2020 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management

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Executive Summary: Air Quality in Our Area

Air Quality in Braintree District

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease, cancer and also asthma symptoms. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

The main source of air pollution within the Braintree district is road traffic. The main pollutant of concern is nitrogen dioxide (NO_2) from vehicle combustion engines. The A120, A131 and A12 pass through the district. The three main towns are Braintree, Halstead and Witham and there are increasing traffic flows in the town centres due to both commercial and residential development. Within the towns and larger villages there is the potential for elevated NO_2 levels at residential facades (point of relevant exposure) close to road junctions and air pollutant monitoring is focussed on these locations.

Monitoring for the year 2019 comprises 18 NO_2 diffusion tubes which includes complete data for 7 new locations (two in Witham and five in Halstead) with a previous site adjacent the A12 at Hatfield Peverel discontinued. There is no increasing trend for existing sites pre 2019. There are high concentrations of NO_2 determined to the north of Halstead High Street where Colchester Road and Head Street converge at a mini roundabout and locations indicate concern of possible exceedance of the NO_2 short term objective level (60µg/m^3) and annual mean objective level (40µg/m^3) at relevant points of exposure. Locations are shown in Appendix D Fig D4. Site BR14 is a pavement location alongside the road presenting as 56.8µg/m^3 (59.9µg/m^3 in 2018) and new tube sites at BR16 and BR20 determine 38.2 µg/m^3 and 37.5 µg/m^3 respectively at facades of residential property.

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

No exceedances are indicated at the points of relevant exposure for other monitoring sites. In Witham town, the highest reading tube is BR5 at Chipping Hill site at Witham where three roads converge onto a mini roundabout. There is now a diffusion tube at the nearest residential façade at BR22 and there is no likelihood of exceedance identified. There are no significant increasing trends at other monitoring locations.

Currently there are no AQMA's declared within Braintree District Council. Further investigation to better define the spatial variation of NO_2 concentrations in Halstead will continue as a priority.

Actions to Improve Air Quality

No AQMAs were declared within the Braintree District area in 2019 and therefore no action plan is required formally. Table 2.2 in the report details actions being taken to improve air quality.

Braintree District Council continues to manage air quality through air pollutant monitoring as described above, assessment of proposed development and promotion of sustainable development, inspection of existing industrial sources through the permitted process regime including liaison with the EA where necessary, control of taxis via the licensing regime and liaison with interested parties to promote good practice. Braintree District Council is a member of the Essex Air Quality group which meets regularly to promote good practice and improvements in air quality related issues ensuring that obligations under current UK Air Quality legislation are met within Essex. Essex County Council also attends this group to assist with County transport planning. There are projects to focus on removing congestion on the local road network such as securing planning consent to commence construction of new slip roads linking the A120 to Millennium Way alleviating congestion at Galleys Corner (roundabout on A120) in Braintree. Braintree District Council declared a climate emergency in 2019 and has started to make sure that Council activities are, as far as possible, carbon neutral by 2030. The first Electric Forecourt under construction in the UK is within Braintree District and due to open in 2020.

Currently Braintree District Council needs a significant growth of homes by 2033. The strategy through the local plan is to plan for infrastructure, control where development is located and to drive investment in rail, roads and the cycling infrastructure as well as looking at new modes of public transport. A key priority is to protect the environment

and supporting the district to reduce energy consumption, carbon emissions and pollution.

The construction of the combined heat and power and waste processing plant at Rivenhall airfield has received an environmental permit by the EA although construction has not commenced. No exceedance of air quality objectives at points of relevant exposure are predicted for this process.

Local Engagement and How to get Involved

Braintree District Council is a member of the Essex Air Quality Group (a group of representatives for Essex local authorities including Essex County Council (highways and Public Health) and other interested parties. www.essexair.org.uk contains comprehensive information about Essex air quality and daily air quality indicators. www.cleanairday.org.uk also provides advice on how the public can get involved with free resources. Members of the public are encouraged to may comment on planning applications and the new local plan on the environmental impacts.

Any queries about air quality matters or related strategies are welcomed and may be sent to the Public Health and Housing Team. Email– phandh@braintree.gov.uk

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1 Local Air Quality Management

This report provides an overview of air quality in Braintree District Council during 2019. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Braintree District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

There are no AQMAs within the Braintree District. Further investigation to better define the spatial variation of NO_2 concentrations in Halstead will continue.

☒ **Braintree District Council confirm the information on UK-Air regarding their AQMA(s) is up to date**

2.2 Progress and Impact of Measures to address Air Quality in Braintree District Council

Defra's appraisal of last year's ASR concluded (as given in italics below)

The Council has made progress with measures to address air quality in Braintree in 2018. No Air Quality Action Plan (AQAP) is required as there are no AQMAs declared, however a number of measures are still ongoing. These include the Councils four-year Corporate Strategy which has a priority of delivering strong sustainable transport infrastructure links to encourage a shift from car use to public transport, walking and cycling. In addition, the Local Plan contains actions such as the provision of electric vehicle charging points and measures to offset adverse air quality impacts.

On the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources. Following the completion of this report, Braintree District Council should submit an Annual Status Report in 2020.

Braintree District Council does implement measures which have an impact of offsetting the effects of air pollution in the district but has not quantified these measures and to date given that no AQMA has been declared has not needed to formulate an action plan to reduce levels at a specific site.

Braintree District Council will confirm the requirement for an AQMA in Halstead by ongoing monitoring and technical assistance where needed if modelling or continuous monitoring is required.

Other ongoing measures to improve air quality generally across the district are set out in Table 2.2.

Braintree District Council will proactively assess how the impact of these measures in terms of reduction of pollutants/emissions may be quantified and how various Braintree District Council Departments (Development Control, Health and Wellbeing, Braintree Energy Action/ Climate Team, Taxi Licensing, Procurement, Fleet management, Operations etc) can improve outcomes of the measures listed in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1.

The measures stated above and in Table 2.1 will help to contribute towards compliance of the air quality objectives.

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Local Plan specific to AQ impact assessment (e.g provision of EV charging points and measures to offset adverse impact)	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	ongoing	Local Authority Environmental Health, Local Authority Transport	Local Authority	n/a	No AQMA - not quantified	Implementation on-going	2020	Shared local plan including garden community villages rejected in 2019. Local plan delayed
2	Provision of air impact assessment and mitigation for construction and demolition stage by developers	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	ongoing	Local Authority Environmental Health	Local Authority	n/a	No AQMA - not quantified	Implementation on-going	ongoing	working well, incorporated into planning conditions and requiring air quality assessments in accordance with IAQM/EPUK planning guidance
3	Provision of travel plans through planning process	Alternatives to private vehicle use	Other	ongoing	Local Authority Environmental Health, Local Authority Transport	Local Authority	n/a	Reduced vehicle emissions	Implementation on-going	ongoing	
4	Enforcement and inspection of pollution industry through environmental permitting and statutory nuisance legislation	Environmental Permits	Other measure through permit systems and economic instruments	ongoing	Local Authority Environmental Health	Local Authority	n/a	No AQMA - not quantified	good level of compliance	ongoing	Substantial compliance
5	Biomass/combustion chimney height assessments	Environmental Permits	Other measure through permit systems and economic instruments	ongoing	Local Authority Environmental Health	Polluter	n/a	No AQMA - not quantified	good level of compliance	ongoing	Substantial compliance
6	Implementation of climate change strategy	Promoting Low Emission Plant	Other measure for low emission fuels for stationary and mobile sources	ongoing	Local Authority Environmental Health	Local Authority	n/a	No AQMA - not quantified	Climate Local Commitment Strategy submitted to the Local Government Association	ongoing	
7	Live well campaign	Alternatives to private vehicle use	Other	ongoing	Local Authority Environmental Health	Local Authority	n/a	No AQMA - not quantified	ongoing public education	ongoing	Talks to schools about walking as alternative to car use to be healthier

8	"Routine attendance of Essex Air Quality Consortium derivation of Essex wide policy	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	ongoing	Local Authority Environmental Health	Local Authority Environmental Health	n/a	No AQMA - not quantified	ongoing	ongoing	
11	Adopted road traffic act powers to require switching off of engines	Traffic Management	Anti-idling enforcement	ongoing	Local Authority Environmental Health	Local Authority	n/a	No AQMA - not quantified	ongoing	ongoing	Used reactively to specific reports of idling vehicles
12	Requirement for new licensed taxi s to be less than 5 years old on first licensing - policy in progress of being reviewed to be specific to EURO type	Promoting Low Emission Transport	Taxi Licensing conditions	ongoing	Local Authority Environmental Health	Local Authority	n/a	No AQMA - not quantified	ongoing	2020/21	rewrite of policy statement
13	Encouraging staff to use lower emission vehicles through leased car and cycle schemes	Promoting Low Emission Transport	Company Vehicle Procurement -Prioritising uptake of low emission vehicles	ongoing	Local Authority	Local Authority	n/a	No AQMA - not quantified	ongoing	ongoing	
14	The Council will continue to promote alternatives to domestic bonfires and responsible waste management	Public Information	Via other mechanisms	In place	Local Authority	Local Authority	n/a	No AQMA - not quantified	ongoing	ongoing	
15	Climate change working group	Other	Other	In Place	Local Authority	Local Authority	n/a	No AQMA - not quantified	inaugural meeting held	ongoing	
16	School travel plans	Promoting Travel Alternatives	School Travel Plans	Ongoing	Local Authority	Local Authority	n/a	No AQMA - not quantified		ongoing	

Links reference to the above

1 Go to www.braintree.gov.uk and search local plan to see current status

6 - Go to www.braintree.gov.uk and search Climate Change Strategy

7 - https://www.livewellcampaign.co.uk promotes activity e.g. walking and cycling

8 - http://www.essexair.org.uk/

11 - https://www.essexhighways.org/highway-schemes-and-developments/highway-schemes/air-quality.aspx or go to Essex highways and search air quality

14 go to www.braintree.gov.uk and search bonfires

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

There is no regulatory standard applied to $PM_{2.5}$ (for local authorities in England) to require action to reduce emissions or concentrations of fine particulate air pollution, although action to tackle PM_{10}/NOx would usually contribute to this. The EU Ambient Air Quality Directive does however set out air quality standards for $PM_{2.5}$ including an exposure reduction obligation for urban background, a target value and a limit value. The target annual mean value is given as 25µg/m^3 although the aim should be for all local authorities to reduce and minimise levels of $PM_{2.5}$ even where there is compliance with the target values.

The National Local Air Quality Technical guidance (TG 16 paragraph 2.57) states that it is estimated that as much as 40% to 50% of the $PM_{2.5}$ levels found in any given area can be from sources outside a local authority's direct boundary.

An area where more work is required is communicating with the public about air pollution, (AQ1010 Final Report13) this is referred to in the TG16 guidance which promotes more active stakeholder engagement.

The Public Health Outcomes Framework introduced a $PM_{2.5}$ indicator "fraction of adult mortality attributed to particulate air pollution. In the last reported period (2018) the information for Braintree indicates that the level is average when compared to the results in the Eastern region with no increasing trend.

Braintree District Council does not have any smoke control areas within its district. It does however limit particulate emissions through industrial process regulation,

waste enforcement, prevention of burning through waste enforcement and statutory nuisance investigations and restrictions on planning consents during site clearance and construction processes.

Sustainable travel and reduction of congestion is promoted through the planning process and local Highways Panels which can reduce emissions from brakes and tyres.

Braintree District Council will continue to review air quality and focus on reducing and preventing air pollution (including $PM_{2.5}$) through the planning regime, air pollution and regulatory control, traffic management with Highways assistance and various local initiatives including but not exclusively the Climate Change and Livewell campaigns as shown in Table 2.2.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

3.1.1 Non-Automatic Monitoring Sites

Braintree District Council undertook non- automatic (passive) monitoring of NO_2 at 18 sites during 2019. **Error! Reference source not found.** in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias[4], “annualisation” (where the data capture falls below 75%), and distance correction[5]. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.1 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3. Note that the concentration data presented in Table A.1 represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

[4] https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html
[5] Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Within Table B.1 there are no exceedances of the short term or annual mean objective levels at the points of relevant exposure. However the levels at BR16 and BR 20 are within 10% of the objective level 38.2 µg/m^3 and 37.5 µg/m^3 respectively at facades of residential property.This is the first year of monitoring using diffusion tubes which are considered indicative and therefore further monitoring data is required in the forthcoming year. BR14 presents as 56.8 µg/m^3 . This tube is outside commercial property where pedestrians may be present and annual mean levels over 60 µg/m^3 indicate a potential exceedance of the NO_2 1-hour mean objective so 56.8 µg/m^3 is close to that concentration level.

Appendix A: Monitoring Results

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
BR1	Blandford House London Road Braintree	Roadside	575600	222900	NO2	NO	6	1.2	NO	2
BR3	Foxden A12 Rivenhall	Roadside	583859	216497	NO2	NO	19	2	NO	1.8
BR4	Beckers Green Road	Urban Background	577800	222500	NO2	NO	12.2	8.3	NO	2
BR5	Chipping Hill Bridge	Roadside	582002	215111	NO2	NO	7	2	NO	1.9
BR6	Railway Street/Victoria St	Roadside	576204	222958	NO2	NO	4	2	NO	2
BR7	Stilemans Wood	Roadside	577680	221964	NO2	NO	20	9	NO	1.8
BR9	Hotel Rivenhall	Roadside	583891	216467	NO2	NO	10	1.5	NO	1.8
BR11	High Street Kelvedon	Roadside	586386	219106	NO2	NO	0	3.5	NO	1.9
BR12	The Street Bradwell	Roadside	580625	223115	NO2	NO	11.7	2.9	NO	1.8
BR13	Bridge Street, Witham	Roadside	581851	214151	NO2	NO	0	1	NO	1.9
BR14	11 Head Street, Halstead	Kerbside	581542	230738	NO2	NO	n/a	0.7	NO	1.9
BR16	4 Head Street Halstead	Roadside	581564	230742	NO2	NO	1.4	1	NO	1.9

BR17	7 Head Street Halstead	Roadside	581530	230731	NO2	NO	n/a	1	NO	1.9
BR18	3 Hedingham Road Halstead	Kerbside	581471	230711	NO2	NO	n/a	0.5	NO	1.9
BR19	12 High Street Halstead	Kerbside	581447	230697	NO2	NO	n/a	0.5	NO	1.9
BR20	33 Head Street Halstead	Roadside	581586	230775	NO2	NO	0	2.3	NO	1.9
BR21	1 Ben Sainty Court Witham	Roadside	582143	214630	NO2	NO	1	2.6	NO	1.9
BR22	60 Avenue Road	Roadside	582033	215081	NO2	NO	0	8.7	NO	1.8

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.1 – Annual Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3) (4)				
							2015	2016	2017	2018	2019
BR1	575600	222900	Roadside	Diffusion Tube	92	92	29.8	31	31	28.2	29.4
BR3	583859	216497	Roadside	Diffusion Tube	100	100	**47.1**	**46.4**	**51.9**	**46.1**	**45.81**
BR4	577800	222500	Urban Background	Diffusion Tube	100	100	15.9	17.3	18.3	16.2	16.56
BR5	582002	215111	Roadside	Diffusion Tube	100	100	**40.8**	**45.9**	**45.3**	**40.4**	39.10
BR6	576204	222958	Roadside	Diffusion Tube	100	100	22.8	23.2	24.6	22.9	21.35
BR7	577680	221964	Roadside	Diffusion Tube	100	100	30.5	28.3	31.6	29.2	27.80
BR9	583891	216467	Roadside	Diffusion Tube	83	83	**43.9**	**46.3**	**46.1**	**40.7**	35.47
BR11	586386	219106	Roadside	Diffusion Tube	100	100	27.3	30.1	27.1	23.1	22.12
BR12	580625	223115	Roadside	Diffusion Tube	92	92	31.3	31.3	31.5	25.9	27.33
BR13	581851	214151	Roadside	Diffusion Tube	100	100	-			33	32.85
BR14	581542	230738	Kerbside	Diffusion Tube	100	100	-			**59.9**	**56.83**
BR16	581564	230742	Roadside	Diffusion Tube	100	100	-				**44.07**
BR17	581530	230731	Kerbside	Diffusion Tube	100	100	-				**42.30**
BR18	581471	230711	Kerbside	Diffusion Tube	92	92	-				32.95

BR19	581447	230697	Kerbside	Diffusion Tube	100	100	-				27.04
BR20	581586	230775	Roadside	Diffusion Tube	92	92	-				37.47
BR21	582143	214630	Roadside	Diffusion Tube	100	100	-				28.23
BR22	582033	215081	Roadside	Diffusion Tube	92	92	-				24.01

☒ **Diffusion tube data has been bias corrected**

☒ **Annualisation has been conducted where data capture is <75%**

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance adjustment**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

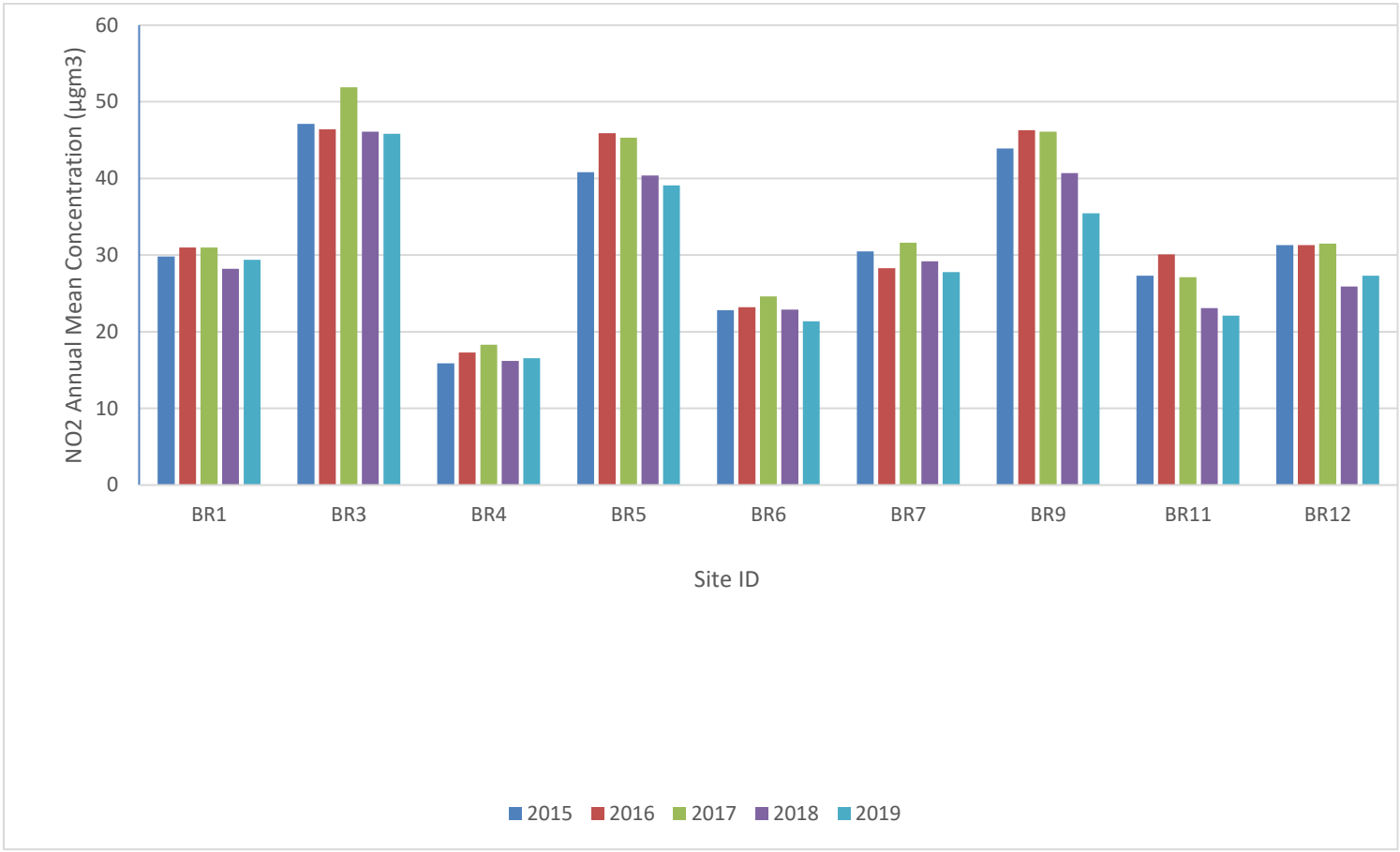
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(4) Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

Figure A.1 – Trends in Annual Mean NO_2 Concentrations



N.B sites BR3, BR5 and BR9 are not at sites of relevant exposure. BR3 and BR5 are alongside A12 at Rivenhall and BR9 is at the railway bridge at Witham close to Easton Road

Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO_2 Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
BR1	575600	222900	51.1	35.6	38.0	50.4	33.6	30.7	30.3	32.0		39.0	50.6	39.9	39.2	29.4	23.3
BR3	583859	216497	60.1	76.4	55.7	51.5	52.4	52.5	55.5	71.4	50.2	66.0	72.2	69.0	61.1	**45.8**	28.7
BR4	577800	222500	27.2	34.7	24.5	20.2	15.9	15.6	15.1	16	16.1	22.8	30.9	26	22.1	16.6	n/a
BR5	582002	215111	59.1	59.2	53.4	37.8	48.8	45.4	52.9	55.4	48.2	55.2	63.2	47	52.1	39.1	32.0
BR6	576204	222958	27	39.1	30.6	29.4	23.6	20.9	21.4	22.2	23.2	29.1	47.8	27.3	28.5	21.4	19.8
BR7	577680	221964	19.9	53	36.3	36.3	33.9	35.1	36.4	43.8	34.4	39.1	39.5	37.1	37.1	27.8	23.0
BR9	583891	216467			69.7	33	49.1	37.9	40.4	45.6	45.1	46.7	59.6	45.8	47.3	35.5	26.3
BR11	586386	219106	34.6	37.6	36.8	33.6	26.5	24	22.8	23.9	25.2	30	37.7	21.2	29.5	22.1	22.1
BR12	580625	223115		39.8	41.9	38.4	35.9	32.5	32.9	34.7	30.8	34.4	48.3	31.2	36.4	27.3	20.9
BR13	581851	214151	32	52.5	42.8	46.5	41.9	43.5	41.5	50	39.7	44.6	50.1	40.5	43.8	32.9	32.9
BR14	581542	230738	86.2	83.7	80.2	69.3	70.2	70.1	75	74	66.2	82.3	86.3	65.7	75.8	**56.8**	n/a
BR16	581564	230742	58.8	63.9	54.1	68.2	56.5	55.6	57.4	50.9	52.8	64.1	66.7	56.1	58.8	**44.1**	38.2
BR17	581530	230731	59.9	64	53.9	55.1	55.7	49.7	57.2	55.6	49.9	55.8	71.7	48.3	56.4	**42.3**	n/a
BR18	581471	230711	50.7	49.1	44.6	54.4		40.6	34.8	32.8	39.8	40	62	34.5	43.9	33.0	n/a
BR19	581447	230697	33.9	43.8	43.2	32.2	35.3	30.4	32.5	32.2	32.4	36.5	44.2		36.1	27.0	n/a
BR20	581586	230775		39.7	57.5	47.6	55.8	46.2	51.3	47.4	49.7	51.7	57.9	44.8	50.0	37.5	37.5
BR21	582143	214630	41.4	55.1	36.2	37.4	33.2	29.1	30.3	31.8	36.8	37.2	47.6	35.5	37.6	28.2	26.4
BR22	582033	215081		43	34.5	26.6	27.5	26.1	29.2	33.4	29	28.9	40.9	33	32.0	24.0	24.0

Reference to Table B.1

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

☒ **Annualisation has been conducted where data capture is <75%**

☒ **Where applicable, data has been distance corrected for relevant exposure in the final column**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

C.1 Laboratory Performance

The nitrogen dioxide diffusion tubes are prepared and analysed by Socotec formerly known as Environmental Scientifics Group (ESG Didcot). The preparation method uses 50% triethanolamine (TEA) in acetone. The UKAS testing laboratory number is 1015.

AIR is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT is a new scheme, started in April 2014, which combined two long running quality assurance schemesPT schemes : LGC Standards STACKS PT scheme and HSL WASP PT scheme.
AIR offers a number of test samples designed to test the proficiency of laboratories undertaking analysis of chemical pollutants in ambient indoor, stack and workplace air. One such sample is the AIR NO2 test sample type that is distributed to participants in a quarterly basis.

Every quarter, roughly January, April, July and October each year, each laboratory receives four diffusion tubes doped with an known amount of nitrite, known to LGC Standards, but not the participants. At least two of the tubes are usually duplicates, which enables precision, as well as accuracy, to be assessed. The masses of nitrite on the spiked tubes are different each quarter, and reflect the typical analytical range encountered in actual NO2 ambient monitoring in the UK
The results shown in the table below from the LAQM website https://laqm.defra.gov.uk/assets/laqmno2performancedatauptonovember2019v1.pdf indicate that SOCOTEC meets a satisfactory standard for analysis as shown in table below.

Table C1 Laboratory Summary Performance

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of $\leq \pm 2$ as defined above.

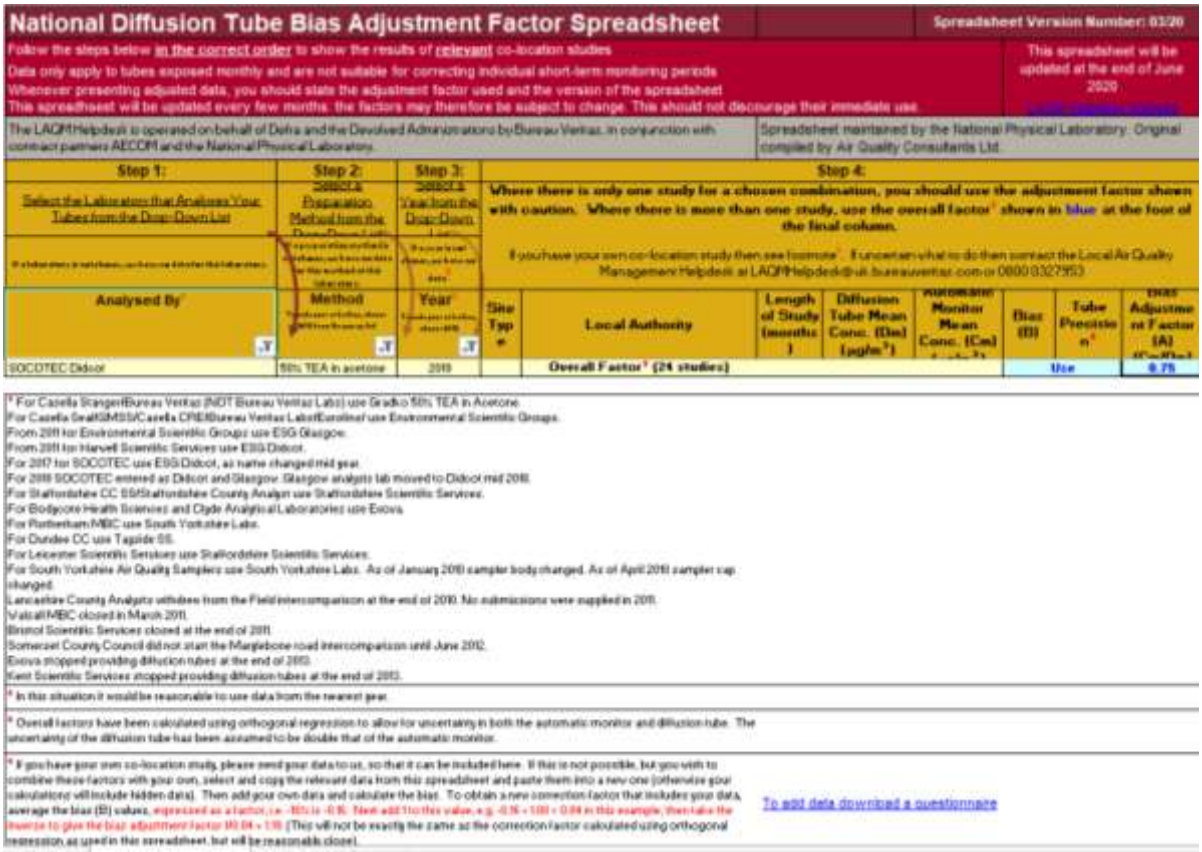
AIR PT Round	AIR PT AR024	AIR PT AR025	AIR PT AR027	AIR PT AR028	AIR PT AR030	AIR PT AR031	AIR PT AR033	AIR PT AR034
Round conducted in the period	January – February 2018	April – May 2018	July – August 2018	September – October 2018	January – February 2019	April – May 2019	July – August 2019	September – November 2019
Aberdeen Scientific Services	100 %	100 %	100 %	100 %	75 %	100 %	100 %	100 %
Cardiff Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Edinburgh Scientific Services	100 %	100 %	100 %	100 %	100 %	NR [2]	100 %	25 %
SOCOTEC	100 % [1]	100 % [1]	100 % [1]	100 % [1]	87.5 % [1]	100 % [1]	100 % [1]	100 % [1]
Exova (formerly Clyde Analytical)	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	100 %	100 %	50 %	100 %	100 %	100 %	100 %	50 %
Gradko International [1]	100 % [1]	100 %	100 %	100 %	75 %	100 %	100 %	100 %
Kent Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Kirklees MBC	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Lambeth Scientific Services	NR [2]	NR [2]	NR [2]	25 %	50 %	100 %	50 %	100 %
Milton Keynes Council	100 %	75 %	100 %	100 %	100 %	100 %	50 %	100 %
Northampton Borough Council	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	100 %	100 %	100 %	100 %	75 %
Staffordshire County Council	50 %	100 %	100 %	100 %	100 %	75 %	75 %	75 %
Tayside Scientific Services (formerly Dundee CC)	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]
West Yorkshire Analytical Services	50 %	75 %	100 %	100 %	100 %	100 %	100 %	50 %

[1] Participant subscribed to two sets of test results (2 x 4 test samples) in each AIR PT round.
[2] NR No results reported
[3] Northampton Borough Council, Kent Scientific Services, Cardiff Scientific Services, Kirklees MBC and Exova (formerly Clyde Analytical) no longer carry out NO2 diffusion tube monitoring and therefore did not submit results

C.2 Diffusion tube bias adjustment factor

The diffusion tube bias adjustment factor is derived from the national data base on the LAQM website. This allows correction of diffusion tube results to account for inherent inaccuracies of the diffusion tube method. The factor is derived by comparing continuous analyser results with SOCOTEC diffusion tube results collocated alongside the continuous analysers operated across the UK by various local authorities. The bias adjustment factor has been determined as 0.75 for year 2019.

Fig C.1 National Diffusion Tube Bias Adjustment Factor Spreadsheet



National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/20

Follow the steps below in the correct order to show the results of relevant co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2020

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

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

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

Step 2: Select a Preparation Method from the Drop-Down List

Step 3: Select a Year from the Drop-Down List

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[1] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote*. If unsure what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Cm/Dm)
SOCOTEC Didcot	50% TEA in acetone	2019		Overall Factor[1] (24 studies)				Use		0.75

[1] For Casella Stanger/Bureau Veritas (NOT Bureau Veritas Labs) use Gradko 50% TEA in Acetone
For Casella Beat/SMSS/Casella CREM/Bureau Veritas Labs/Eurofins use Environmental Scientific Groups
From 2011 for Environmental Scientific Groups use ESG Glasgow
From 2011 for Harwell Scientific Services use ESG Didcot
For 2017 for SOCOTEC use ESG Didcot, as name changed mid year
For 2018 SOCOTEC entered as Didcot and Glasgow. Glasgow analysis lab moved to Didcot mid 2018.
For Staffordshire CC SSF/Staffordshire County Analyst use Staffordshire Scientific Services
For Bodycote Health Sciences and Clyde Analytical Laboratories use Exova
For Portsmouth MBC use South Yorkshire Labs
For Dundee CC use Tayside SS
For Leicester Scientific Services use Staffordshire Scientific Services
For South Yorkshire Air Quality Samplers use South Yorkshire Labs. As of January 2018 sampler body changed. As of April 2018 sampler cap changed.
Lancashire County Analysts withdrew from the Field intercomparison at the end of 2010. No submissions were supplied in 2011.
Vale of Mbc closed in March 2011.
Bristol Scientific Services closed at the end of 2011.
Somerset County Council did not start the Marylebone road intercomparison until June 2012.
Exova stopped providing diffusion tubes at the end of 2013.
Kent Scientific Services stopped providing diffusion tubes at the end of 2013.

[2] In this situation it would be reasonable to use data from the nearest year.

[3] Overall factors have been calculated using orthogonal regression to allow for uncertainty in both the automatic monitor and diffusion tube. The uncertainty of the diffusion tube has been assumed to be double that of the automatic monitor.

[4] If you have your own co-location study, please send your data to us, so that it can be included here. If this is not possible, but you wish to combine these factors with your own, select and copy the relevant data from this spreadsheet and paste them into a new one (otherwise your calculations will include hidden data). Then add your own data and calculate the bias. To obtain a new correction factor that includes your data, average the bias (B) values, expressed as a factor, i.e. -15% is -0.15. Next add 1 to this value, e.g. -0.15 + 1.00 = 0.85 in this example, then take the inverse to give the bias adjustment factor (in this example 1/0.85 = 1.18). (This will not be exactly the same as the correction factor calculated using orthogonal regression as used in this spreadsheet, but will be reasonably close).

To add data download a questionnaire

C.3 Distance correction calculations

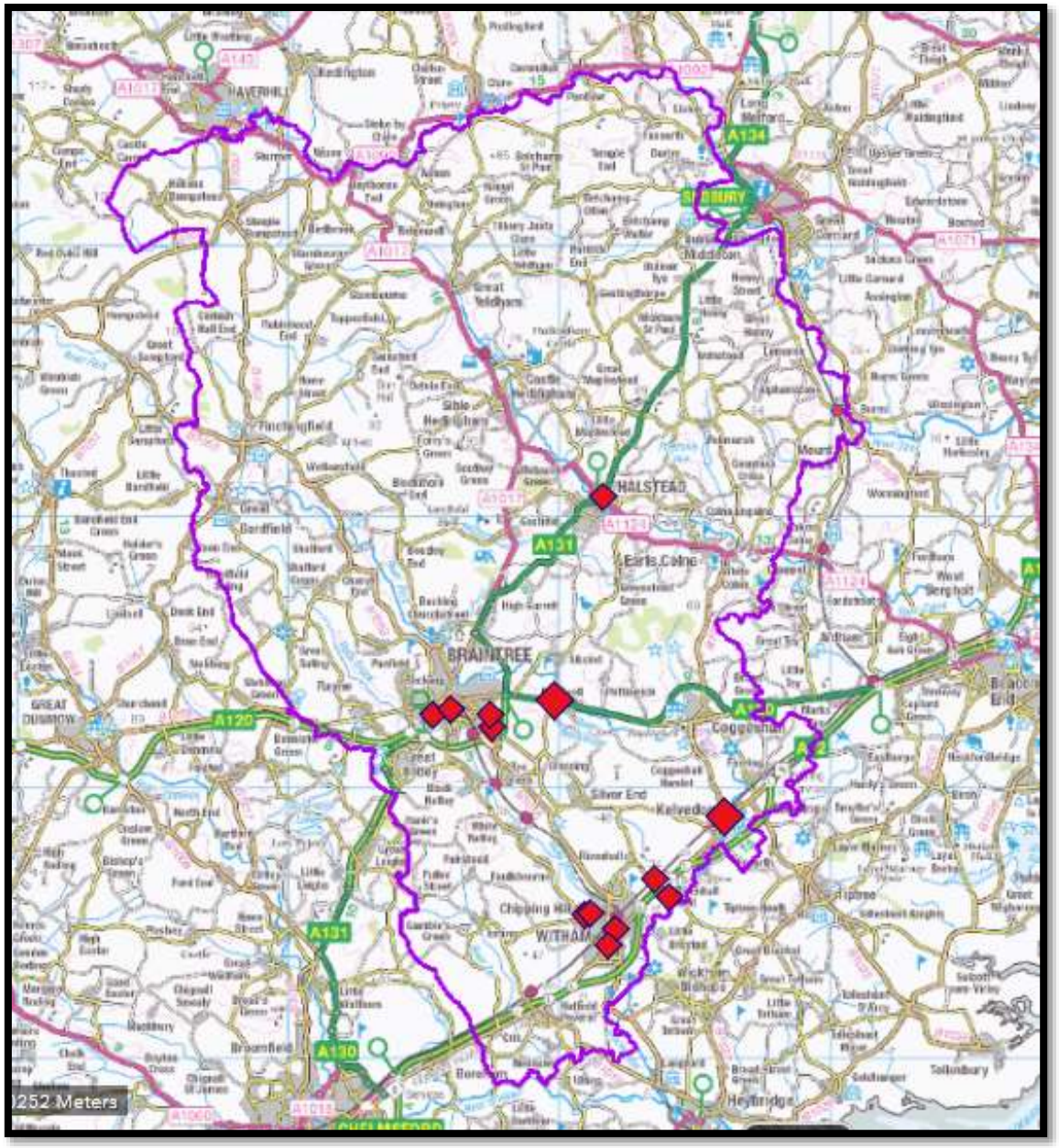
The distance correction calculations are given in Table C.1 below for the relevant monitoring sites using the LAQM NO_2 Fall-off with Distance Calculator *Version 4.2) (https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html)

Table C.2 Calculated distance corrections at residential facades

Site Name/ID	Distance (m)		NO2 Annual Mean Concentration (µg/m3)			Comment
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor	
BR1	1.2	6.0	11.3	29.4	23.3	
BR3	2.0	19.0	13.4	45.8	28.7	
BR5	2.0	7.0	15.0	39.1	32.0	
BR6	2.0	4.0	11.4	21.4	19.8	
BR7	9.0	20.0	11.3	27.8	23.0	
BR9	1.5	10.0	13.4	35.5	26.3	
BR12	2.9	11.7	9.4	27.3	20.9	
BR16	1.0	2.4	10.9	44.1	38.2	Predicted concentration at Receptor within 10% the AQS objective.
BR21	1.0	2.6	18.8	28.2	26.4	

Appendix D: Map(s) of Monitoring Locations

Fig D.1 - NO_2 Diffusion Tube Locations for Braintree District area (year 2019)



◆ symbol indicates location of diffusion tube (N.B. in Halstead there are six tube locations within small area so shown as one location, site at Kelvedon is BR11 (*not shown in separate maps below)*)

Fig D.2 - NO_2 Diffusion Tube Locations for Braintree Town and Bradwell (2019)

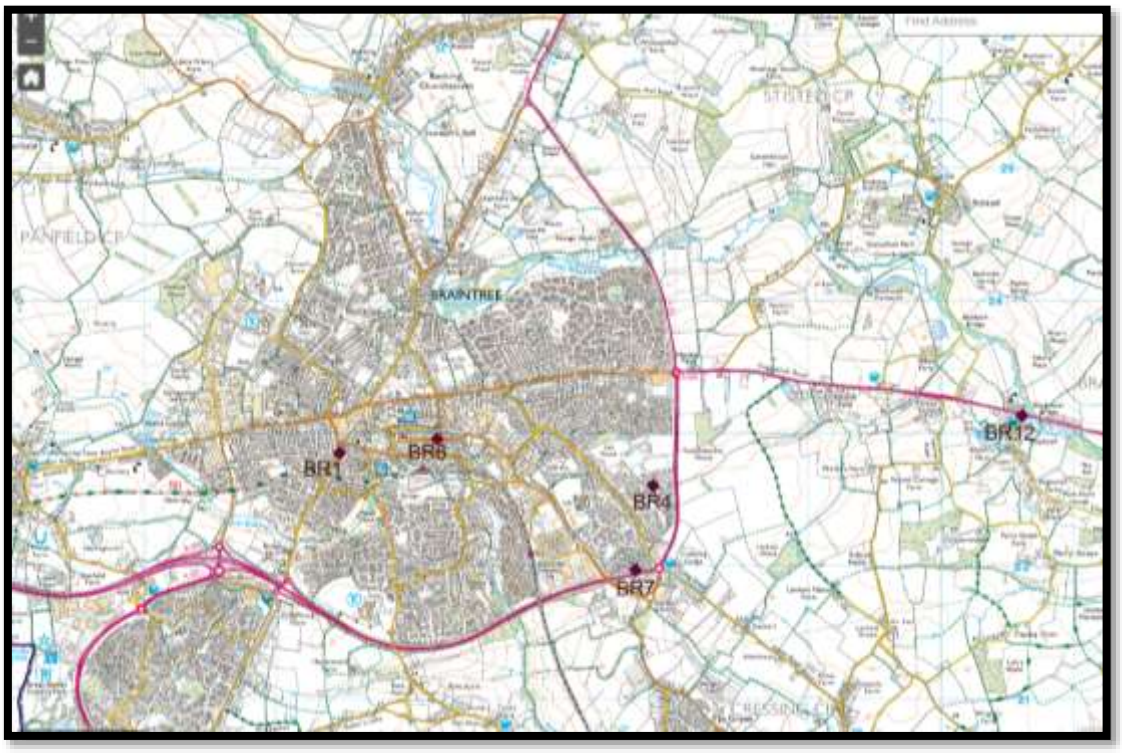


Fig D.3 –NO_2 Diffusion Tube Locations for Witham Town and Rivenhall (2019)

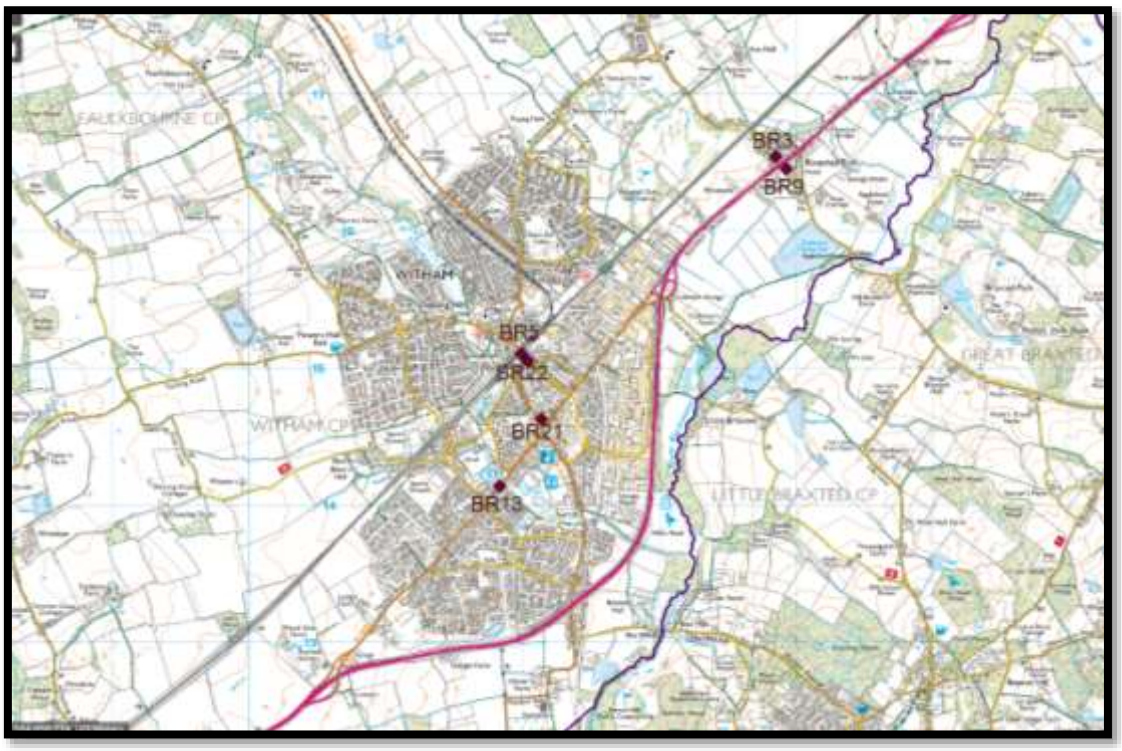
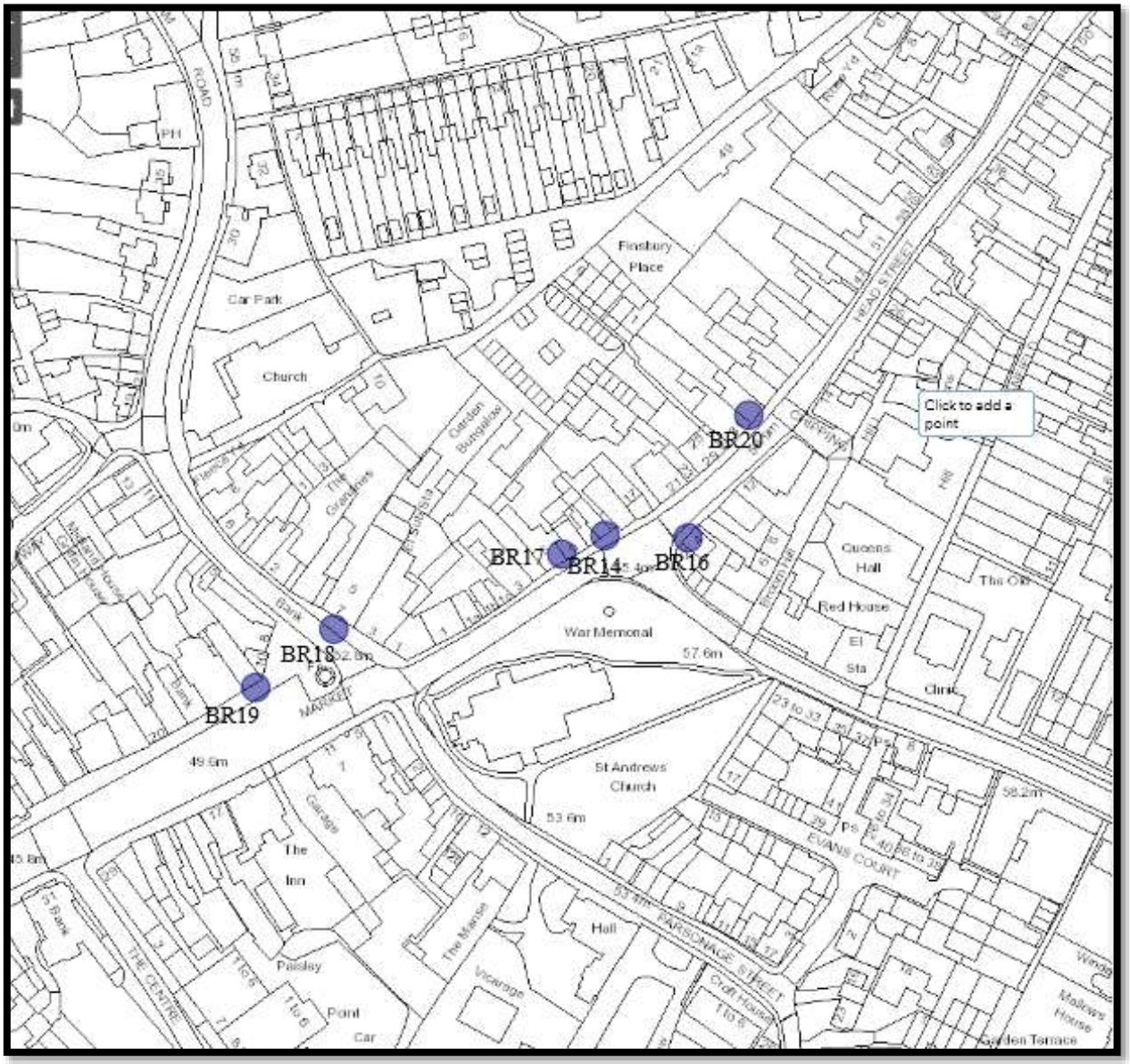


Fig D.4 - NO_2 Diffusion Tube Locations for Halstead Town (2019)



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[6]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[6] The units are in micrograms of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
…	…

References

1) Air Quality Review and Assessment Website

2) Defra (2016) Local Air Quality Management, Technical Guidance (TG16)