance Calculations

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
KC33	1.1	2.1	43.8	31.9	**42.2**	*Predicted concentration at Receptor above AQS objective.*
KC38	1.7	2.7	41.0	31.9	**40.0**	*Predicted concentration at Receptor above AQS objective.*
KC48	7.0	8.0	36.6	31.3	*36.3*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC49	4.0	5.0	36.7	31.3	*36.4*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC56	9.0	23.0	36.5	31.3	34.7	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.*
KC59	0.7	1.7	39.8	31.3	*38.4*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC82	0.5	1.0	39.5	31.3	*38.5*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC83	0.5	1.0	39.7	31.3	*38.7*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC84	0.5	1.0	46.5	31.3	**44.6**	*Predicted concentration at Receptor above AQS objective.*
KC85	0.5	1.5	38.5	31.3	*37.1*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC86	0.5	1.5	36.3	31.3	35.3	
KC87	0.5	1.5	39.5	31.3	*37.9*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC88	0.5	1.0	39.3	31.3	*38.3*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC89	0.5	1.0	52.1	31.3	**49.6**	*Predicted concentration at Receptor above AQS objective.*
KC90	5.0	5.5	43.5	31.3	**43.2**	*Predicted concentration at Receptor above AQS objective.*
KC91	0.5	1.0	49.4	31.3	**47.2**	*Predicted concentration at Receptor above AQS objective.*

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted (µg m³)	Background Concentration (µg m³)	Concentration Predicted at Receptor (µg m³)	Comments
KC92	0.5	1.0	43.4	31.3	**41.9**	*Predicted concentration at Receptor above AQS objective.*
KC93	0.5	1.0	47.9	31.3	**45.9**	*Predicted concentration at Receptor above AQS objective.*
KC94	1.0	1.5	44.3	31.3	**43.3**	*Predicted concentration at Receptor above AQS objective.*
KC95	0.3	0.8	48.4	31.3	**45.7**	*Predicted concentration at Receptor above AQS objective.*
KC96	1.0	1.5	40.6	31.3	*39.8*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC97	0.5	0.8	38.3	31.3	*37.7*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC98	0.5	1.0	45.3	31.3	**43.6**	*Predicted concentration at Receptor above AQS objective.*
KC99	0.5	1.0	45.1	31.3	**43.4**	*Predicted concentration at Receptor above AQS objective.*
KC100	0.5	1.0	41.9	31.3	**40.6**	*Predicted concentration at Receptor above AQS objective.*
KC101	0.5	1.0	42.0	30.4	**40.6**	*Predicted concentration at Receptor above AQS objective.*
KC102	1.0	1.5	43.3	30.4	**42.2**	*Predicted concentration at Receptor above AQS objective.*
KC105	0.5	1.0	39.8	30.4	*38.7*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC106	0.5	1.0	38.6	30.4	*37.6*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC107	1.5	2.5	37.1	30.4	*36.4*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC98	0.5	1.0	45.3	31.3	**43.6**	*Predicted concentration at Receptor above AQS objective.*
KC99	0.5	1.0	45.1	31.3	**43.4**	*Predicted concentration at Receptor above AQS objective.*
KC100	0.5	1.0	41.9	31.3	**40.6**	*Predicted concentration at Receptor within 10% the AQS objective.*

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted ($\mu g\ m^3$)	Background Concentration ($\mu g\ m^3$)	Concentration Predicted at Receptor ($\mu g\ m^3$)	Comments
KC101	0.5	1.0	42.0	30.4	**40.6**	*Predicted concentration at Receptor within 10% the AQS objective.*
KC102	1.0	1.5	43.3	30.4	**42.2**	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.*
KC105	0.5	1.0	39.8	30.4	*38.7*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC106	0.5	1.0	38.6	30.4	*37.6*	*Predicted concentration at Receptor within 10% the AQS objective.*
KC107	1.5	2.5	37.1	30.4	*36.4*	*Predicted concentration at Receptor within 10% the AQS objective.*

Appendix B   Full Monthly Diffusion Tube Results for 2021

Table A.5   NO₂ Diffusion Tube Results

Site ID	Valid data capture for monitoring period %[a]	Valid data capture 2021 %[b]	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Annual Mean – Raw Data	Annual Mean – Bias Adjusted
KC31	100	100	32.3	32.9	38.5	37.3	35.0	28.3	29.6	22.2	38.2	35.3	33.3	31.4	32.8	27.3
KC32	100	100	28.0	25.2	19.2	18.5	15.8	13.3	14.1	11.4	19.5	21.4	25.0	6.9	18.2	15.1
KC33	91.6	91.6		49.4	55.5	48.8	51.7	47.6	45.1	46.5	62.0	61.1	64.3	48.4	52.8	**43.8**
KC34	100	100	36.8	31.1	29.7	26.8	24.5	21.5	22.5	17.4	31.8	31.7	34.8	30.3	28.3	23.4
KC35	75	75	45.9	42.1	41.9	40.1	43.6	39.2	38.1	40.9				46.2	42.0	34.8
KC38	100	100	59.7	51.7	51.7	43.6	48.5	19.0	47.9	44.0	60.2	61.1	56.1	48.7	49.4	**41.0**
KC39	100	100	32.8	27.7	27.5	24.0	22.9	49.5	20.7	17.7	29.5	24.9	28.1	22.6	27.3	22.7
KC81	100	100	35.1	28.6	30.6	26.3	23.2	19.2	19.6	14.9	27.7	26.5	30.5	27.4	25.8	21.4
KC41	100	100	34.6	31.2	23.5	22.6	23.8	19.8	21.5	16.4	27.1	27.1	28.2	27.1	25.2	20.9
KC42	100	100	28.9	27.2	24.5	27.1	22.2	17.5	18.5	14.0	27.0	27.2	32.3	26.6	24.4	20.3
KC43	100	100	33.2	32.2	27.0	24.2	21.2	19.3	21.4	18.2	28.4	25.5	29.7	26.5	25.6	21.2
KC44	100	100	35.7	40.6	28.7	29.2	33.4	23.8	28.8	20.3	38.0	30.7	32.3	27.6	30.7	25.5
KC45	100	100	32.5	26.1	23.3	24.1	24.4	20.0	22.3	17.8	28.7	37.6	32.6	29.9	26.6	22.1
KC47	100	100	31.0	28.2	25.3	20.1	19.4	15.2	16.8	12.8	23.6	24.6	28.3	24.5	22.5	18.6
KC47	100	100	31.5	23.8	24.4	21.5	19.7	15.2	17.1	13.6	24.2	25.0	25.4	26.1	22.5	18.6
KC47	100	100	31.0	28.7	24.0	21.8	19.0	14.8	16.9	13.2	22.2	24.9	24.0	23.4	22.5	18.6
KC48	100	100	42.4	48.1	38.7	38.2	45.4	40.7	44.5	42.4	54.2	51.3	43.4	39.3	44.1	36.6
KC49	100	100	39.0	37.3	37.8	43.2	45.5	40.7	44.7	36.0	58.8	51.2	46.2	50.3	44.2	36.7
KC50	100	100	38.3	31.3	34.3	28.7	32.8	26.8	30.4	22.7	36.7	34.3	36.7	31.3	32.0	26.6
KC51	91.6	91.6		22.8	23.9	21.9	20.4	16.3	17.8	14.0	23.1	22.7	29.0	22.2	21.3	17.7
KC52	100	100	32.8	39.8	31.4	36.2	35.6	30.9	31.3	23.4	41.8	39.4	34.1	35.2	34.3	28.5
KC53	100	100	39.3	29.8	31.4	28.3	28.1	26.1	25.8	21.8	33.0	35.7	31.3	29.5	30.0	24.9
KC54	100	100	38.6	42.0	39.1	37.6	36.0	32.0	33.5	30.6	44.8	43.8	44.4	41.0	38.6	32.0
KC54	100	100	42.3	43.4	40.9	36.5	22.7	31.4	32.6	30.3	44.1	43.9	44.4	39.0	38.6	32.0

Site ID	Valid data capture for monitoring period %[a]	Valid data capture 2021 %[b]	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Annual Mean – Raw Data	Annual Mean – Bias Adjusted
KC54	100	100	37.5	37.3	38.9	38.4	33.6	32.6	33.9	30.8	44.1	42.6	45.1	39.3	38.6	32.0
KC55	100	100	37.8	37.5	32.2	29.9	28.7	20.1	22.9	14.8	35.1	28.2	31.9	28.6	29.0	24.0
KC56	100	100	40.3	44.2	44.1	38.9	44.8	42.1	45.1	37.8	52.5	50.7	46.8	40.2	44.0	36.5
KC57	100	100	36.1	36.4	28.1	32.0	28.4	29.4	28.5	22.1	35.4	32.5	39.1	31.0	31.6	26.2
KC58	83.3	83.3		35.4		39.7	35.7	33.9	33.4	25.3	42.2	36.5	43.3	36.5	36.2	30.0
KC59	100	100	62.5	42.0	55.0	44.6	46.8	44.1	44.0	38.5	53.1	48.5	52.8	43.6	47.9	39.8
KC60	100	100	35.7	33.7	31.7	34.6	36.3	32.2	32.5	25.4	42.0	41.2	42.2	36.8	35.4	29.3
KC61	100	100	37.9	41.6	39.2	31.9	35.2	31.6	32.2	26.9	41.5	38.7	39.6	36.7	36.1	29.9
KC64	100	100	42.7	38.6	34.3	35.9	33.3	32.2	37.0	27.4	43.2	36.5	35.1	34.3	35.9	29.8
KC65	100	100	34.5	31.3	26.3	23.8	22.1	19.0	22.3	15.8	30.6	26.4	29.5	27.9	25.8	21.4
KC66	100	100	35.0	31.1	30.8	23.6	24.3	18.8	20.7	16.0	29.1	27.8	32.5	30.0	26.6	22.1
KC67	91.6	91.6	36.6	32.4	29.0	25.6	24.0	18.9	20.7	18.5		31.4	34.9	29.4	27.4	22.7
KC68	100	100	35.3	37.7	29.3	24.1	29.3	22.7	26.4	22.8	14.5	36.2	40.4	34.1	29.4	24.4
KC69	100	100	37.4	41.8	37.6	35.5	37.5	34.8	33.6	30.3	42.2	29.4	34.8	27.1	35.2	29.2
KC70	100	100	40.4	39.6	27.0	31.0	29.8	25.8	27.7	20.7	36.9	44.8	48.0	38.5	34.2	28.4
KC71	100	100	45.9	42.9	38.9	42.2	39.6	37.0	37.1	29.0	48.9	36.4	32.0	32.3	38.5	32.0
KC72	100	100	39.6	33.0	33.3	32.9	30.7	29.2	25.3	21.7	36.3	44.2	36.0	33.9	33.0	27.4
KC73	91.6	91.6	3.6	31.9	29.1	38.0	31.5	29.0	28.2	24.9	36.3	34.5		38.7	29.6	24.6
KC74	100	100	34.5	36.6	31.0	40.5	35.1	33.3	30.1	27.0	38.5	34.6	37.9	33.6	34.4	28.5
KC75	92.3	92.3		33.7	30.2	32.8	31.7	107.4	29.6	26.4	38.4	35.6	39.8	38.0	40.3	33.5
KC76	91.6	91.6	34.5	30.0	28.4	24.1	22.0	17.7	19.0	15.0	25.1		39.0	33.6	26.2	21.8
KC77	100	100	31.9	34.3	29.5	27.1	21.3	18.0	19.8	16.8	27.9	26.2	27.7	29.3	25.8	21.4
KC78	100	100	35.9	34.1	23.9	28.5	26.2	22.3	22.9	16.8	29.2	27.9	34.8	30.3	27.7	23.0
KC79	100	100	33.2	28.8	23.9	24.1	22.0	19.6	20.2	15.3	28.3	30.9	34.6	31.0	26.0	21.6
KC80	91.6	91.6	34.1	29.3	27.8	24.9	22.0		18.6	15.5	26.0	27.6	27.4	25.0	25.3	21.0
KC82	100	100	55.8	43.4	52.8	46.4	43.1	40.7	39.53	37.2	57.4	46.75	56.7	43.0	47.6	39.5
KC83	100	100	65.5	46.1	54.0	46.4	40.1	36.9	35.24	30.9	46.7	41.40	64.9	47.6	47.9	39.7
KC84	100	100	80.1	60.3	52.1	57.8	49.2	54.2	45.55	41.5	58.3	53.40	61.5	45.1	56.0	**46.5**

Site ID	Valid data capture for monitoring period %[a]	Valid data capture 2021 %[b]	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Annual Mean – Raw Data	Annual Mean – Bias Adjusted
KC85	100	100	59.6	49.4	57.0	50.8	43.7	42.7	42.78	33.4	46.9	46.03	45.3	34.9	46.4	38.5
KC86	100	100	54.5	56.0	51.4	49.8	44.9	44.6	33.17	32.1	42.0	33.79	33.5	28.5	43.7	36.3
KC87	91.6	91.6	72.3	50.6	54.9	48.2	42.7	46.7	41.11	32.1		43.06	43.2	37.3	47.6	39.5
KC88	100	100	61.4	68.2	51.6	52.1	40.3	39.2	37.64	30.2	42.2	48.52	42.0	46.1	47.3	39.3
KC89	100	100	84.5	66.1	69.7	55.4	52.4	58.5	50.20	44.8	70.6	62.97	73.6	52.4	62.8	**52.1**
KC90	91.6	91.6	77.2		44.4	55.0	40.2	50.2	45.83	34.0	52.5	71.89	71.0	47.7	52.5	**43.5**
KC91	100	100	79.9	66.9	59.4	66.6	56.1	57.8	50.90	35.8	56.8	65.49	59.5	57.0	59.6	**49.4**
KC92	100	100	64.4	58.1	56.1	64.2	55.1	48.0	47.74	37.1	56.3	43.70	44.9	39.0	52.3	**43.4**
KC93	100	100	76.5	59.2	68.4	59.7	55.9	52.5	50.02	39.6	59.9	56.24	57.9	47.6	57.7	**47.9**
KC94	91.6	91.6	61.3	53.2	56.6	51.8		52.6	51.15	39.7	58.9	51.42	62.1	44.6	53.4	**44.3**
KC95	91.6	91.6	82.1	56.6	68.6	52.3		53.7	50.76	42.7	60.1	49.40	58.4	50.8	58.4	**48.4**
KC96	66.6	66.6			46.5	41.5		46.1	39.15	32.9	52.7	48.75	56.3		46.0	**40.6**
KC97	83.3	83.3	62.3	53.9	55.0	47.9		47.2	40.73		55.5	55.85	49.0	43.3	51.8	38.3
KC98	91.6	91.6	59.6	53.2	62.8	51.2		59.2	41.34	36.1	65.8	60.23	52.9	50.3	54.6	**45.3**
KC99	100	100	58.8	70.3	58.1	55.1	58.5	54.6	47.35	28.1	54.7	63.00	59.0	46.9	54.4	**45.1**
KC100	100	100	60.4	62.9	61.0	48.2	57.4	28.2	43.12	36.8	57.3	57.70	47.1	45.9	50.5	**41.9**
KC101	100	100	60.7	55.3	59.8	54.3	57.7	19.7	48.20	38.4	66.2	61.68	54.6	39.2	50.6	**42.0**
KC102	100	100	54.2	55.0	54.6	56.2	53.6	52.3	47.83	41.2	59.5	53.94	52.2	43.0	52.2	**43.3**
KC103	83.3	83.3		47.6	47.8	42.7	38.5	35.5		23.8	41.0	38.26	42.7	32.8	39.1	32.5
KC104	83.3	83.3	53.4	58.2	46.6			37.4	40.41	31.4	49.9	49.05	39.1	42.0	44.8	35.5
KC105	91.6	91.6	64.8	51.2	54.4	51.0	47.3	45.4		28.9	48.1	45.95	47.1	42.0	48.0	39.8
KC106	100	100	58.5	53.4	49.3	43.2	46.1	43.7	40.14	33.7	53.6	46.30	46.2	36.7	46.5	38.6
KC107	100	100	53.4	52.1	52.0	44.9	46.2	42.2	37.21	31.8	54.2	39.71	38.4	32.2	44.7	37.1
KC108	100	100	44.5	37.6	39.1	42.5	36.6	31.7	33.80	23.3	48.2	39.46	36.7	34.8	37.5	31.1
KC109	91.6	91.6	51.4	44.2	45.8	45.0	41.3	41.4	37.90	35.9		44.27	44.0	38.8	43.1	35.8
KC110	100	100	46.3	47.5	42.8	39.9	38.7	36.2	37.50	28.6	47.8	43.42	41.9	37.0	40.7	33.7
KC111	100	100	50.6	37.6	44.1	38.3	37.3	33.1	30.48	25.6	41.9	37.61	44.5	38.4	39.1	32.5

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 m3, indicating a potential exceedance of the NO_2 hourly mean AQS objective are shown in <u>bold and underlined.</u>

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%).

Concentrations in red denote erroneous data that was not included within any reporting calculations.

Blank cells indicate a diffusion tube was missing and could therefore not analysed.