2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: May, 2021

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Executive Summary: Air Quality in Our Area

The 2021 Annual Status Report is designed to provide the public with information relating to local air quality in Brentwood, to fulfil Brentwood Borough Council's statutory duty to review and assess air quality within its area, and to determine whether or not the air quality objectives are likely to be achieved.

In 2020, Brentwood Borough Council measured **no** exceedances of the Air Quality Objectives.

Air Quality in Brentwood

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

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

The Borough of Brentwood is situated in the southwest of Essex and is a pleasant, busy town situated within the Metropolitan Green Belt. Apart from its urban heart, the Borough of Brentwood has about 3,000 acres (about 1,215 hectares) of woodland, yet it is only 18 miles from Central London.

The main source of air pollution in Brentwood is road traffic emissions for major roads, notably the M25, A12, A127, A128, A1023 and A129.

Brentwood Borough Council has three Air Quality Management Areas (AQMA) which are detailed in Table 2.1. These were declared due to exceedances of Nitrogen Dioxide (NO_2). However, no exceedances at relevant exposure have been measured in these AQMAs.

[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017
[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Air quality appraisal: damage cost guidance, July 2020
[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

Conclusions and Priorities

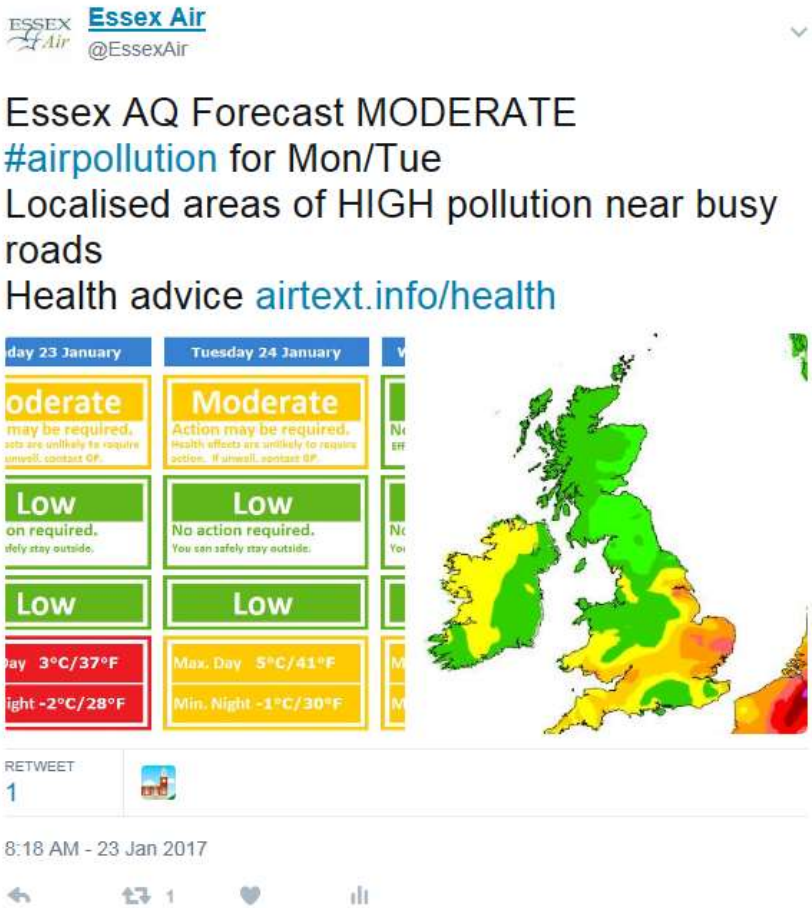
Brentwood Borough Council have concluded that:

- No air quality exceedances have been identified in 2020.
- Measured air pollution in 2020 has reduced significantly from previous years due to Covid-19 related national lockdowns and regional tiered restrictions because of the reduced traffic movements
- There are no new developments that will have an impact on air quality.

Local Engagement and How to get Involved

Brentwood Borough Council is a member of the Essex Air Quality consortium. The Essex Air web site provides a daily forecast of air pollution which is based off UK-AIR data feeds. Also, the @EssexAir twitter feed provides localised weekly air pollution forecasts.

Figure i.1 Essex Air Twitter Air Quality Notifications



Links to Defra recommended actions and health advice are provided when air pollution is likely to be moderate or higher. This will enable those with heart or lung conditions, or other breathing problems to make informed judgements about their levels of activity or exposure.

The Essex Air twitter also promotes the DVSA service for reporting smoky lorries or buses. Particulate matter is usually not visible but when poorly maintained diesel engines can produce visible particles, appearing as smoke. Fine particles have an adverse effect on human health, particularly among those with respiratory and cardiovascular problem.

Figure i.2 - Essex Air Reporting Smoky Vehicle Tweets

Essex County Council has worked closely with Liftshare to develop the Essex Car Share scheme. This operates across Brentwood and provides commuters with a car sharing service which could cut congestion and air pollution whilst saving money.

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1 Local Air Quality Management

This report provides an overview of air quality in Brentwood during 2020. 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 Brentwood Borough Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

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 should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Brentwood Borough Council can be found in Table 2.1. The table presents a description of the three AQMAs that are currently designated within Brentwood.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Brentwood AQMA No.2	Declared 10/01/2005	NO2 Annual Mean	Parts of Brook Street, Brentwood and the A12.	Yes	53.4	No exceedance	2008	https://uk-air.defra.gov.uk/assets/documents/no2ten/Local_zone29_Brentwood_AQActionplan_1.pdf
Brentwood AQMA No.4	Declared 10/01/2005	NO2 Annual Mean	Parts of Warescot Road, Hurstwood Avenue and Ongar Road, Brentwood and the A12.	Yes	76	No exceedance	2008	
Brentwood AQMA No.7	Declared 10/01/2005	NO2 Annual Mean	Parts of Ongar Road, Ingrave Road, High Street and Shenfield Road, Brentwood in proximity to Wilsons Corner (the junction of the A128 and A1203).	No	56.9	No exceedance	2008	

Appendix D: Map of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO_2 annual mean

The 2020 Annual Status Report identified that pollutant concentrations are well below the Air Quality Objectives (at relevant exposure) and that it is appropriate to revoke the remaining AQMAs.

Brentwood Borough proposes to revoke:

- AQMA 2: Parts of Brook Street, Brentwood and the A12.
- AQMA4: Parts of Warescot Road, Hurstwood Avenue and Ongar Road, Brentwood and the A12.
- AQMA7: Parts of Ongar Road, Ingrave Road, High Street and Shenfield Road, Brentwood in proximity to Wilsons Corner (the junction of the A128 and A1203).

Progress and Impact of Measures to address Air Quality in Brentwood

Brentwood Borough Council and Essex County Council have a number of ongoing measures to improve air quality in Brentwood These are detailed in Table 2.2 below.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Essex Carshare	Alternatives to private vehicle use	Car & lift sharing schemes	2014	Ongoing	Essex County Council	Essex County Council	No	Funded	< £10k	Implementation	Not quantified	N/A	Ongoing	
2	Travel Budi	Alternatives to private vehicle use	Car & lift sharing schemes	2007	Ongoing	Brentwood Borough Council	Brentwood Borough Council	No	Funded	< £10k	Implementation	Not quantified	N/A	Ongoing	
3	Member of Essex air	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	N/A	Ongoing	County Council / District & Borough Councils	N/A	No	Funded	< £10k	Implementation	Not quantified	N/A	Ongoing	

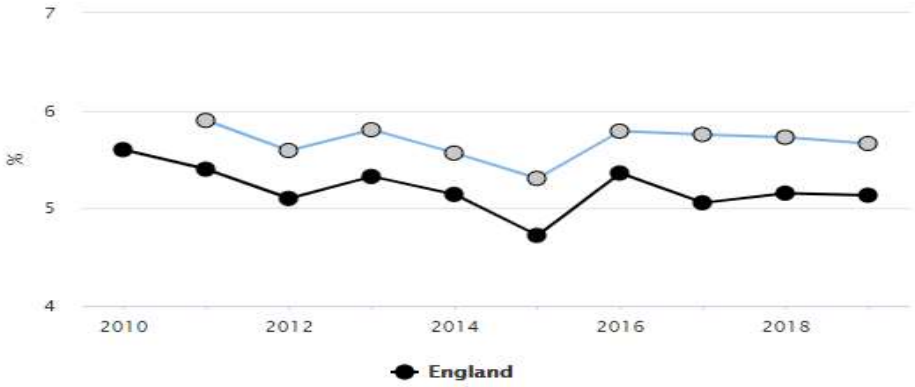
$PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

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.

Brentwood Borough Council does not monitor $PM_{2.5}$ concentrations however notes the Defra background mapping resource which for $PM_{2.5}$ in 2020 models a maximum annual mean concentration of 11.19µg/m^3 in the Local Authority area.

The Public Health Outcomes Framework indicator D01 – Fraction of mortality attributable to particulate ($PM_{2.5}$) air pollution which for 2019 gave a value of 5.7% which has improved from 5.9% in 2011. These values are broadly similar to other authorities within the region.

Figure 2.1 – Public Health Framework Indicator D01 Fraction of all-cause adult mortality attributable to anthropogenic particulate air pollution



Brentwood Borough Council is taking the following measures to address $PM_{2.5}$:

- Regular inspections of permitted industry where combustion and non-combustion processes could lead to anthropogenic emissions of $PM_{2.5}$
- Working with Essex County Council (highway authority) to deliver Major Transport improvement schemes to alleviate congestion. In addition to reduced exhaust emissions, these schemes will reduce non-exhaust emissions from brake and tyre wear by making traffic flows smoother.
- Operation of Smoke Control Orders. A number of residential locations within Brentwood are covered by orders to prevent smoke being emitted from chimneys.

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

This section sets out the monitoring undertaken within 2020 by Brentwood Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

No exceedances of the nitrogen dioxide air quality objectives have been identified and the long-term trend for monitored concentrations is downwards.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Brentwood Borough Council does not undertake automatic continuous monitoring.

3.1.2 Non-Automatic Monitoring Sites

Brentwood Borough Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 35 sites during 2020. **Error! Reference source not found.**1 in Appendix A presents the details of the non-automatic 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.

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 33%), and distance correction. Further details on adjustments are provided in Appendix C.

Appendix A: Monitoring Results

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 33%), and distance correction. Further details on adjustments are provided in Appendix C.

Table A.1 – Details of Non-Automatic Monitoring Sites

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
BRW 5	Telegraph pole at end of Brook Street	Roadside	556887	192412	NO2	Yes BRW2	16.3	1.3	No	2.5
BRW 6	Freeway Cottage, 63 Brook Street	Roadside	557014	192493	NO2	Yes BRW2	0.9	1.3	No	2.5
BRW 7	13 Nags Head Lane - on fence trellis	Roadside	557118	191978	NO2	No	5	15.6	No	2.5
BRW 8	3 High Street - front facade	Roadside	559691	193912	NO2	Yes BRW7	9.4	9.8	No	2.5
BRW 9	Caffe Uno, High Street - front facade	Roadside	559643	193889	NO2	Yes BRW7	0.9	8.1	No	2.5
BRW 10	5/7 Ongar Road - lamp-post	Roadside	559699	193948	NO2	Yes BRW7	0.7	3.2	No	2.5
BRW 11	36 Ongar Road - front facade	Roadside	559604	194035	NO2	Yes BRW7	0	5.7	No	2.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
BRW 12	Corner of Kings Road/Hart Street/High Street	Roadside	559187	193658	NO2	No	5.3	2.1	No	2.5
BRW 14	145 High Street - front facade	Roadside	559148	193660	NO2	No	0	2.6	No	2.5
BRW 15	4 Westbury Road - downpipe on corner of house	Roadside	559085	193601	NO2	No	2	6.9	No	2.5
BRW 16	24 Wingrave Crescent - rear boundary fence	Urban Background	557379	192900	NO2	No	8.3	25.1	No	2.5
BRW 17	51 Spital Lane - side garden	Roadside	557632	193151	NO2	No	3.8	9.3	No	2.5
BRW 18	46 Selwood Road - rear garden tree stump	Urban Background	557826	193333	NO2	No	6	20	No	2.5
BRW 19	61 Warescot Road - front facade	Roadside	558769	194873	NO2	Yes BRW4	0	10.4	No	2.5
BRW 20	76 Warescot Road - lamp-post	Kerbside	558818	194913	NO2	Yes BRW4	7	0.2	No	2.5
BRW 21	316 Ongar Road - side gatepost	Roadside	558681	194799	NO2	Yes BRW4	9.9	8.2	No	2.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
BRW 22	339 Ongar Road - front facade	Roadside	558683	194894	NO2	Yes BRW4	0	7.1	No	2.5
BRW 23	12 Hurstwood Avenue - front facade	Roadside	558742	194928	NO2	Yes BRW4	0	8.2	No	2.5
BRW 24	Highwood Close - lamp-post	Roadside	558624	194695	NO2	No	18.8	1	No	2.5
BRW 25	65 Greenshaw - lamp-post	Roadside	558482	194547	NO2	No	5.5	21.4	No	2.5
BRW 26	289 Chelmsford Road - telegraph pole	Roadside	562278	196649	NO2	No	15.2	2.1	No	2.5
BRW 28	Ingatestone Junior School, The Furlongs - playground pergola	Urban Background	564446	199509	NO2	No	11	37	No	2.5
BRW 29	1 Trimble Close - lamp-post	Roadside	564617	199849	NO2	No	8.9	11	No	2.5
BRW 30	8 Trimble Close - rear facade	Roadside	564654	199898	NO2	No	0	9.5	No	2.5
BRW 31	New Road, Ingatestone - telegraph pole	Roadside	565186	200071	NO2	No	19.2	18.7	No	2.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
BRW 32	The Poplars, Brook Street	Urban Background	556964	192288	NO2	Yes BRW2	0	45	No	2.5
BRW 33	108 Doddinghurst Road - front facade	Urban Background	559139	195012	NO2	No	1.6	16.3	No	2.5
BRW 34	La Clarentet, Talbrook - carport	Roadside	557719	193226	NO2	No	2.2	2.7	No	2.5
BRW 36	Lincolns Lane - background	Rural	556603	194628	NO2	No	N/A	0.6	No	2.5
BRW 38	58 Roman Road	Roadside	563659	198314	NO2	No	9.6	26.3	No	2.5
BRW 39	Thorndon Avenue/A127	Roadside	562412	189153	NO2	No	21.3	2.2	No	2.5
BRW 40	131 High St - lamp-post	Kerbside	559191	193681	NO2	No	3	1	No	2.5
BRW 41	88 High St - lamp-post	Kerbside	559292	193710	NO2	No	3	1	No	2.5
BRW42	Shenfield Taxi Rank	Roadside	561328	195002	NO2	No	N/A	1	No	2.5
BRW43	Shenfield Bus Stop	Roadside	561294	194995	NO2	No	N/A	2.4	No	2.5

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.2 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
BRW 5	556887	192412	Roadside	100	100	45.95	46.96	39.58	42.09	31.08
BRW 6	557014	192493	Roadside	100	100	39.34	37.61	34.24	32.60	25.61
BRW 7	557118	191978	Roadside	100	100	26.60	29.59	25.15	23.77	19.46
BRW 8	559691	193912	Roadside	100	100	40.48	36.53	33.87	35.08	26.35
BRW 9	559643	193889	Roadside	100	100	33.47	35.09	31.93	31.02	22.35
BRW 10	559699	193948	Roadside	100	100	41.22	39.96	36.42	33.56	24.56
BRW 11	559604	194035	Roadside	100	100	37.04	35.48	31.12	30.54	24.56
BRW 12	559187	193658	Roadside	100	100	30.56	28.23	26.94	26.18	20.67
BRW 14	559148	193660	Roadside	100	100	38.02	37.05	31.88	29.64	23.67
BRW 15	559085	193601	Roadside	100	100	23.17	22.70	20.52	19.69	15.59
BRW 16	557379	192900	Urban Background	100	100	29.07	31.38	28.14	27.32	21.27
BRW 17	557632	193151	Roadside	100	100	30.34	29.58	25.99	26.57	20.47
BRW 18	557826	193333	Urban Background	100	100	25.38	26.27	23.40	22.50	18.49
BRW 19	558769	194873	Roadside	100	100	29.56	29.16	26.76	26.66	21.07
BRW 20	558818	194913	Kerbside	100	100	38.95	36.63	32.27	31.93	26.20
BRW 21	558681	194799	Roadside	75	75	26.45	27.11	23.69	23.69	19.81
BRW 22	558683	194894	Roadside	100	100	35.12	34.50	30.33	30.00	23.55
BRW 23	558742	194928	Roadside	100	100	38.89	39.52	33.27	33.52	25.51
BRW 24	558624	194695	Roadside	100	100	28.47	27.91	23.80	24.60	19.41
BRW 25	558482	194547	Roadside	100	100	30.84	32.85	28.48	26.68	26.27
BRW 26	562278	196649	Roadside	100	100	29.92	32.05	26.37	26.67	20.89
BRW 28	564446	199509	Urban Background	100	100	25.54	31.65	28.34	28.42	22.45
BRW 29	564617	199849	Roadside	100	100	27.51	28.20	24.56	24.53	19.59

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
BRW 30	564654	199898	Roadside	100	100	32.39	30.03	26.39	26.87	20.98
BRW 31	565186	200071	Roadside	100	100	27.29	27.50	28.31	25.85	41.5
BRW 32	556964	192288	Urban Background	100	100	33.05	35.75	29.74	28.54	23.59
BRW 33	559139	195012	Urban Background	100	100	25.97	23.67	22.11	22.59	17.87
BRW 34	557719	193226	Roadside	100	100	28.70	29.79	22.87	23.43	19.54
BRW 36	556603	194628	Rural	100	100	16.87	18.65	15.94	15.97	12.44
BRW 38	563659	198314	Roadside	100	100	21.19	20.56	18.51	19.13	21.79
BRW 39	562412	189153	Roadside	100	100	38.28	30.97	27.13	25.70	20.81
BRW 40	559191	193681	Kerbside	100	100	41.65	44.13	39.15	36.88	32.02
BRW 41	559292	193710	Kerbside	100	100	36.35	45.58	39.18	38.39	30.80
BRW42	561328	195002	Roadside	100	100			**41.53**		27.32
BRW43	561294	194995	Roadside	92	92			**43.06**		29.05

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16**

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

☒ **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 correction**

Notes:

The annual mean concentrations are presented as µg/m^3.

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

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

(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%).

Figure A.1 – AQMA BRW2 Trends in Annual Mean NO_2 Concentrations

Figure A.2 – AQMA BRW4 Trends in Annual Mean NO_2 Concentrations

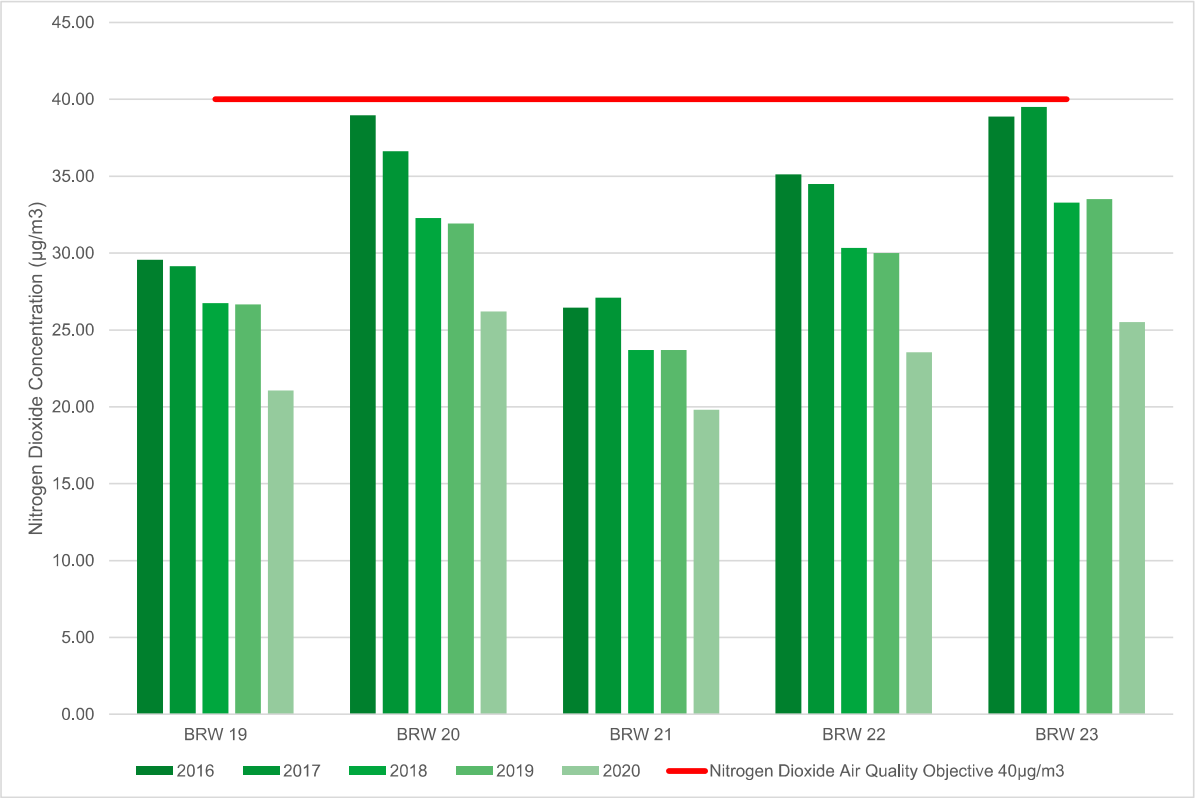


Figure A.3 – AQMA BRW7 Trends in Annual Mean NO_2 Concentrations

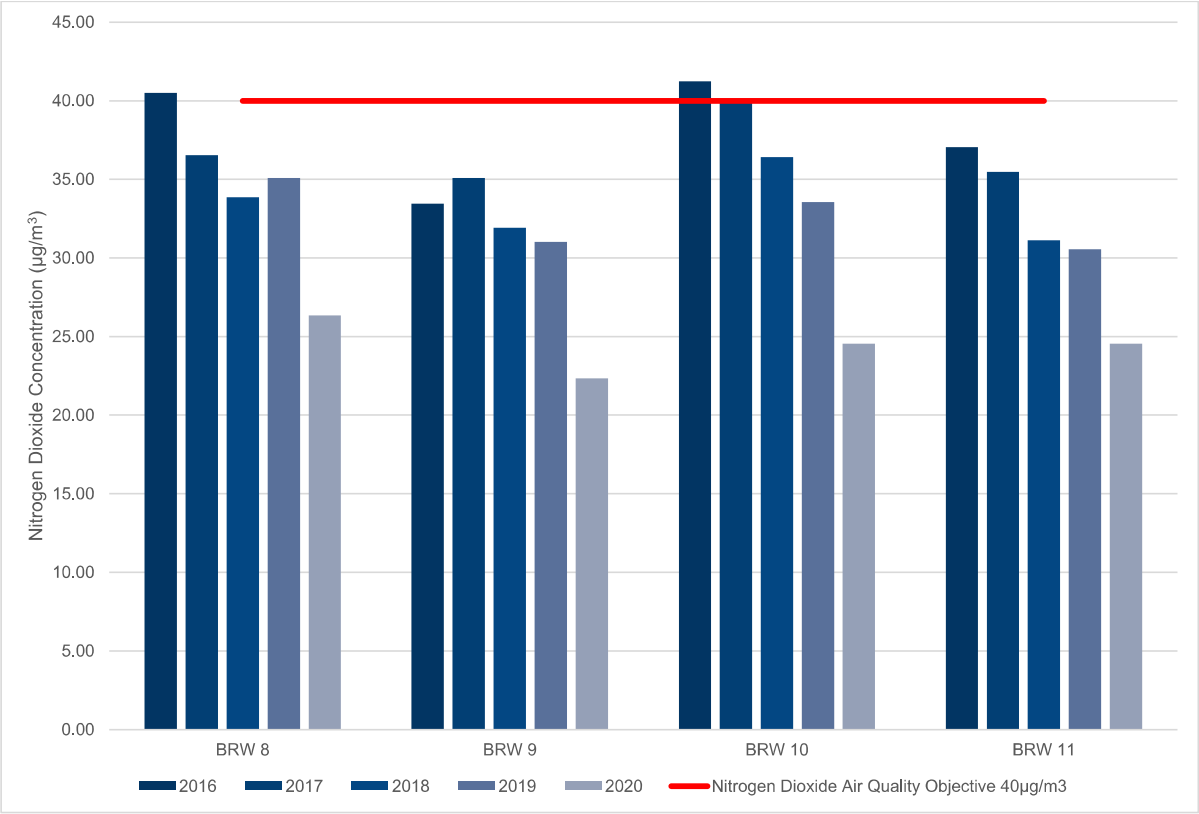
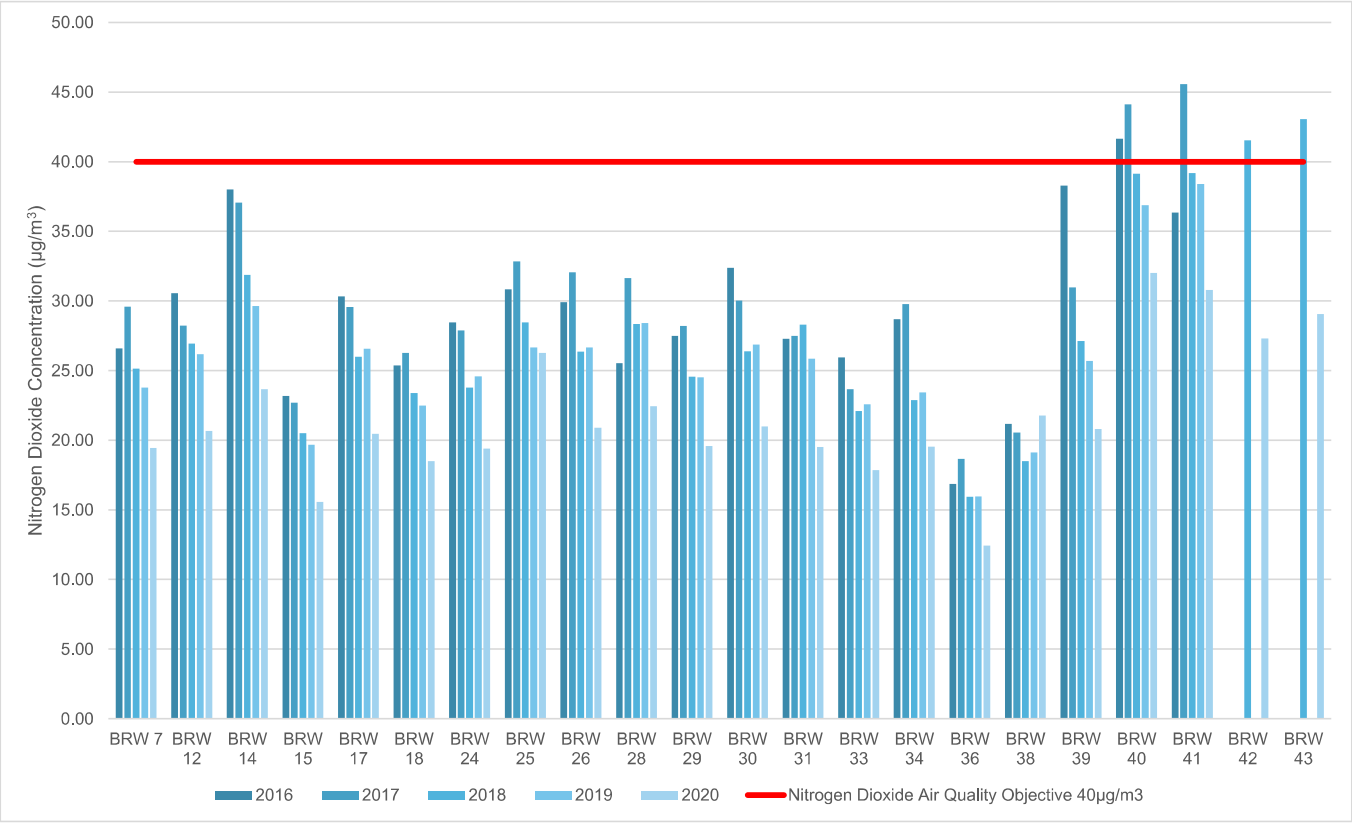


Figure A.4 – Non AQMA Trends in Annual Mean NO2 Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 2020 Diffusion Tube Results (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Annual Mean (µg/m3)	
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.77) and Annualised
BRW 5	556887	192412	62.2	46.3	33.1	28.3	25.1	36.9	38.3	42.5	37.1	47.2	47.0	40.5	40.37	31.08
BRW 6	557014	192493	55.8	38.1	30.4	24.3	25.1	27.7	25.2	33.5	37.1	34.8	33.5	33.7	33.26	25.61
BRW 7	557118	191978	43.4	24.9	18.0	13.8	15.3	23.9	24.5	22.2	26.2	30.2	31.7	29.3	25.28	19.46
BRW 8	559691	193912	55.7	38.3	28.7	22.0	22.8	28.7	27.0	33.7	41.9	39.4	44.9	27.7	34.22	26.35
BRW 9	559643	193889	45.9	38.3	23.9	15.7	17.8	19.5	21.8	27.5	31.4	29.1	41.7	35.8	29.02	22.35
BRW 10	559699	193948	44.6	34.4	22.8	21.8	23.7	29.3	24.3	34.0	36.1	34.8	40.0	36.9	31.89	24.56
BRW 11	559604	194035	53.0	34.6	24.9	20.5	18.7	26.2	26.6	31.9	34.4	34.0	40.7	37.1	31.89	24.56
BRW 12	559187	193658	43.4	28.3	23.1	19.1	16.3	18.9	15.1	22.2	30.8	31.9	33.7	39.2	26.84	20.67
BRW 14	559148	193660	50.1	35.8	21.2	18.6	19.7	23.7	26.6	32.9	39.6	33.5	39.8	27.5	30.74	23.67
BRW 15	559085	193601	34.4	23.7	16.6	14.9	12.2	13.6	14.3	16.8	22.4	22.4	26.8	24.7	20.24	15.59
BRW 16	557379	192900	42.8	30.8	25.2	15.9	19.9	20.1	28.9	25.6	32.9	32.1	31.6	25.6	27.62	21.27
BRW 17	557632	193151	40.4	33.1	22.8	18.2	18.6	20.1	26.6	23.5	32.1	27.9	31.0	24.9	26.58	20.47
BRW 18	557826	193333	39.2	30.0	21.4	17.8	16.6	18.0	19.1	18.7	26.6	23.9	29.6	27.2	24.02	18.49
BRW 19	558769	194873	40.4	31.6	24.3	20.7	18.7	21.4	21.0	25.1	32.1	27.5	35.2	30.4	27.36	21.07
BRW 20	558818	194913	43.6	32.5	31.6	30.2	27.7	29.8	28.1	36.3	43.8	32.1	39.0	33.5	34.03	26.20
BRW 21	558681	194799	35.8	27.7	19.1	16.3	16.4	Missing	29.1	Missing	30.4	31.4	Erroneous Data Point Removed	25.4	25.73	19.81
BRW 22	558683	194894	49.0	39.6	24.1	16.3	20.3	25.4	19.3	30.2	30.2	35.2	41.1	36.3	30.58	23.55
BRW 23	558742	194928	52.8	43.8	25.2	19.3	23.0	31.4	25.8	36.3	33.9	37.3	40.9	27.9	33.13	25.51
BRW 24	558624	194695	43.4	32.9	20.5	18.6	13.6	18.0	19.7	20.3	27.9	28.5	32.5	26.8	25.21	19.41
BRW 25	558482	194547	51.4	39.0	71.1	20.5	19.5	22.4	26.4	26.4	34.6	31.2	37.1	29.8	34.12	26.27
BRW 26	562278	196649	43.8	35.0	24.1	18.2	15.1	18.6	21.0	24.1	30.8	30.2	36.5	28.1	27.13	20.89
BRW 28	564446	199509	47.6	42.8	25.6	17.2	21.0	21.4	28.9	24.9	32.1	29.8	33.7	24.7	29.15	22.45
BRW 29	564617	199849	41.7	34.2	22.6	17.0	15.9	18.9	21.4	21.4	29.5	27.3	31.7	23.5	25.44	19.59

BRW 30	564654	199898	43.0	34.4	23.1	19.7	19.5	20.1	23.9	24.3	31.4	26.4	32.9	28.3	27.25	20.98
BRW 31	565186	200071	35.2	24.9	24.3	23.0	21.2	19.7	23.0	23.0	32.3	24.1	28.7	24.7	25.32	19.50
BRW 32	556964	192288	50.5	39.6	23.9	16.3	19.7	24.1	30.2	28.9	34.4	33.7	36.5	29.8	30.63	23.59
BRW 33	559139	195012	38.4	31.0	19.9	13.0	14.2	14.9	19.7	18.9	26.2	24.9	30.2	27.2	23.21	17.87
BRW 34	557719	193226	42.3	32.5	20.7	17.8	17.6	18.0	24.1	22.4	26.6	25.1	32.3	25.2	25.37	19.54
BRW 36	556603	194628	30.6	19.9	13.6	11.1	8.6	11.5	7.5	11.9	15.1	17.4	25.4	21.4	16.16	12.44
BRW 38	563659	198314	29.8	21.4	15.7	14.7	126.2	17.4	10.7	16.8	17.6	21.6	24.1	23.5	28.31	21.79
BRW 39	562412	189153	39.4	29.8	25.1	19.5	23.0	22.0	23.3	26.8	28.5	27.9	31.6	27.5	27.03	20.81
BRW 40	559191	193681	71.5	51.3	28.1	23.3	27.0	33.5	37.1	41.7	50.1	44.2	53.0	38.3	41.58	32.02
BRW 41	559292	193710	47.2	53.6	35.6	18.7	24.7	39.2	29.3	45.3	45.7	45.7	52.0	43.0	40.00	30.80
BRW42	561328	195002	62.2	46.1	36.9	24.7	18.4	24.9	21.6	31.6	36.1	36.5	45.7	41.1	35.48	27.32
BRW43	561294	194995	68.9	50.7	36.7	21.0	17.0	22.8	26.0	Missing	38.1	41.3	47.0	45.5	37.73	29.05

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1**

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16**

☒ **National bias adjustment factor used**

☒ **Brentwood Borough Council confirms that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System**

Notes:

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Brentwood During 2020

Brentwood Borough Council has not identified any new sources relating to air quality within the reporting year of 2020.

Additional Air Quality Works Undertaken by Brentwood Borough Council during 2020

Brentwood Borough Council has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

Diffusion Tubes QA/QC

Brentwood Borough Council undertook monitoring at 35 nitrogen dioxide diffusion tubes sites in 2020.

The diffusion tubes were supplied and analysed by Socotec with a preparation method of 50% triethanolamine (TEA) in Acetone.

The AIR NO_2 proficiency testing scheme found that the laboratory achieved the following percentage of results determined as satisfactory for 2020:

Table C.1 – AIR PT Results 2020

AIR PT Round	AIR PT AR036	AIR PT AR037	AIR PT AR039	AIR PT AR040
Round conducted in the period	January – February 2020	April – May 2020	July – August 2020	September – October 2020
SOCOTEC	100%	No results reported	No results reported	100%

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within this 2021 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

As Brentwood Borough Council do not undertake automatic air quality monitoring it is not possible to calculate a local bias adjustment. The national bias adjustment factor of 0.77 has been applied to the 2020 monitoring data. A summary of bias adjustment factors used by Harlow Council over the past five years is presented in Table C.3. The same laboratory and preparation of diffusion tubes have been used over this time.

Table C.2 – Bias Adjustment Factor

Year	Local or National	Diffusion Tube	Version of National Spreadsheet	Adjustment Factor
2020	National	Socotec 50% TEA in Acetone	03/21	0.77
2019	National	Socotec 50% TEA in Acetone	03/20	0.75
2018	National	Socotec 50% TEA in Acetone	03/19	0.76
2017	National	ESG Didcot 50% TEA in Acetone	03/18	0.77
2016	National	ESG Didcot 50% TEA in Acetone	03/17v2	0.77

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO2 monitoring locations within Brentwood required distance correction during 2020.

Appendix D: Map of Monitoring Locations and AQMAs

Figure D.1 – Monitoring Location Map: BRW2 AQMA, A12 & M25

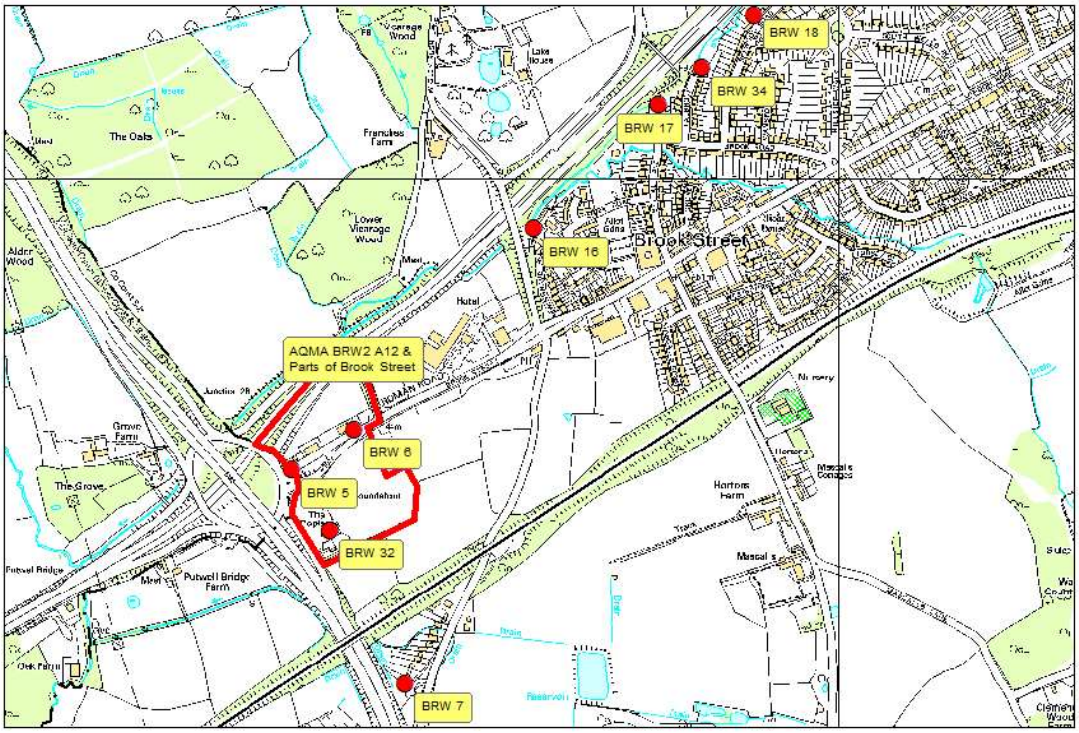


Figure D.2 – Monitoring Location Map: BRW4 AQMA & A12/Warescot Road/Hurstwood Avenue/Ongar Road

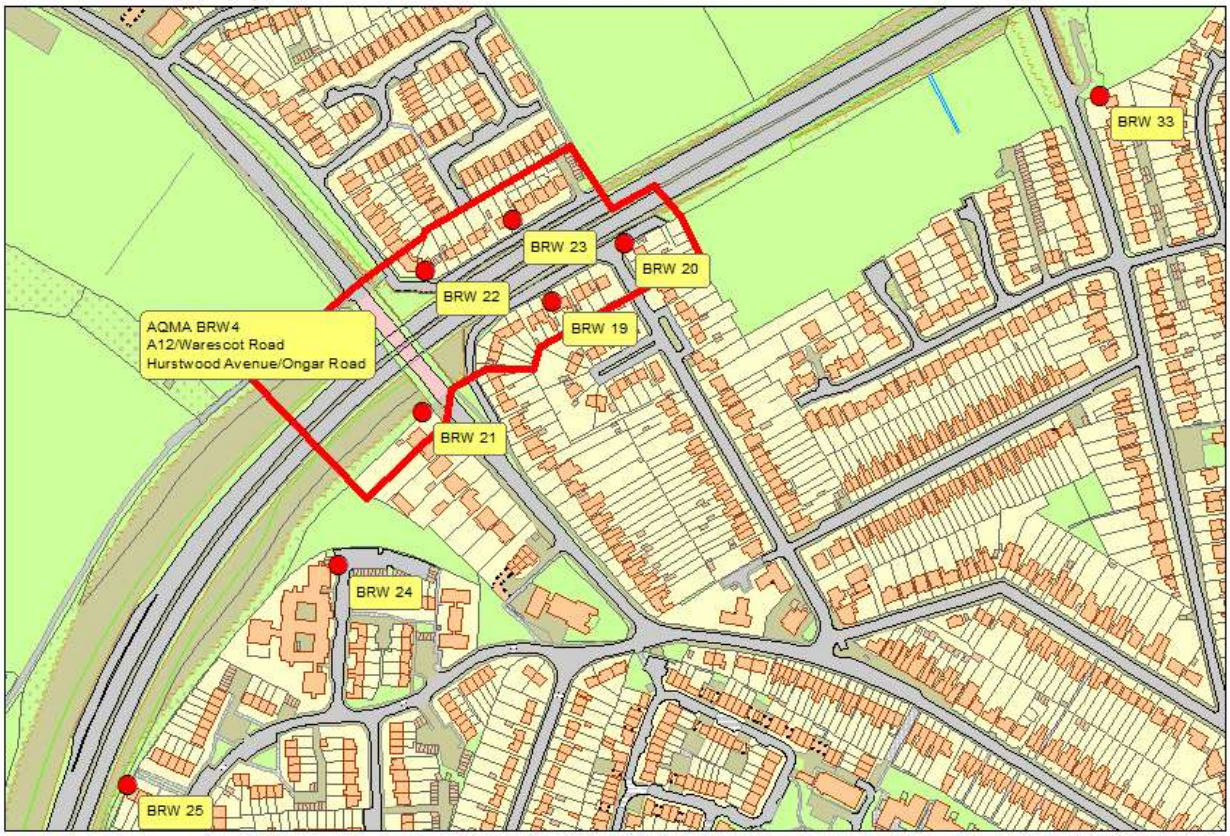


Figure D.3 – Monitoring Location Map: BRW7 AQMA & Brentwood Town Centre

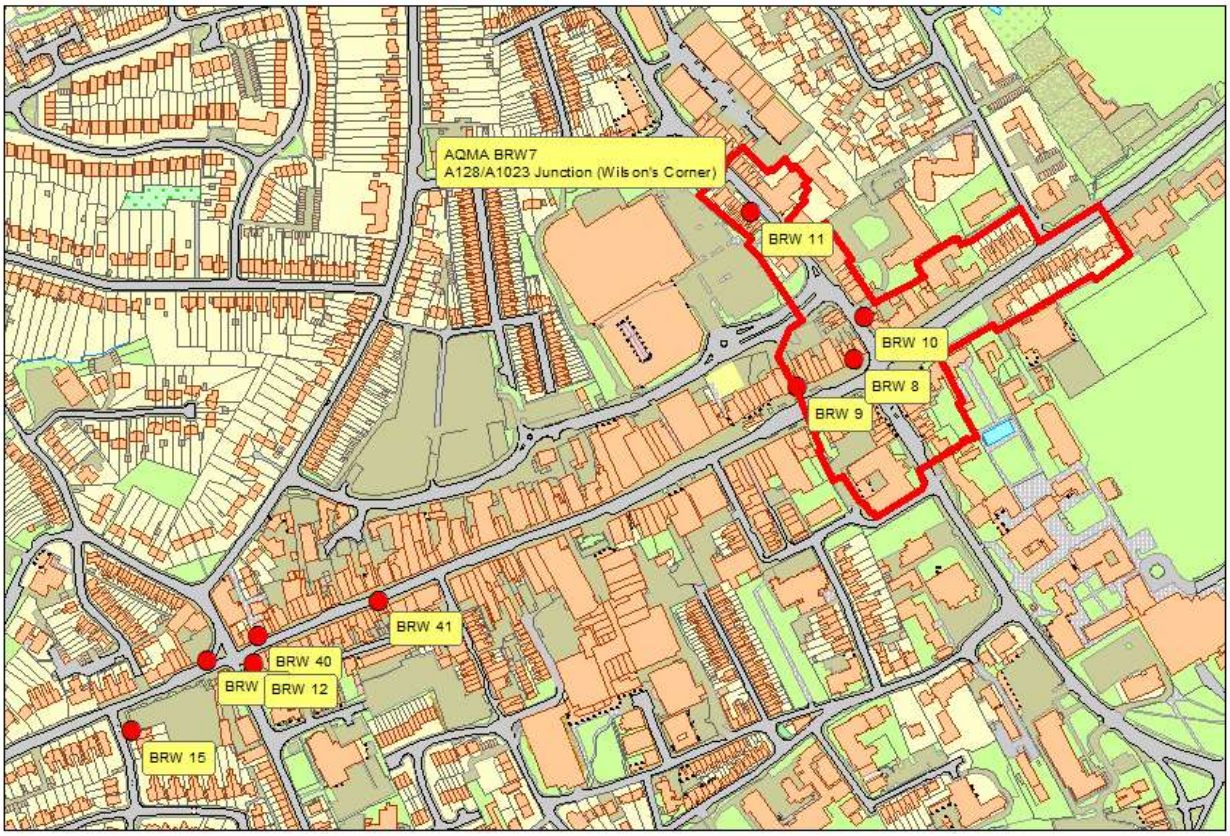


Figure D.4 – Monitoring Location Map: South Weald Rural Background

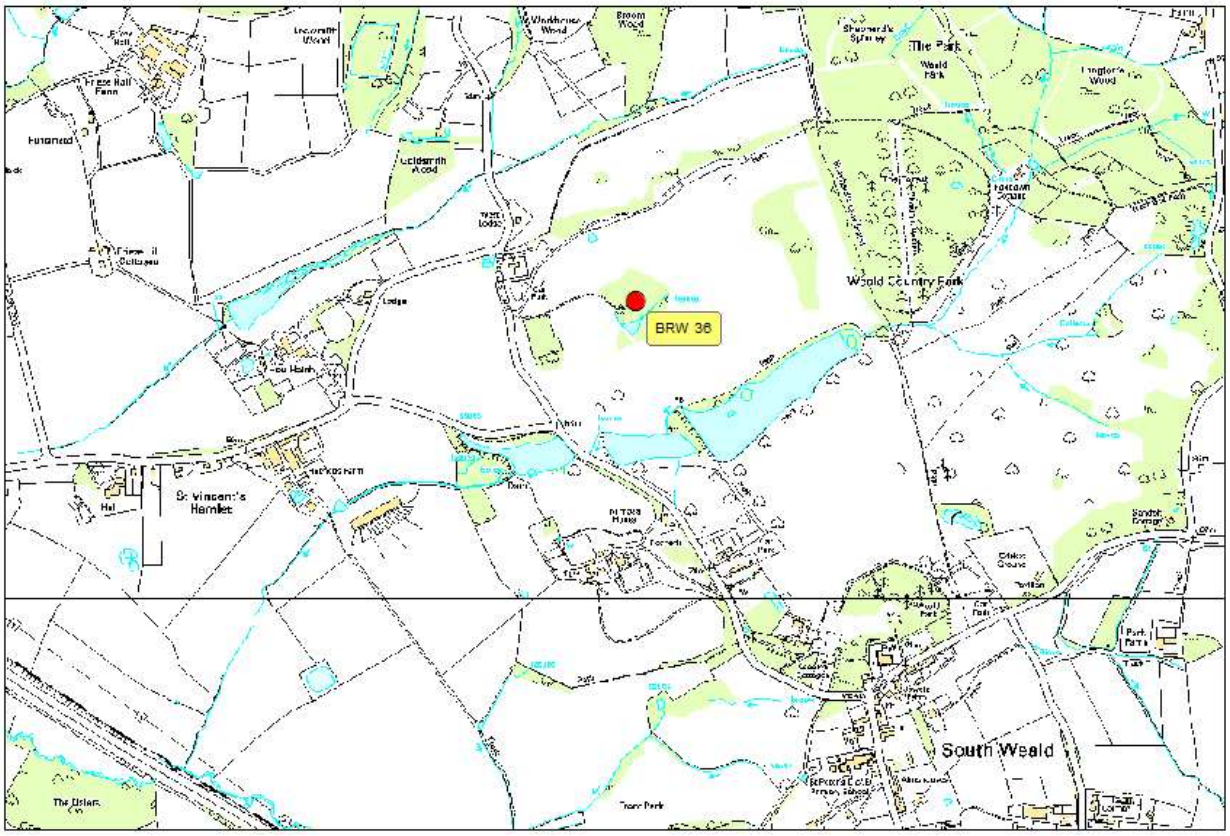


Figure D.5 – Monitoring Location Map: West Horndon

Figure D.6 – Monitoring Location Map: Ingatestone & Margaretting

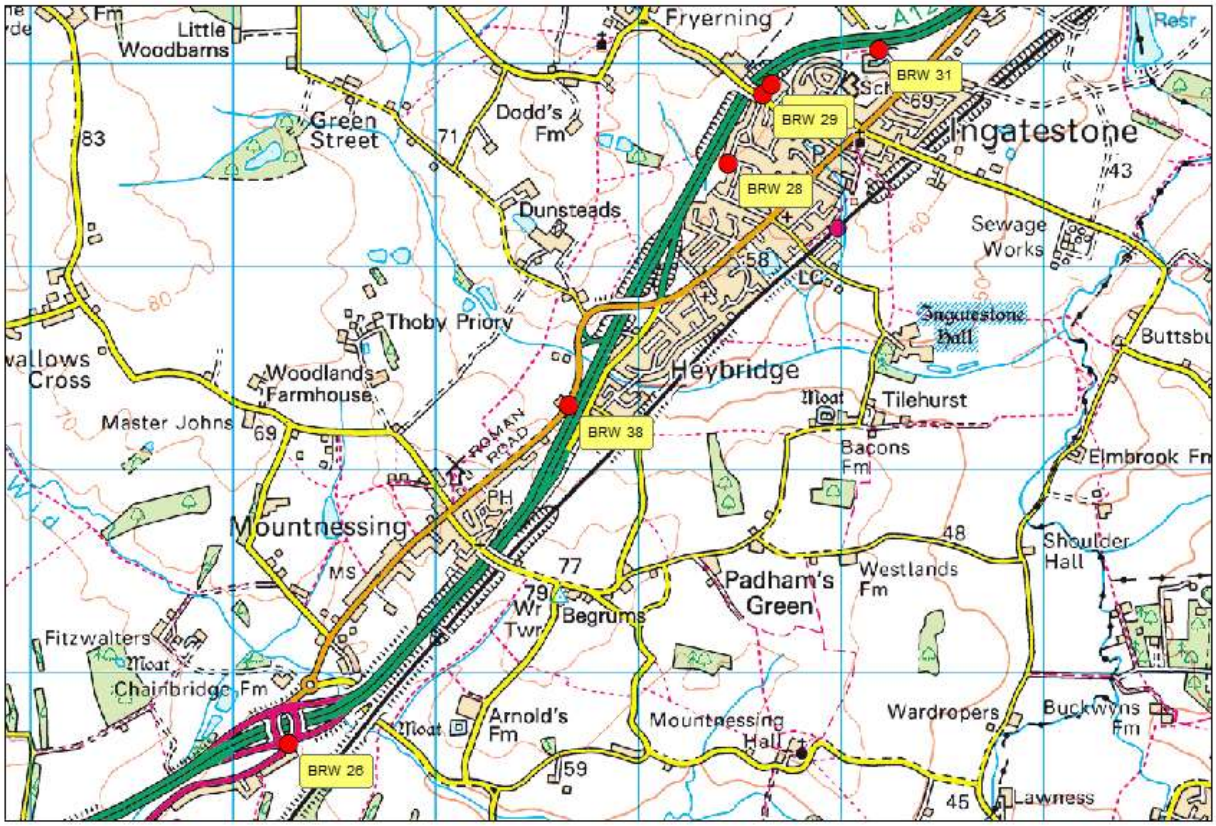


Figure D.7 – Monitoring Location Map: Shenfield

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[5]

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

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

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data[6] suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[7] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

[6] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

[7] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Brentwood

No LAQM related opportunities have arisen as a consequence of COVID-19 within Brentwood.

Opportunities Presented by COVID-19 upon LAQM within Brentwood.

No LAQM related opportunities have arisen as a consequence of COVID-19 within Brentwood.

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	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
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm 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

- Defra Diffusion Tube Bias Adjustment Factors Spreadsheet available at; https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html
- Defra LAQM Summary of Laboratory Performance in AIR NO_2 PT Scheme available at; https://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html
- Essex Air Quality Consortium available at; http://www.essexair.org.uk
- EssexCarShare.com available at; https://liftshare.com/uk/community/essex
- Essex Air Twitter Feed available at; https://twitter.com/essexair
- Brentwood Borough 2020 ASR available at; https://essexair.org.uk/Reports/Brentwood2020ASR.pdf
- Public Health Outcomes Framework Indicator 3.01 available at; https://fingertips.phe.org.uk/profile/public-health-outcomes-framework
- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland available at; https://laqm.defra.gov.uk/technical-guidance/
- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland available at; https://laqm.defra.gov.uk/documents/LAQM-PG16-April-16-v1.pdf