

2018 Air Quality Annual Status Report (ASR)

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

October, 2018



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Report Reference number	WK/201863874
Date	October 2018

Executive Summary: Air Quality in Our Area

Air Quality in Epping Forest District Council

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 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 billion³.

The Council continues to monitor air quality across the district, using nitrogen dioxide as the key air quality indicator. The air quality in the district is reasonably good with only small pockets of increased concentrations of vehicle emissions related pollutants, limited to congested high street areas and busy junctions. The results for 2017 indicate a slight improvement in nitrogen dioxide concentrations across the district. It is not clear if this is attributable to an actual decline in emissions contributing to poor air quality, or whether this is due to meteorological conditions during the year. The Council retains one small AQMA near the B1393 Bell Common junction, which remains above the 40µg/m³ objective concentration. As the annual mean concentration is above 60µg/m³ this also indicates that the hourly average objective concentration has been exceeded. For details of the AQMA, see:

<http://www.essexair.org.uk/AQInEssex/LA/EppingForest.aspx?View=aqma>

No new significant sources of emissions were identified for consideration, nor were any new AQMAs declared. The Council continues to work with our partners including Essex County Council and the Environment Agency on environmental protection and air quality matters.

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

Actions to Improve Air Quality

Because the single largest influence on air quality in the District is the motor car, the Council is generally reliant on national strategies and vehicle emissions regulations for the improvement of air quality.

The Council is currently reviewing its Action Plan with a view to introducing a new range of measures aimed at reducing concentrations of pollutants, both within the AQMA and across the district. Measures will be aimed at developing appropriate infrastructure to support the anticipated increased uptake in electric and plug-in hybrid vehicles, as well as promoting sustainable transport choices from both local businesses and residents. In addition we are still exploring possibilities of taking steps that will directly improve the traffic flow at the Bell Common AQMA however we have been unable to progress such actions at this time.

Conclusions and Priorities

The results from monitoring undertaken in 2017 show that air quality continues to be an issue in Bell Common Epping, due to the amount of road traffic using the B1393. The concentration here remains above both the annual mean and hourly mean objectives. No other exceedances were identified where relevant receptors were present.

Particular challenges include the ageing bus fleet which provides essentially a rural transport service where the London transport network ends. This also means that the motor car remains the first transport choice.

At present local priorities are aimed at the overall improvement of air quality via a variety of means, including non-specific but health-related activities, raising awareness at the local level and changing habits. We are hoping to develop a more targeted focus on the AQMA and its vicinity within the new Action Plan.

Local Engagement and How to get Involved

Get involved – it's easy! Ride your bike, walk or scoot to work, walk your children to school. Make it fun!

If you must use your car and you are waiting for others or find yourself stuck in traffic, turn your engine off! As well as wasting money and polluting the environment, idling is illegal.

Have you considered updating your vehicle to an electric or plug-in hybrid? There are still grants available to assist with the cost of doing so.

The Essex Air Web site can provide you with useful information which may help you get out and about, see: <http://www.essexair.org.uk/>

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1 Local Air Quality Management

This report provides an overview of air quality in Epping Forest District during 2017. 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 Epping Forest District 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.

A summary of AQMAs declared by Epping Forest District Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at

<http://www.essexair.org.uk/AQInEssex/LA/EppingForest.aspx?View=aqma>

Alternatively, see Appendix D: Maps of Monitoring Locations and AQMAs, which provide a map of air quality monitoring locations in relation to the AQMA.

We do not propose to make any changes to the AQMA at this time.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
AQMA Epping Forest District Council No.2	Declared 1 st August 2010	Nitrogen dioxide : 1-hour & Annual mean Objectives	Bell Common, Epping	An area encompassing 2 properties at the junction of Epping High Road and Theydon Road.	NO	68	µg/m ³	64.45	µg/m ³	Air Quality Action Plan	2012	**See below .

Link to Action Plan : <http://www.essexair.org.uk/AQInEssex/LA/EppingForest.aspx?View=reports&ReportType=EPPINGFOREST>

** Please note that the Council is in the process of updating its Action Plan however we have been unable to complete this at the current time due to an unavoidable delay with the Local Plan. The Local Plan contains a number of policies which would support the achievement of improvements to air quality but these are still to be examined by an Independent Inspector appointed by the Secretary of State for Housing, Communities and Local Government.

Epping Forest District Council confirm the information on UK-Air regarding their AQMA is up to date

2.2 Progress and Impact of Measures to address Air Quality in Epping Forest District

Defra's appraisal of last year's ASR concluded that whilst "an exceedance of the annual mean nitrogen dioxide objective was measured at the monitoring site located within the AQMA. No other exceedances occurred in 2016." It goes on to acknowledge that "the Council have provided an explanation of the significant improvement of air quality at the monitoring location in the AQMA which occurred in 2015 and 2016. The monitoring location was moved in 2015 closer to the centre of the junction, where concentrations are not as elevated. Monitoring at the original site at a residential building façade has been resumed in January 2017. On the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants, with the provisos listed in the commentary below." The Council has addressed these provisos in this report.

Epping Forest District Council has taken forward a number of measures during the current reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

Air quality has been a consideration in the Councils emerging local plan and greater liaison with regards to development and its impact on air quality takes place as a result.

Epping Forest District Council expects the following measures to be completed over the course of the next reporting year:

- Clean Air Day – undertake additional promotional work outside schools, focussing on known problem areas, speaking to parents in vehicles and also raising awareness with the children.
- Idling vehicles promotion campaign – Raise awareness of the impacts of idling vehicles and that idling is an offence that may lead to the issuing of an FPN
- Obtain relevant powers for nominated officers to issue fixed penalty notices (FPNs)
- Liaising with Epping Forest Conservators and Essex County Council Highways Department in relation to options to improve air quality in the Air Quality

Management Area, with the aim of making sufficient progress to continue updating the Air Quality Action Plan.

- Liaising with internal departments regarding the emerging Local Plan to ensure that policies facilitate mitigation to protect human health going forward.
- Work with Development Control to update standard conditions placed on planning applications, to ensure that they address current and future issues as a result of development.

Epping Forest District Council's priorities for the coming year are:

- Continue liaison with key partners including Essex County Council Highways Department with regarding workable options that will address air quality issues in the AQMA at Bell Common. Discussions will be informed by outputs from air quality modeling commissioned by the Council to support the emerging Local Plan which have reviewed the potential for longer term improvements in air quality arising from national and international interventions together with the application of policies proposed in the Plan. As soon as we are in a position to, we will publish a revised Air Quality Action Plan.
- Targeted enforcement of idling vehicles where complaints are received and following the promotional campaign

The principal challenges and barriers to implementation that Epping Forest District Council anticipates facing are:

- Availability of land adjacent to the Bell Common AQMA which would facilitate making adjustments to the road network and therefore improve traffic flow throughout the area
- Effective partnership working where interests and required outcomes differ.
- Financial costs of implementing preferred options for measures to reduce pollution concentrations

Progress on the following measures has been slower than expected due to:

- Local Plan: The Local Plan has been delayed following a legal challenge which preventing the Council from submitting it to the Secretary of State for Housing, Communities and Local Government for examination.

- **Electric Vehicle Charge Points:** the council has invested considerable time looking in to the various options for the installation of electric vehicle charging hardware. Unfortunately due to the uncertainty regarding the specification of the most appropriate hardware and associated operational matters, the Council has been unable to commit to progressing with this matter to date. We will continue to look into this, and look into the potential of partnership working alongside the County Council where appropriate.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Epping Forest District Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of the Bell Common AQMA (AQMA Epping Forest District Council No.2). These will be fully considered as part of the new Action Plan, which will be completed as soon as we are able to assess the impact of the emerging Local Plan.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Environmental Permitting inspections	Environmental Permits	Environment charges through permit systems and economic instruments	EFDC	N/A	N/A	100% of inspections due completed	Applicable to the whole district not just the AQMA	100% to date	Ongoing	100% Completed during 2017
2	Updates to Essex Air web site	Public information	Via the internet	Essex Air	N/A	N/A	None	Applicable to the whole district not just the AQMA	Ongoing	Ongoing	Website updates undertaken
3	Fleet vehicle standards for CO ₂	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	EFDC	2017	TBC	TBC	Applicable to the whole district not just the AQMA	Ongoing	Ongoing	Electric vehicles have replaced some corporate vehicles. Further work required.

Additional measures:

1. *Installation of Electric vehicle charge points in EFDC Car Parks :*
Considerable time has been spent looking into various options available to the council to install such equipment in Council owned Car Parks. We have been unable to commit to any one option at present but are still continuing to work towards the provision of this in the future.
2. *Enforcement of Idling Vehicles by EFDC:*
Further to complaints regarding idling vehicles outside of schools, officers were given the necessary authority to serve Fixed Penalty Notices (May 2018). It is intended for this power to be targeted where complaints are received and it will follow a promotional campaign to highlight this power to residents.

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.

Epping Forest District Council is taking the following measures to address PM_{2.5}:

New Measure:

- Authorisation of officers to issue fixed penalty notices in respect of idling vehicles on the public highway (May 2018)

Existing / Ongoing Measures:

- Effective regulation of Part B and Part A2 regulated activities including solvent emission activities.
- Investigation of complaints regarding, and regular reviews to search for unpermitted industrial activities.
- Investigation of complaints and effective regulation in respect of industrial and domestic bonfires.
- Investigation of complaints, provision of information and effective regulation of smoke control areas (Loughton and Waltham Abbey).
- Participation in 'Clean Air Day' anti-idling promotion initiatives with a focus outside schools.
- Consideration of planning applications with regard to dust creation on building sites and appropriate mitigation strategies.

The above measures will link to the Public Health Outcomes Framework indicator 3.01, and help to bring about a reduction of the fraction of mortality attributable to particulate air pollution (PM_{2.5}). As Epping Forest District Council do not currently undertake monitoring of particulate matter (either PM¹⁰ or PM_{2.5}), we are unable to determine the effectiveness of measures in reducing concentrations of this pollutant.

It is anticipated that the measures already being taken in respect of other pollutants will assist in the reduction of both primary PM^{2.5} and secondary PM^{2.5}.

As the District comprises of a mainly urban south and mainly rural north, the approaches to reduce PM^{2.5} will differ according to the sources present in the local area. As much PM^{2.5} within the district will have originated outside of the district, we will continue to work with neighbouring authorities to achieve a consistent approach to air quality improvement.

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

3.1 Summary of Monitoring Undertaken

The monitoring undertaken in 2017 was a direct continuation of that undertaken by Epping Forest District Council in 2016, with no monitoring locations being removed or added to the survey. The only alteration was the relocation of the monitoring site in the Bell Common Air Quality Management Area to its original location on the façade of the residential property. This change was made as this location reflects the worse case scenario and also enables the production of meaningful trend data. A graph illustrating this can be found in Appendix A, figure A.1.

The concentrations monitored in 2017 did not reveal any significant changes and no changes to declarations are therefore proposed at this time. Additional monitoring locations are being set up with effect from January 2018 in order to monitor nitrogen dioxide concentrations in Ongar as well as provide a better understanding of concentrations along a congested section of road in Buckhurst Hill. As results from the 3 monitoring locations on the “Burrows Chase” development to the south of Waltham Abbey have not revealed any exceedances, 2 of these are to be discontinued in 2018, with the remaining location providing an indicator for the future. In the event that this reveals elevated concentrations, further monitoring will be undertaken.

3.1.1 Automatic Monitoring Sites

Epping Forest District Council did not undertake automatic (continuous) during 2017. National monitoring results are available at <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>

3.1.2 Non-Automatic Monitoring Sites

Epping Forest District Council undertook non- automatic (passive) monitoring of NO₂ at 27 sites during 2017. Table A. 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 (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, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B.

Exceedances of the annual mean objective were monitored at the following sites:

- Hainault Road, Chigwell (45.27 µg/m³)
- Bell Vue, Epping (64.45µg.m³)

As the Hainault Road monitoring location is not representative of relevant exposure, a distance correction calculation was undertaken. This can be found in Appendix C, and shows that after the distance to the façade of the nearest residential property is taken into account, the calculated concentration of nitrogen dioxide at the receptor location is 33.6 µg/m³. As this is below the objective concentration of 40 µg/m³ it did not require further action.

The Bell Vue monitoring location is representative of relevant exposure as it is located on the façade of a residential property. No distance calculation is therefore required for this site. As the concentration recorded is above 60 µg/m³ it can also be assumed that the hourly objective of 200 µg/m³ has been exceeded more than 18 times in the year. This monitoring location is already located within the Bell Common AQMA, which has been declared for both an exceedance of the hourly and annual mean objectives. No further designations are therefore required in respect of this.

The graph in Appendix A, Figure A.1 shows the trend of monitoring data at the Bell Vue site, located within the AQMA. This chart also reflects the recent results that

were obtained from the alternative monitoring location during 2015 and 2016. Whilst the alternative monitoring site gave the impression of an improvement in nitrogen dioxide concentrations, the result from 2017 demonstrates that concentrations in the AQMA have not changed in recent years.

The remaining graphs in Appendix A, Figures A.2, A.3, and A.4 show trends of monitoring data obtained from Epping, Loughton, and Waltham Abbey. Whilst concentrations fluctuate over time, there is a slight overall trend in favour of an improvement at all sites in the preceding 12 months.

Appendix A: Monitoring Results

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	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)
1	Chigwell: Hainault Road	Kerbside triplicate	544234	192236	NO ₂	No	Residential (8.5m)	1m	No	2.0m
2	Epping: 15 High Street	Urban Background triplicate	545555	201732	NO ₂	No	Residential (0m)	13.7m	No	2.0m
3	Epping: Bell Vue	Roadside triplicate	544928	201281	NO ₂	Yes	Residential (0m)	1.8m	No	2.0m
4	Epping: Ladbrokes	Roadside triplicate	546196	202355	NO ₂	No	Public (0m)	5.6m	No	2.5m
5	Epping: Superdrug	Roadside triplicate	546058	202193	NO ₂	No	Public (0m)	4.9m	No	2.5m
6	Hastingwood: Canes Cottages	Urban Background triplicate	547838	206819	NO ₂	No	Residential (0m)	15.6m	No	2.0m
7	Loughton: 1 Church Hill	Roadside co-location	542505	196668	NO ₂	No	Public (0m)	4.2m	No	2.0m
8	Loughton: 72 Church Hill	Urban Background co-location	542664	196868	NO ₂	No	Residential (0m)	12.7m	No	2.0m
9	Loughton: 249 High Road (Timpson)	Roadside triplicate	542339	196360	NO ₂	No	Public (0m)	6.4m	No	2.0m

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10	Loughton: 252 High Road (Bojangles)	Roadside duplicate	542373	196478	NO ₂	No	Public (0m)	5.7m	No	2.0m
11	Loughton: Goldings Hill	Roadside co-location	543091	197316	NO ₂	No	Residential (4.8m)	1m	No	2.0m
12	North Weald: Tempest Mead	Urban Background triplicate	549648	203671	NO ₂	No	Residential (4.2m)	1.0m	No	2.0m
13	Roydon: High Street	Roadside triplicate	540919	209956	NO ₂	No	Residential (0.75m)	1.2m	No	2.0m
14	Roydon: Netherhall Lane	Urban Background triplicate	539711	208662	NO ₂	No	Background (16m)	1.7m	No	2.0m
15	Sewardstone: Albion Terrace	Roadside co-location	537727	196187	NO ₂	No	Residential (3.1m)	4.6m	No	2.0m
16	Waltham Abbey: 13 The Elms	Urban Background triplicate	541308	200037	NO ₂	No	Residential (0m)	36.6m	No	2.0m
17	Waltham Abbey: 15 The Elms	Urban Background triplicate	541320	200020	NO ₂	No	Residential (0m)	55.8m	No	2.0m
18	Waltham Abbey: Abbeyview	Urban Background co-location	537808	200644	NO ₂	No	Residential (6.1m)	1.5m	No	2.0m
19	Waltham Abbey: Burrows Chase	Urban Background co-location	538570	199509	NO ₂	No	Residential (0m)	14.6m	No	2.0m
20	Waltham Abbey: Hayden Road	Urban Background co-location	538386	199557	NO ₂	No	Residential (0m)	12m	No	2.0m
21	Waltham Abbey: Howse Road	Urban Background co-location	537956	199565	NO ₂	No	Residential (0m)	19m	No	2.0m

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22	Waltham Abbey: Lodge Lane	Roadside triplicate	538710	199860	NO ₂	No	Residential (7.3m)	0.5m	No	2.0m
23	Waltham Abbey: Roundhills	Urban Background co-location	538954	199973	NO ₂	No	Residential (6.7m)	1.0m	No	2.0m
24	Buckhurst Hill: Underground Station	Roadside triplicate	541719	193979	NO ₂	No	Residential (7m)	1.6m	No	2.15m
25	Buckhurst Hill: St Johns School	Roadside triplicate	540902	194240	NO ₂	No	Residential (11m)	2.5m	No	2.0m
26	Buckhurst Hill: Westbury Lane	Urban Background triplicate	541512	193975	NO ₂	No	Residential (3.5m)	2.1m	No	2.0m
27	Sheering: Sheering Road	Roadside triplicate	548842	212102	NO ₂	No	Residential (30m)	2m	No	2.0m

Notes:

- (1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).
(2) N/A if not applicable.

Table A.2 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2013	2014	2015	2016	2017
Chigwell: Hainault Road	Kerbside triplicate	Diffusion tube	100	100	36	35	39	48	45.27
Epping: 15 High Street	Urban Background triplicate	Diffusion tube	100	100	30	31	25	28	27.62
Epping: Bell Vue	Roadside triplicate	Diffusion tube	100	100	65	63	42⁽⁴⁾	46⁽⁴⁾	64.45
Epping: Ladbroke	Roadside triplicate	Diffusion tube	100	100	35	36	34	33	30.83
Epping: Superdrug	Roadside triplicate	Diffusion tube	100	100	43	42	36	39	35.67
Hastingwood: Canes Cottages	Urban Background triplicate	Diffusion tube	100	100	28	26	16	26	25.99
Loughton: 1 Church Hill	Roadside co-location	Diffusion tube	100	100	38 [#]	35 [#]	28	33	27.04
Loughton: 72 Church Hill	Urban Background co-location	Diffusion tube	100	100	29	28	26	27	26.28
Loughton: 249 High Road (Timpson)	Roadside triplicate	Diffusion tube	100	100	38	38	32	36	32.80
Loughton: 252 High Road (Bojangles)	Roadside duplicate	Diffusion tube	95.8	100	40	38	34	39	37.57
Loughton: Goldings Hill	Roadside co-location	Diffusion tube	100	100	38	37	45	42	38.59
North Weald: Tempest Mead	Urban Background triplicate	Diffusion tube	97.2	100	-	20	19	19	18.35

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Roydon: High Street	Roadside triplicate	Diffusion tube	100	100	29	25	22	24	23.22
Roydon: Netherhall Lane	Urban Background triplicate	Diffusion tube	80.6	100	21	21	21	21	17.87
Sewardstone: Albion Terrace	Roadside co-location	Diffusion tube	91.7	100	40	33	27	34	32.71
Waltham Abbey: 13 The Elms	Urban Background triplicate	Diffusion tube	100	100	36	32	32	34	31.78
Waltham Abbey: 15 The Elms	Urban Background triplicate	Diffusion tube	100	100	35	30	30	31	30.34
Waltham Abbey: Abbeyview	Urban Background co-location	Diffusion tube	100	100	32	28	23	29	28.05
Waltham Abbey: Burrows Chase	Urban Background co-location	Diffusion tube	100	100	31	27	25	27	24.83
Waltham Abbey: Hayden Road	Urban Background co-location	Diffusion tube	95.8	100	34	31	29	30	25.79
Waltham Abbey: Howse Road	Urban Background co-location	Diffusion tube	100	100	33	29	29	30	25.86
Waltham Abbey: Lodge Lane	Roadside triplicate	Diffusion tube	100	100	32	30	28	35	33.05
Waltham Abbey: Roundhills	Urban Background co-location	Diffusion tube	95.8	100	-	34	24	30	30.50
Buckhurst Hill: Underground Station	Kerbside triplicate	Diffusion tube	100	58.3	-	-	-	33	30.91
Buckhurst Hill: St Johns School	Roadside triplicate	Diffusion tube	85.7	58.3	-	-	-	34	31.89

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Buckhurst Hill: Westbury Lane	Urban Background triplicate	Diffusion tube	83.3	50	-	-	-	29	27.71
Sheering, Sheering Road	Rural Roadside triplicate	Diffusion tube	100	100	-	-	-	33	28.74

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

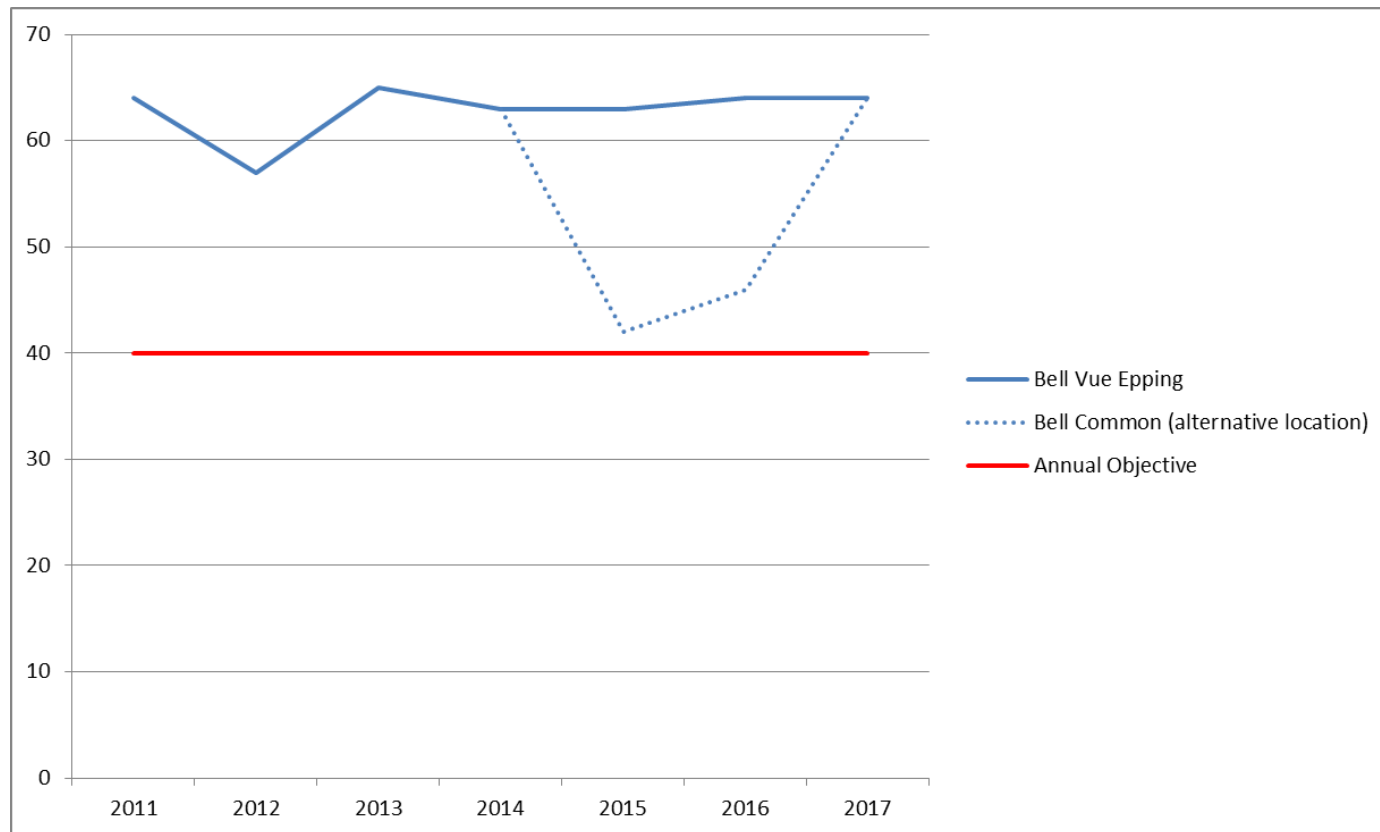
NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(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%).

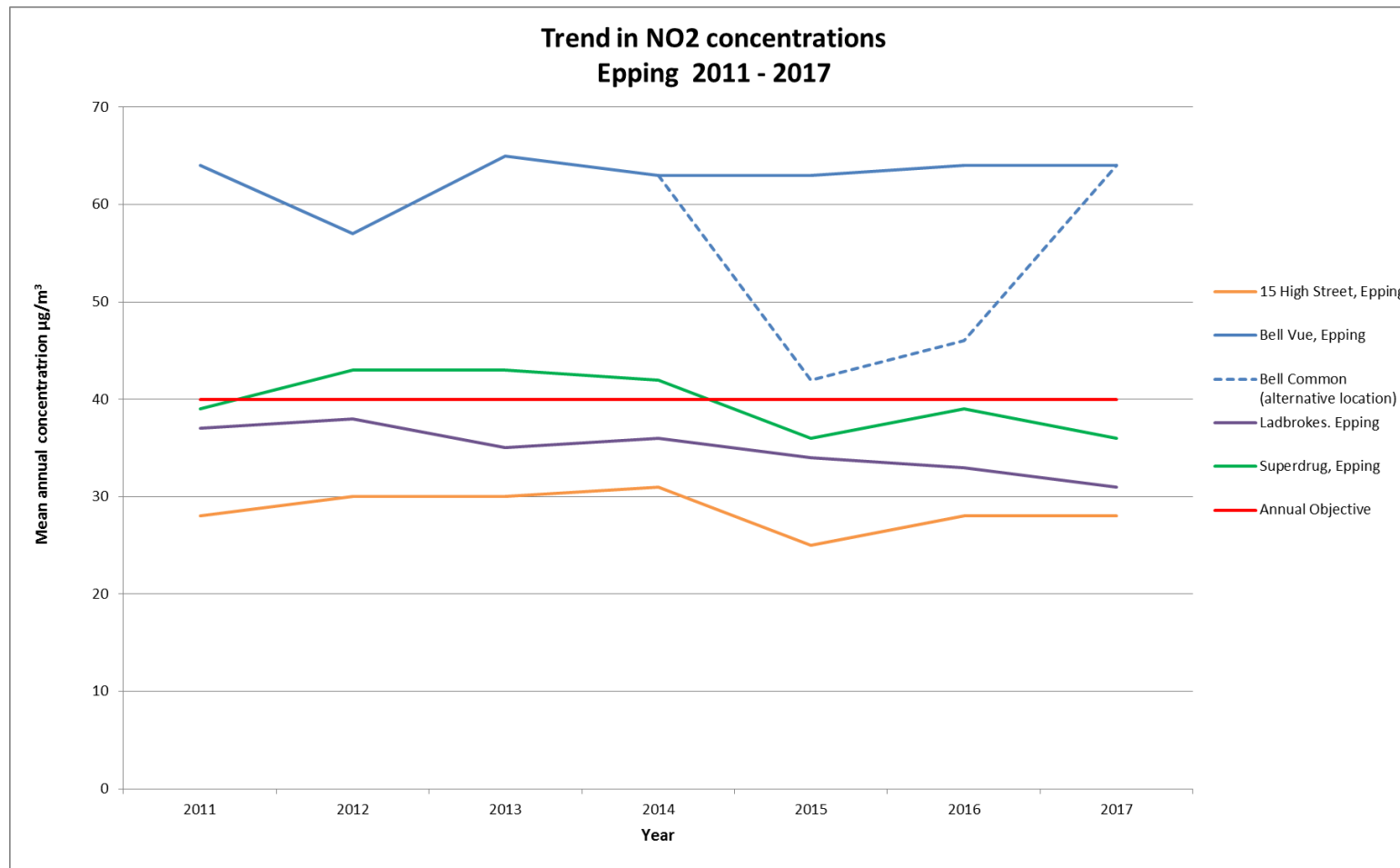
(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(4) These results were obtained from an alternative monitoring location with advantageous dispersal of pollutants (Grid Reference 544944, 201293). This was considered not to reflect relevant exposure and therefore the monitoring location was returned to the façade of the property.

Figure A.2 – Trend in Annual Mean NO₂ Concentration in the Bell Common Air Quality Management Area

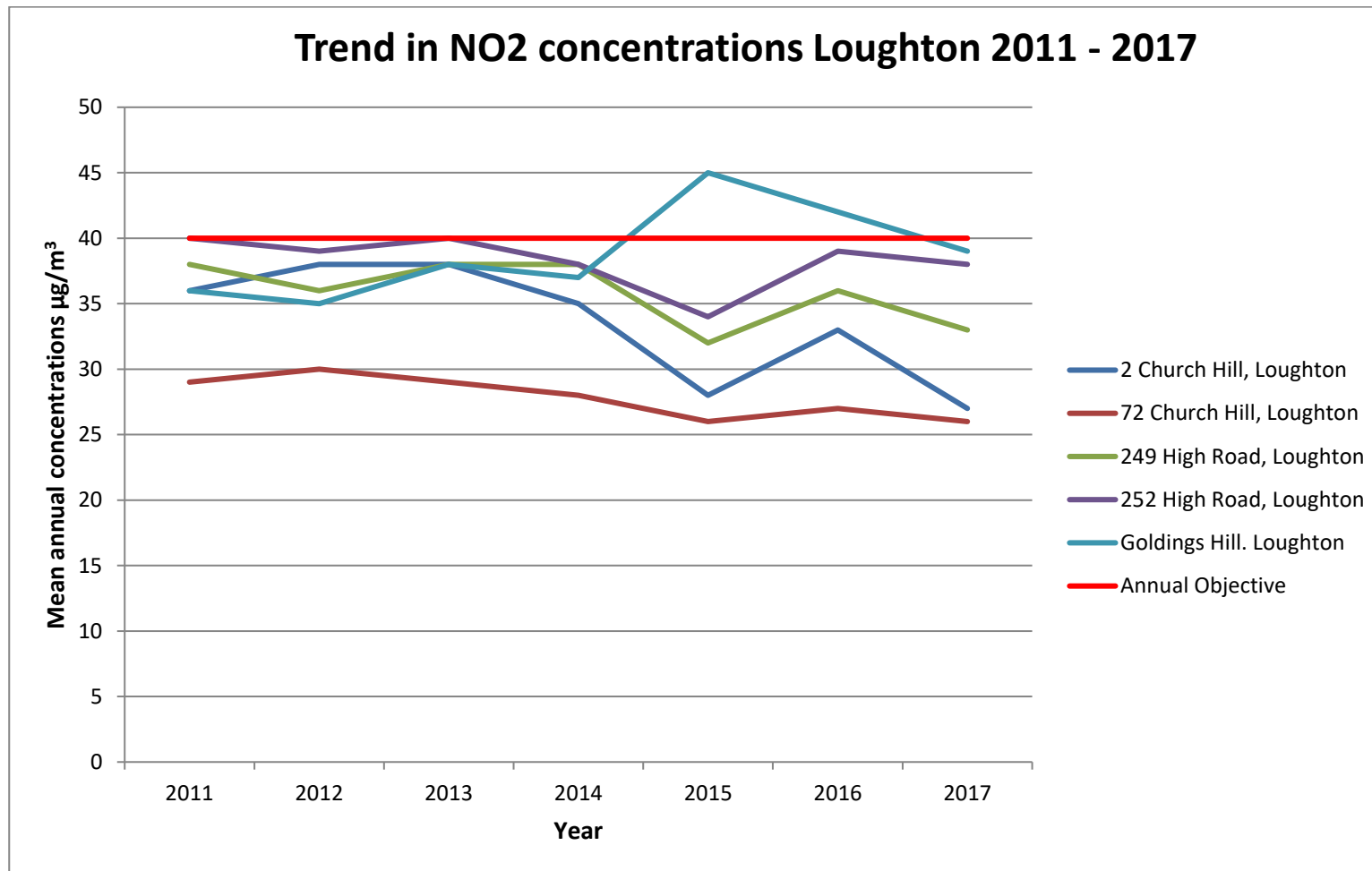
This figure shows a slight increase in concentrations of nitrogen dioxide at the Bell Common Air Quality Management Area between 2014 and 2017. The dotted line reflects the concentrations recorded during 2015 and 2016 when the monitoring location was moved slightly away from the receptor property which resulted in a reduced concentration being measured. The monitoring tube was restored to its previous location in January 2017, as a result the continuous blue line shows that concentrations at this location have remained stable since 2011 with the exception of 2012 when there was a small improvement.

Figure A.2 – Trend in Annual Mean NO₂ Concentration in Epping



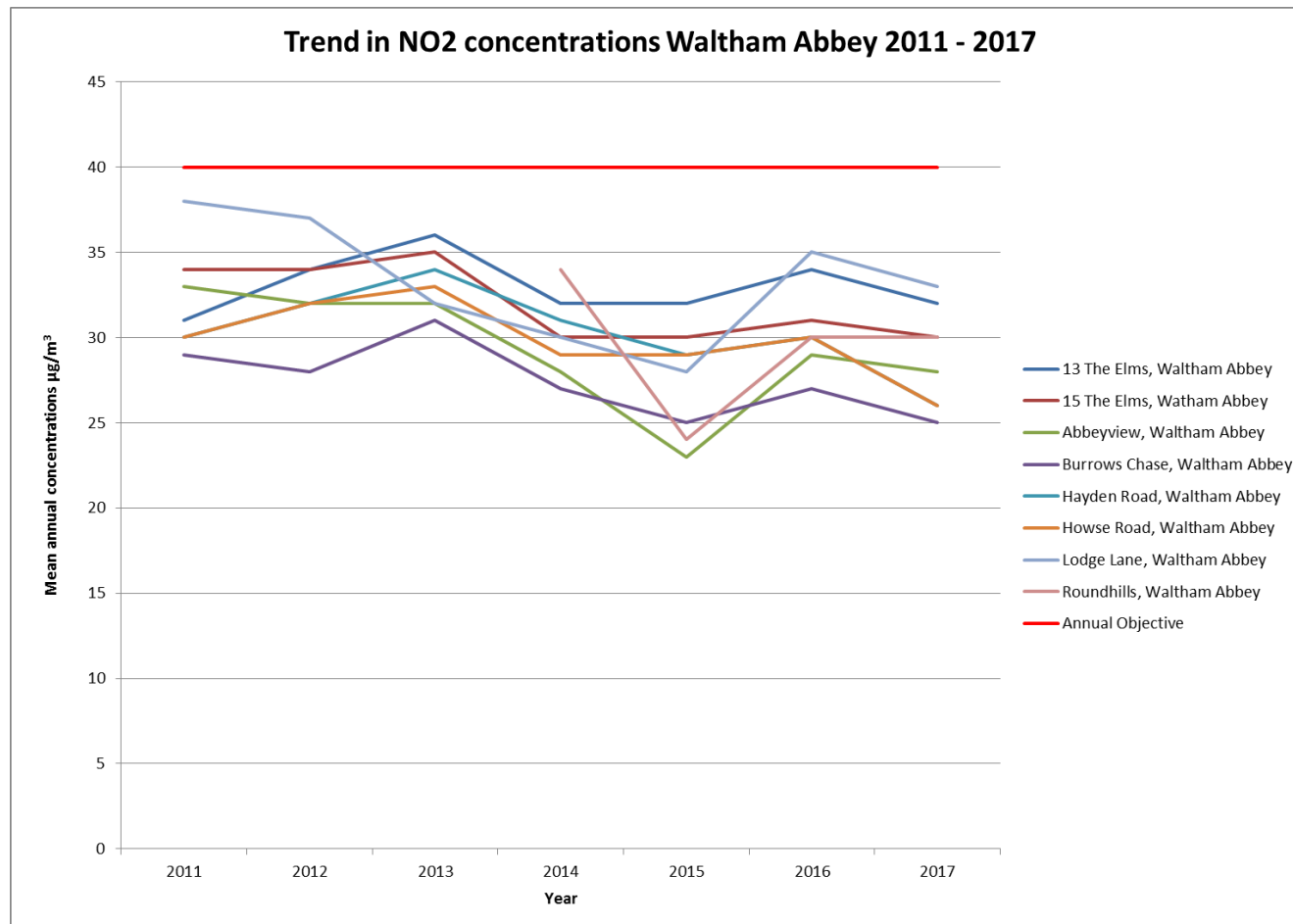
This chart shows the concentrations of nitrogen dioxide measured in Epping, with exception of the AQMA at Bell Common, remain below the objective concentration. Concentrations in the commercial part of the high street showed a slight improvement whilst concentrations in the southern part remained stable.

Figure A.3 – Trend in Annual Mean NO₂ Concentration in Loughton



This chart shows the concentrations of nitrogen dioxide recorded from monitoring locations in Loughton were all under the objective. There was an improvement at all locations from the previous year.

Figure A.4 – Trend in Annual Mean NO₂ Concentration in Waltham Abbey



This chart shows concentrations of nitrogen dioxide measured at monitoring locations in Waltham Abbey have all remained under the objective level. The trend, displayed by these locations, shows an improvement to the previous year.

Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO₂ Monthly Diffusion Tube Results – 2017

Site ID	NO ₂ Mean Concentrations (µg/m ³)												Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.77) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
1a	90.9	66.3	59.4	59.6	51.8	47.6	47.1	49.5	55	60.6	73.6	51.2	58.79	45.27	33.6
1b	74.8	69.5	63	57.8	52.5	44.4	43.7	49.8	55.6	57.5	69.6	58.5			
1c	88.8	67.5	59.8	58.5	51.2	44.4	44.9	51.8	53.1	57.4	73	56.6			
2a	42.1	44.4	37.2	31.2	30.2	25.1	26.2	32.4	31.3	35.6	45.4	38.2	35.88	27.62	n/a
2b	60.9	37.5	37.2	31.2	31	28.2	21.7	28.5	34	37.9	45.5	35.1			
2c	59.9	43.6	39.3	29.9	31	27.6	26.9	31.8	34.6	38.7	42.6	37.6			
3a	86.2	90.6	87.4	88.2	73.3	78.9	71.3	86.5	82.8	85.6	102.7	68.9	83.70	64.45	64.45
3b	100.9	88.2	89.4	87	64.2	83.6	76.2	77.9	91.7	89.4	109.7	88.9			
3c	93.3	73.3	82.9	90.8	63.8	79	74.7	71.3	81.4	80.5	100.8	72			
4a	49.3	47.8	46.9	37.4	35.8	33.3	31.7	32.3	39.4	48.8	46.3	37	40.03	30.83	n/a
4b	58.6	50.3	41.4	35.7	34.7	31.9	5.9	35.9	39.7	39	46.7	45.3			
4c	53.8	51.8	46.1	33.7	35.8	30.8	31.8	30.1	39.9	45.8	46.9	43.6			
5a	65.4	51.5	51.3	38.1	44.4	41.8	40	40	43.9	46.5	50.1	42.3	46.32	35.67	n/a
5b	61.1	56.9	51.3	38.8	52.4	41.8	39.4	41.6	46.8	40.3	49.4	30			
5c	75.8		52.4	39	50.1	42.1	36.4	40.1	41.8	45.7	50.1	42.1			

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6a	49.3		33.6	30.2	26.3	23.1	23.5	29.9	29.8	34.5	39.5	44	33.76	25.99	n/a
6b	47.3	36.2	28.8	31.7	27.4	25.7	23.2	29.7	33.5	35.7	49.5	42.2			
6c	55.1		34	28.9	27.7	22.9	23.8	28.5	32.1	36.2	41	43.4			
7a	44.7	42.8	35.1	27.7	34.6	25.4	24.6	29	30.4	29.8	43.2	40.3	35.11	27.04	n/a
7b	60.1	44.5	40.2	28.2	29.3	25.9	24.3	29.9	32.6	33.6	46.2	40.3			
8a	55.1	42.7	34.7	30.9	25.3	24.3	24.7	28.7	30.6	33.4	36.3	38	34.13	26.28	n/a
8b	55.4	45.5	37.7	31.1	29.3	25.5	26.1	28.3	29.4	32.9	40.9	32.2			
9a	63.6	43.5	45.1	35.4	42.7	36.5	36.6	34.9	38.1	43.3	42.9	43.7	42.60	32.80	n/a
9b	56.1	53.7	47.1	35.6	42.3	34.9	35.1	34.2	41.9	42.3	43.9	44.3			
9c	60.6	53.3	44.8	35.1	41.2	34.3	37.4	35.6	43.1	41.5	44.7	44.3			
10a	56	55	50.2	45.3	42.6	40.6	42.2	40.8	45.8	52.7	59.2	44	48.79	37.57	n/a
10b	66.7	56.3	46.9	45.5	42.4	43.2	41.6	45	45.5	51.7	58.6	53.1			
11a	69.5		52.7	43.4	53.3	45.7	41.3	44.6	49.7	51.7	59.5	32.8	50.12	38.59	n/a
11b	72.6	56.8	49.9	44.2	52.9	45.4	40.7	39.8	51.1	46.3	56.6	52.8			
12a	25.3	31.3	26.3	19.6	16.5	16.3	16.3	18.5	22.2	27.1	32.8	31.9	23.83	18.35	n/a
12b	39	31.1	23.5	20.1	15.8	15.6	15.8	17.3	21.4	25.3	33.5	29.4			
12c	32.9	31.7	23.9	16.4	17.2	16.3	15.8	18	22.1	26.1	34.6	31			
13a	50.5	37.4	31.2	27.4	22.6	20	21.4	20.4	28.2	32.1	38.3	35.3	30.16	23.22	n/a
13b	44.4	41.7	29.7	26.6	26.2	21.7	20.2	23.9	24.9	31.9	40.4	37.2			
13c	40.7	40.3	31.2	26.3	24	21.3	21.5	22.9	27.1	30.9	44.2	21.6			
14a	36.8	31.4	24.8	23	19.2	14.9	15.3	16.5	20.2	24.1	22.4	33.7	23.21	17.87	n/a
14b	26	32.1	20.3	22.1	18.3	15.2	14.5	18.1	19.8	24.4	31.8	29.1			
14c	40.9	27.6	25.2	21.2	18.2	14.9	16.2	13.4	20	22.2	31.4	30.4			
15a	45.9	50.4	43	40.2	40.1	30.9	29.3	36.2	36.9	49.1	56.4	43.9	42.48	32.71	n/a
15b	66.8	44.4	37.6	40.2	40.5	33.1	30.3	36.4	42.6	42.7	58.2	44.3			
16a	59.3	49.3	47.7	49.4	34.2	37.7	33.1	37.2	35.2	31.8	51.8	44.7	41.27	31.78	n/a
16b	52.7	45.3	44.3	48	29.2	36.1	29.3	37.8	36.3	37.9	56.9	41.4			
16c	38	45.9	45.2	45.5	31.8	35.8	30.6	37.3	34.3	37.4	52.2	45.2			

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17a	53.5	38.2	40.8	46.8	29	33.2	30.3	31.1	38.2	37.3	49	45.9	39.41	30.34	n/a
17b	48.3	44.8	40.6	48.5	31.5	30	28.7	35.8	40.9	41.3	50.9	42.1			
17c	30.9	42.4	41.8	42.8	32	33.1	29.7	35.1	37.8	38.5	55.9	42			
18a	44.3	45.6	41.2	25	29.2	26		30.5	33.1	38.2	47.9		36.44	28.05	n/a
18b	55.7	39.8	38.1	26.8	30.6	30.1		28.1	33.3	37.2	48				
19a	45	34.1	31.3	32.6	34.1	24.8	24.9	27.1	30.3	30.1	43.2	33.1	32.24	24.83	n/a
19b	46.7	24.8	33.5	33.7	32.4	22.5	26.7	26.6	30	27.3	43.8	35.2			
20a	47.7	41.7	26.5	39.3	31.8	18.2	25.2	29.8	30.1	22.4	52.2	28.8	33.49	25.79	n/a
20b	50.4	40.5	34.9	36.2	25	18.5	27.5	33.1	33.8	33.8	35.5	40.8			
21a	53	43.3		35.1	27.4	21.8	23.2	28.7	31.6	33.6	34		33.59	25.86	n/a
21b	58.9	37	34.8	34.8	30.7	21.6	22.9	28.6	31.4			39.3			
22a	44.1	53.5	47.3	46.9	38.9	38.3	32.3	29.9	39.4	43.8	59.1	44	42.92	33.05	n/a
22b	46.1	51.2	48.7	44.5	39.8	34.6	31.2	37.6	39.4	41.8	52.9	46.6			
22c	57.9	47.3	40.4	43.6	36.9	35.1	33.6	36.8	35.5	39.9	52.9	53.4			
23a	59.4	41.5	44.8	30.3	27.5	31.7	26.2	36.3	39.6	40.2	53.4	47.3	39.61	30.50	n/a
23b	55.5	49.1	41.4	35	27.2	32.4	29.9	32.7	35.9	38.9	44.6	49.8			
24a	64.4	48.7	47.8	32.7	33.3	28.3	27.6	28.9		38.9	46.9	47	40.14	30.91	n/a
24b	58.2	47.6	41.6	36.9	39.2	32	30.7	30.8		38.1	43	40.4			
25a	59.3	50.9	37.8	33.2	35.3	37.6	33.5		31.5	44.9		43.8	41.41	31.89	n/a
25b	51.3	49.9	42.9		36.1	32	34.8	38.7	36.2	42	48.5	42.9			
25c	55.4	50.9	44	33	36.2	40.8		32.9	31.5	46.4	49.4	42.2			
26a	44.2	43.8	37.5	30.5	26.9		23.9	29.2	40.1	37.1	49	37	35.99	27.71	n/a
26b	49.7	42.4	38	27.8	30.6	28	23.8	26.2	41.5	34.9	44.5	39.7			
26c	55.8	46.5	36.7	28.9	26.4	26.5	23.2	29	40.2	37	42.5	40.2			
27a	63.4	48.4	36	31.8	35.2	26.3	27.7	32.7	38.6	42.6	50.1	32.8	37.33	28.74	n/a
27b	37.7	47.2	44.3	31.7	35.9	28	21.6	17.4	38.8	39.2	48.8	33.9			
27c	51.4	45.5	43.4	32.8	33.6	26.4	29.6	27	40.1	39.8	51.8	32.4			

- ☒ National bias adjustment factor used
- ☒ Annualisation has been conducted where data capture is <75%
- ☒ Where applicable, data has been distance corrected for relevant exposure

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 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

Laboratory QA/QC

ESG Didcot participates in the AIR NO2 PT laboratory performance scheme. Rounds AR18, AR19, AR21 and AR22 of the testing scheme cover the monitoring period contained in this air quality status report. All results were considered to be satisfactory, with 100% performance for all rounds. Full details can be found at <https://laqm.defra.gov.uk/assets/AIR-PT-Rounds-13-to-24-Apr-2016-Feb-2018.pdf>

Bias Adjustment



A bias adjustment factor of 0.77 was calculated based on the co-location studies that fed into the national bias adjustment calculation undertaken by the National Physics Laboratory for tubes produced by ESG Didcot using a 50% TEA in Acetone preparation (version 3/18). Epping Forest District Council does not have a local co-location study.

National Diffusion Tube Bias Adjustment Factor Spreadsheet							Spreadsheet Version Number: 03/18			
Follow the steps below in the correct order to show the results of relevant co-location studies							This spreadsheet will be updated at the end of June 2018			
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods							This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use			
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet							LAQM Helpdesk Website			
This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use							Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.			
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.										
Step 1:		Step 2:	Step 3:	Step 4:						
Select the Laboratory that Analyses Your Tubes from the Drop-Down List		Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor ² shown in blue at the foot of the final column.						
If a laboratory is not shown, we have no data for this laboratory.		If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data ²	If you have your own co-location study then see footnote ¹ . If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953						
Analysed By ¹	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ²	Bias Adjustment Factor (A) (Cm/Dm)
ESG Didcot	50% TEA in acetone	2017	R	Suffolk Coastal DC	12	45	37	21.7%	G	0.82
ESG Didcot	50% TEA in acetone	2017	R	Dumfries and Galloway Council	12	36	29	23.3%	G	0.81
ESG Didcot	50% TEA in acetone	2017	KS	Marylebone Road Intercomparison	12	106	79	34.3%	G	0.74
ESG Didcot	50% TEA in acetone	2017	R	Vale of White Horse District Council	11	31	25	26.0%	G	0.79
ESG Didcot	50% TEA in acetone	2017	UB	Cardiff City Council	10	29	21	35.1%	G	0.74
ESG Didcot	50% TEA in acetone	2017	R	Cambridge City Council	12	45	33	37.7%	G	0.73
ESG Didcot	50% TEA in acetone	2017	R	Wrexham County Borough Council	12	20	17	14.5%	G	0.87
ESG Didcot	50% TEA in acetone	2017	UI	North Lincolnshire Council	12	22	16	40.7%	G	0.71
ESG Didcot	50% TEA in acetone	2017	KS	Caerphilly CBC	12	37	32	15.8%	G	0.86
ESG Didcot	50% TEA in acetone	2017	R	Caerphilly CBC	11	44	29	51.2%	G	0.66
ESG Didcot	50% TEA in acetone	2017	UB	City of York Council	12	23	15	53.4%	G	0.65
ESG Didcot	50% TEA in acetone	2017	R	City of York Council	10	37	28	30.8%	G	0.76
ESG Didcot	50% TEA in acetone	2017	R	City of York Council	11	32	23	41.0%	G	0.71
ESG Didcot	50% TEA in acetone	2017	R	City of York Council	12	40	25	58.6%	G	0.63
ESG Didcot	50% TEA in acetone	2017	R	Hambleton District Council	10	21	20	4.0%	G	0.96
ESG Didcot	50% TEA in acetone	2017	R	Horsham District Council	11	35	29	18.1%	G	0.85
ESG Didcot	50% TEA in acetone	2017	R	Horsham District Council	12	31	26	21.3%	G	0.82
ESG Didcot	50% TEA in acetone	2017	R	Horsham District Council	11	33	23	41.1%	G	0.71
ESG Didcot	50% TEA in acetone	2017	UC	Leeds City Council 1	12	41	32	28.5%	G	0.78
ESG Didcot	50% TEA in acetone	2017	R	Leeds City Council 10	11	48	38	25.1%	S	0.80
ESG Didcot	50% TEA in acetone	2017	R	Leeds City Council 2	12	47	35	34.4%	S	0.74
ESG Didcot	50% TEA in acetone	2017	R	Leeds City Council 4	11	56	43	29.1%	S	0.77
ESG Didcot	50% TEA in acetone	2017	R	Leeds City Council 7	11	38	27	39.8%	S	0.72
ESG Didcot	50% TEA in acetone	2017	R	Slough Borough Council	12	45	35	26.4%	G	0.79
ESG Didcot	50% TEA in acetone	2017	UB	Slough Borough Council	12	32	26	28.6%	G	0.78
ESG Didcot	50% TEA in acetone	2017	UB	Slough Borough Council	11	39	33	19.2%	G	0.84
ESG Didcot	50% TEA in acetone	2017	R	Tunbridge Wells	12	56	40	38.2%	G	0.72
ESG Didcot	50% TEA in acetone	2017		Overall Factor ² (27 studies)					Use	0.77

Adjustment for Distance

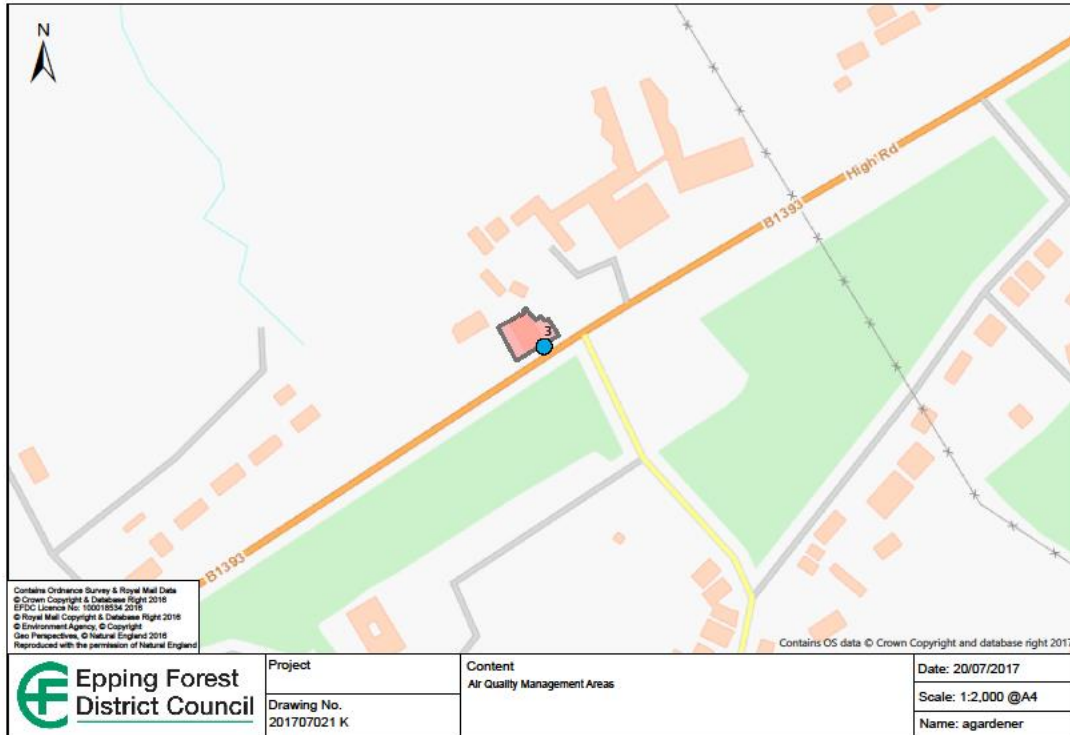
Where the nearest receptor is further away from the source of pollution than the monitoring location, and the bias adjusted annual average result is above the 40 $\mu\text{g}/\text{m}^3$ objective, an appropriate adjustment has been made. This was required for the following Monitoring site:

Hainault Road:

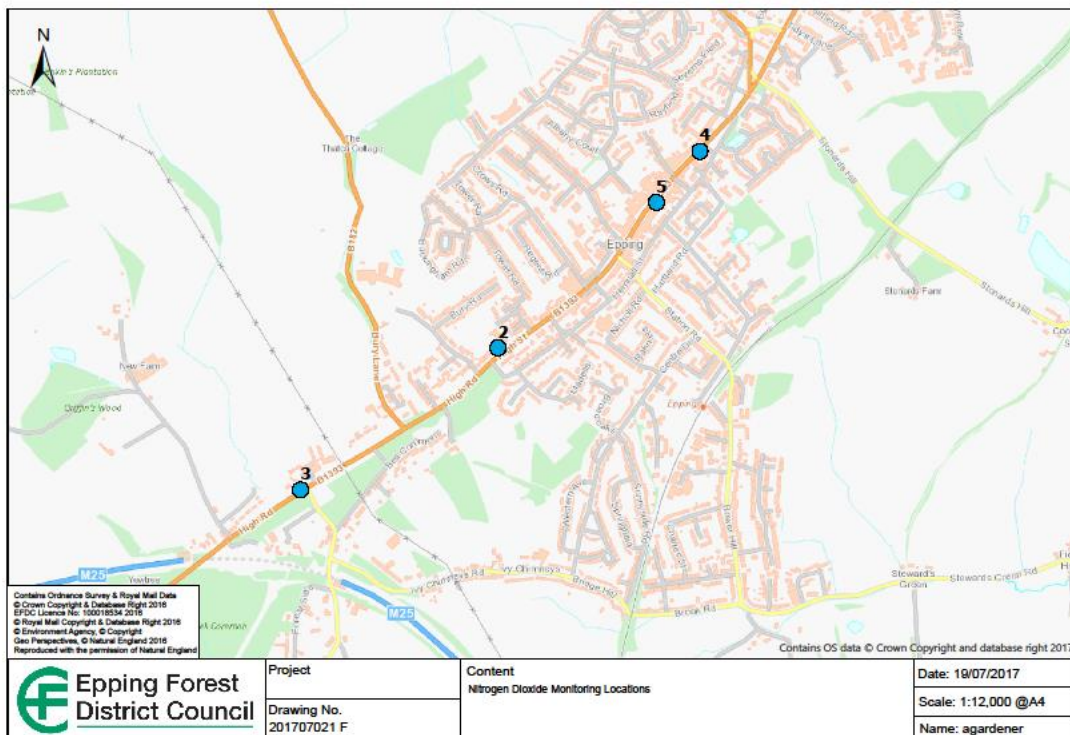
 		
Enter data into the red cells		
Step 1	How far from the KERB was your measurement made (in metres)?	1 metres
Step 2	How far from the KERB is your receptor (in metres)?	8.5 metres
Step 3	What is the local annual mean background NO ₂ concentration (in $\mu\text{g}/\text{m}^3$)?	18.25 $\mu\text{g}/\text{m}^3$
Step 4	What is your measured annual mean NO ₂ concentration (in $\mu\text{g}/\text{m}^3$)?	45.27 $\mu\text{g}/\text{m}^3$
Result	The predicted annual mean NO ₂ concentration (in $\mu\text{g}/\text{m}^3$) at your receptor	33.6 $\mu\text{g}/\text{m}^3$

Appendix D: Maps of Monitoring Locations and AQMAs

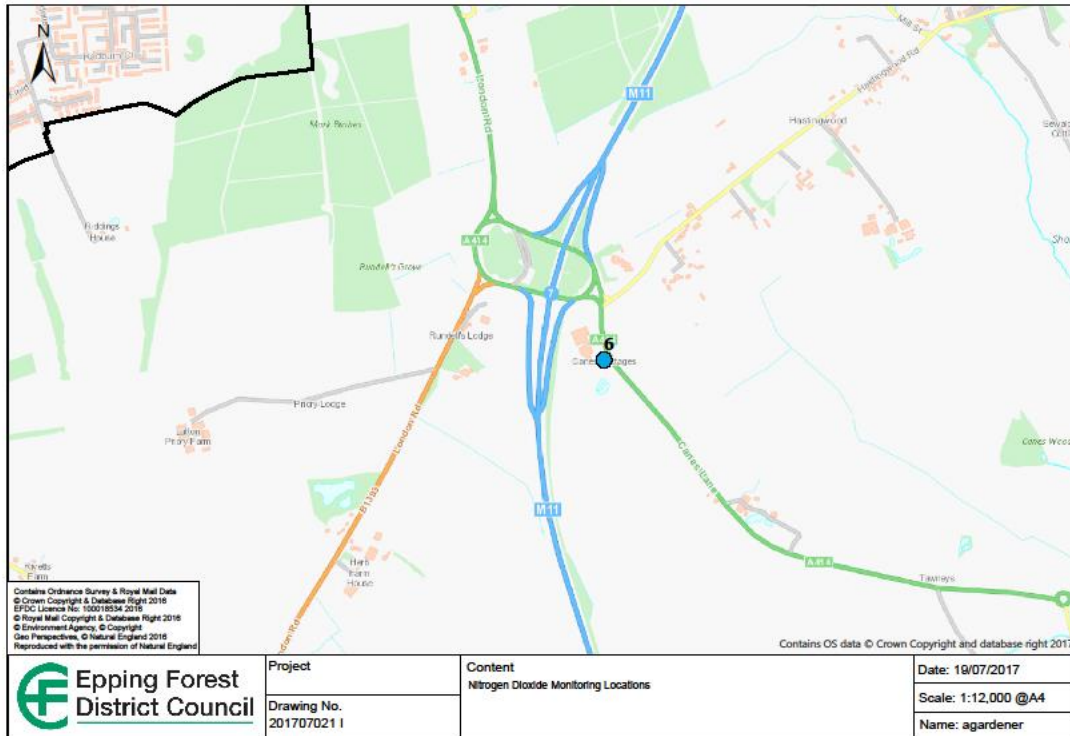
Air Quality Management Area, Bell Common, Epping:



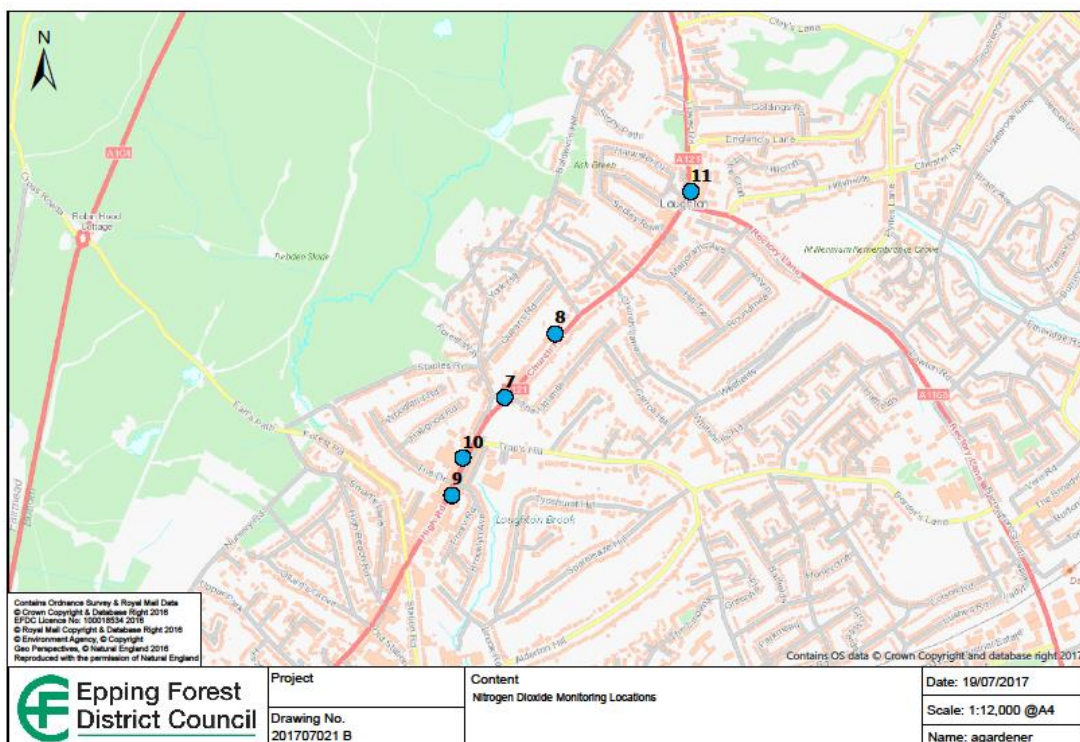
Epping Area:



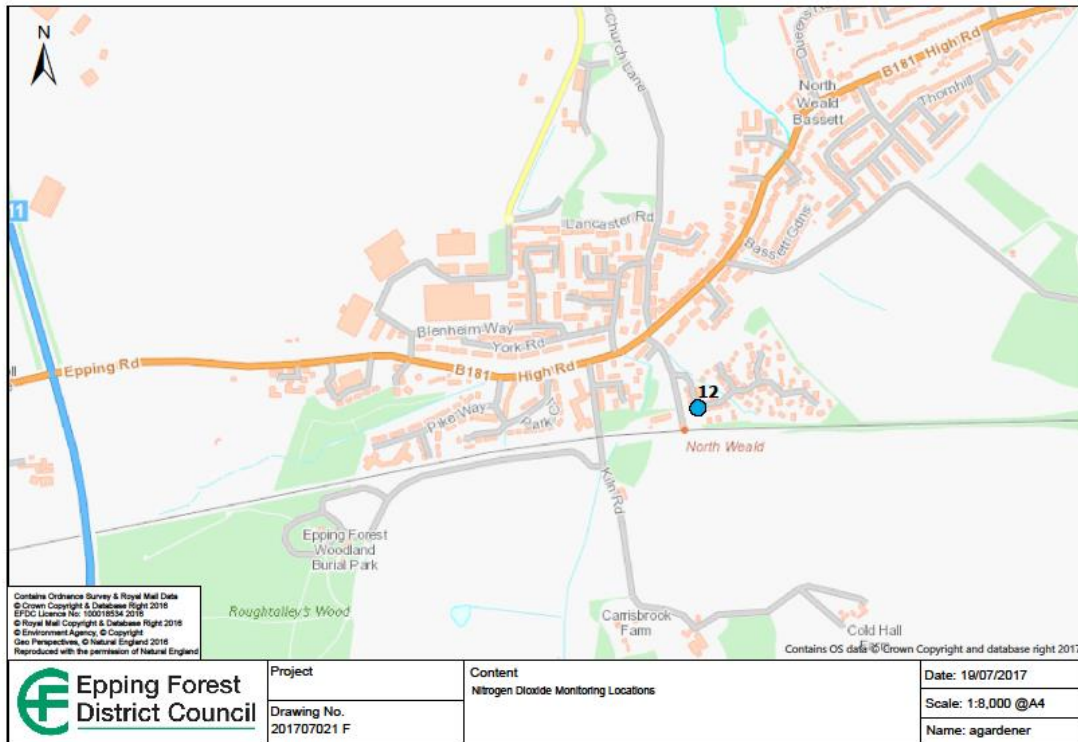
Hastingwood Area:



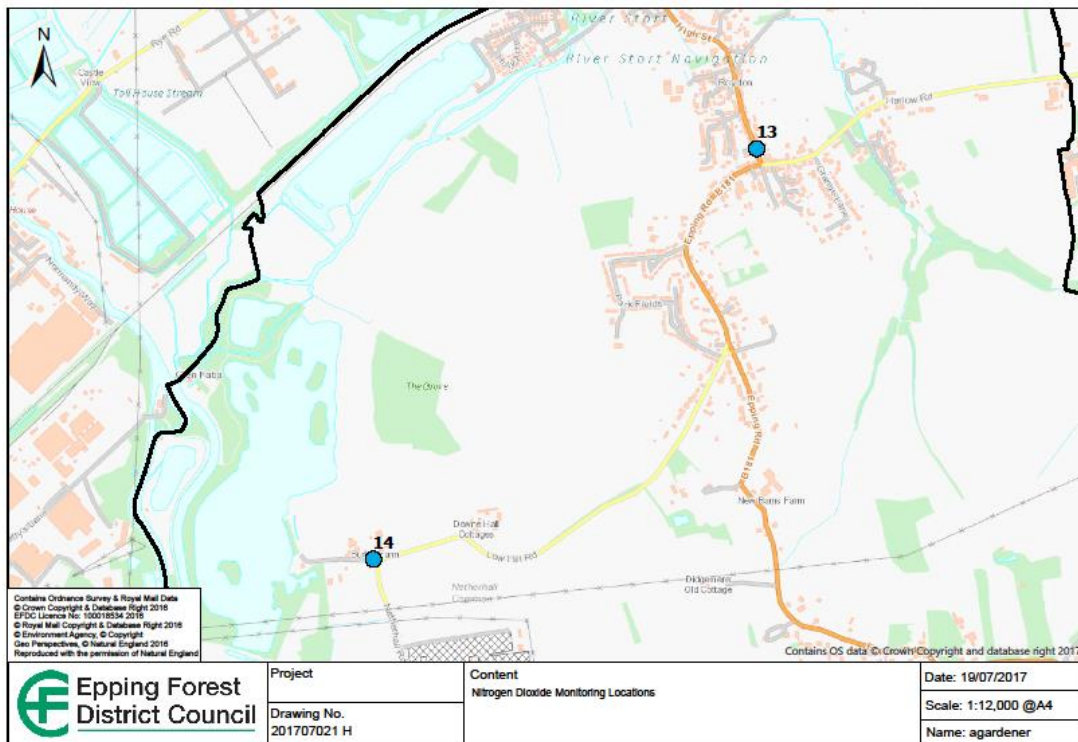
Loughton Area:



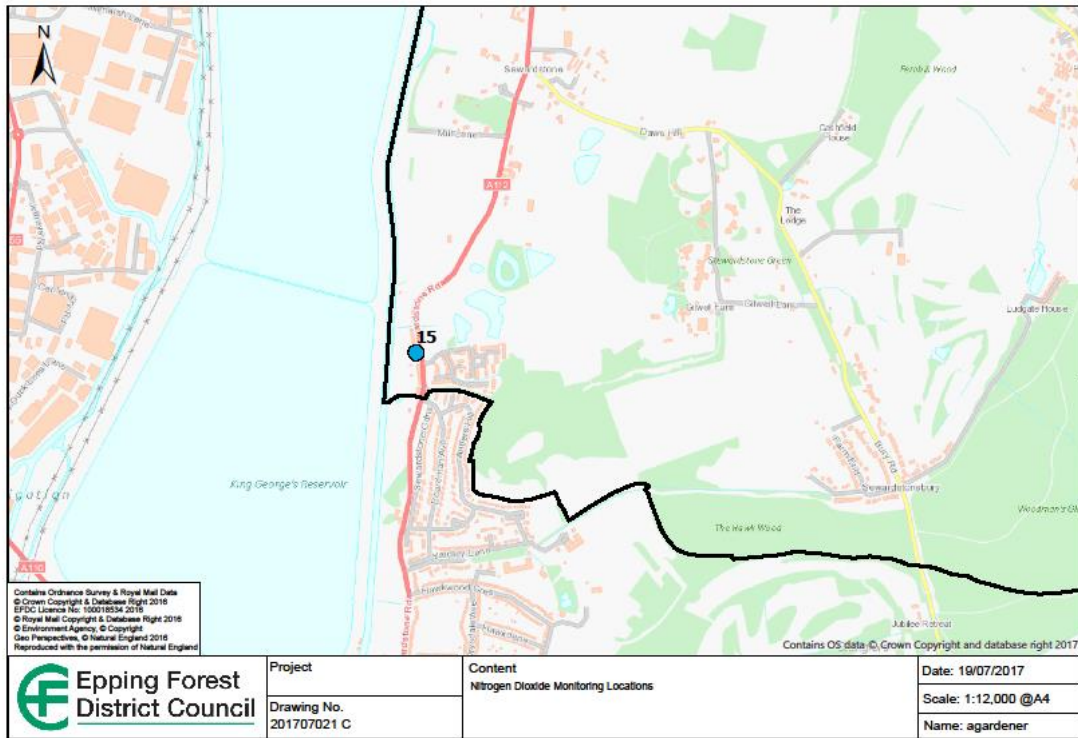
North Weald Area:



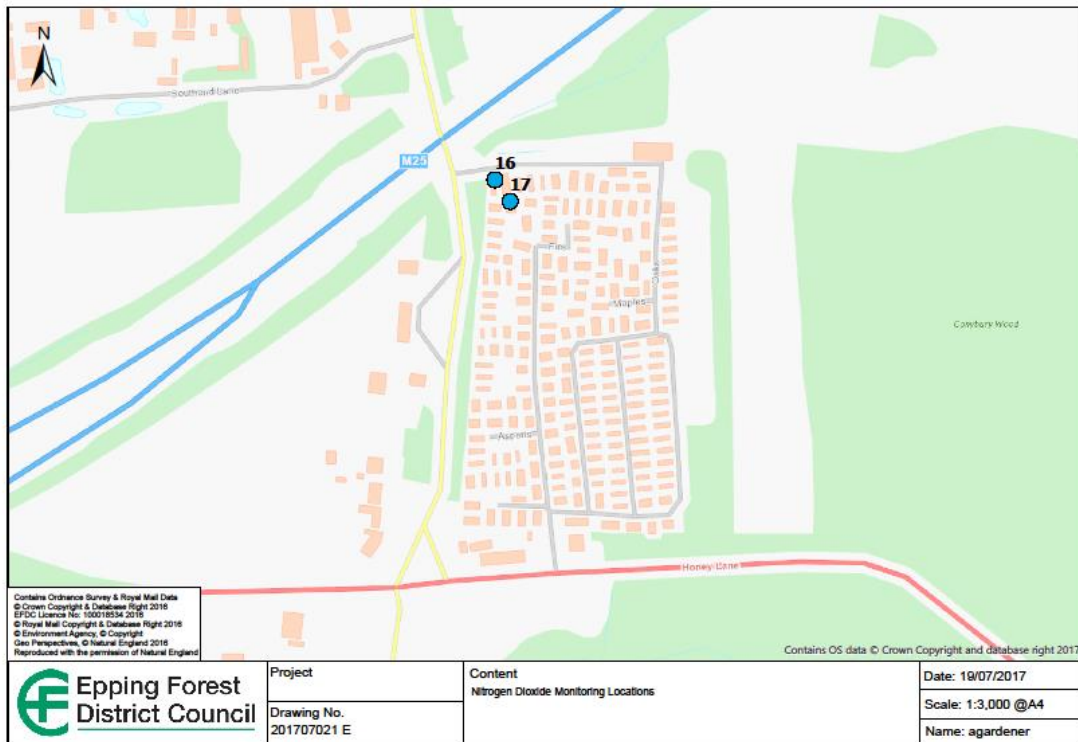
Roydon Area:



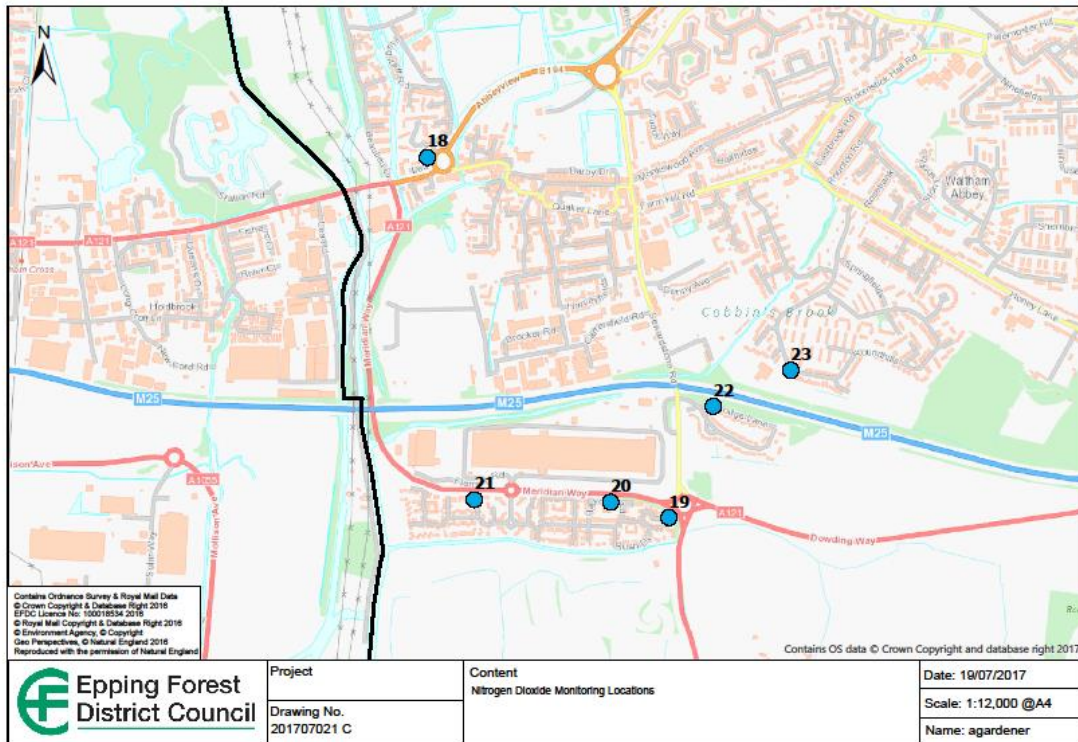
Sewardstone Area:



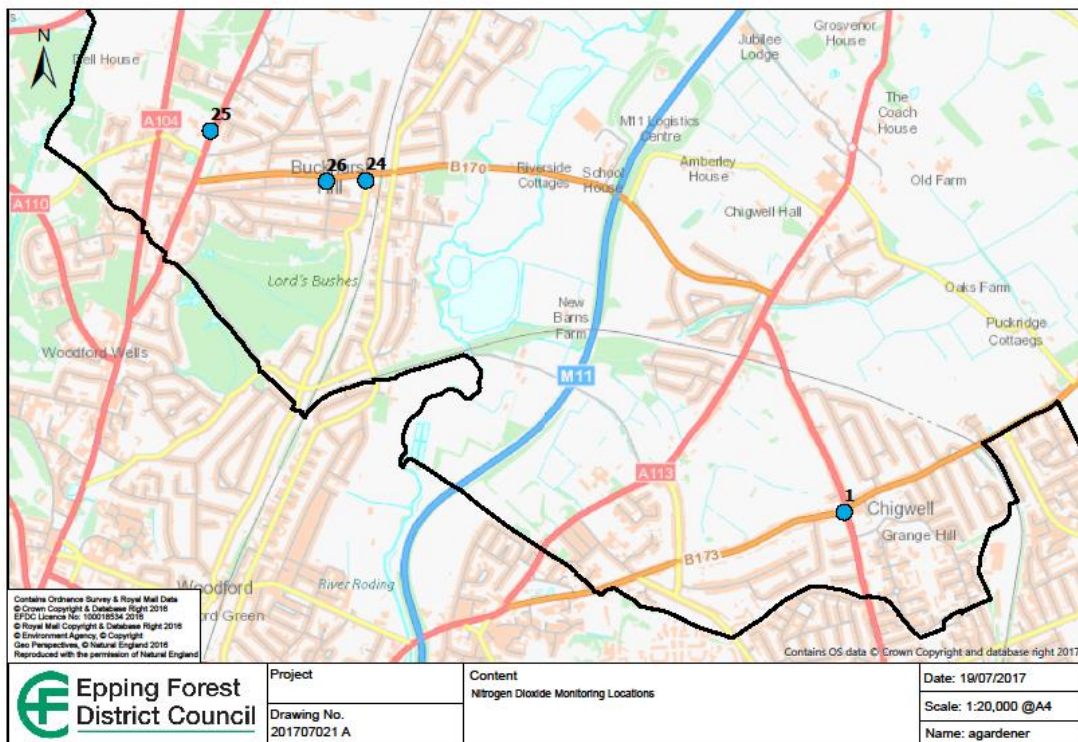
The Elms, Waltham Abbey:



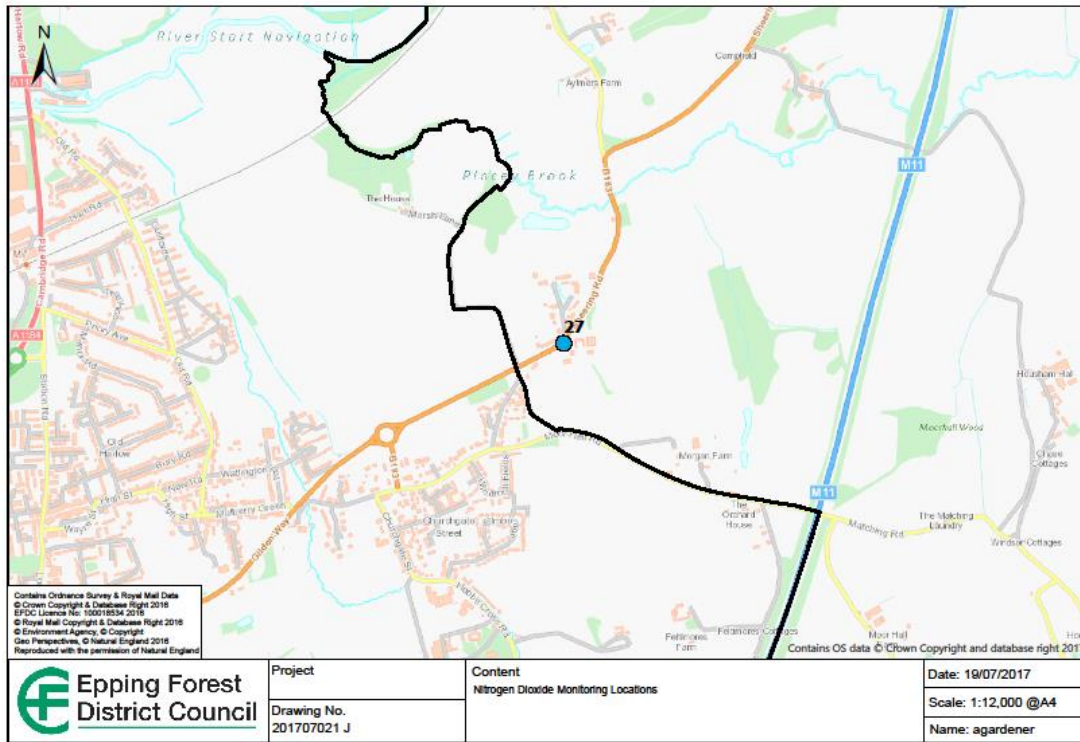
Waltham Abbey Area:



Chigwell / Buckhurst Hill Area:



Sheering Area:



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁴	
	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

⁴ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

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

Nitrogen Dioxide Bias Adjustment Factor Spreadsheet:

<https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

Distance from Road Calculation:

<https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>

Local Air Quality Management Technical Guidance LAQM:TG(16)

<https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf>

Summary of Laboratory Performance in Workplace Analysis Scheme for Proficiency (AIR-PT)

<https://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html>