2024 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management, as amended by the Environment Act 2021

Date: June, 2024

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Executive Summary: Air Quality in Our Area

Air Quality in Epping Forest District

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year[1].

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution[2].

Table ES 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the kind of activities they might arise from.

Table ES 1 - Description of Key Pollutants

Pollutant	Description
Nitrogen Dioxide (NO_2)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO_2)	Sulphur dioxide (SO_2) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Particulate matter is everything in the air that is not a gas. Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes. PM_{10} refers to particles under 10 micrometres. Fine particulate matter or $PM_{2.5}$ are particles under 2.5 micrometres.

[1] UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

The main pollutant of concern in Epping Forest District is nitrogen dioxide, which is produced by road vehicles. It is monitored across the district by diffusion tubes. Results for 2023 show that concentrations at the majority of the 42 monitoring locations (39) have decreased since 2022 and 3 have recorded a small increase in concentrations. This is in line with predicted national trends. The results in the various towns and villages are presented in Appendix A, Figures A.1a to A.1h.

The Council retains one small Air Quality Management Area (AQMA) near the B1393 / Theydon Road junction at Bell Common, Epping. The annual mean concentration of nitrogen dioxide measured here during 2023 was 33.1µg/m^3. This is significantly below both the 60µg/m^3 concentration which is used to indicate that the hourly objective is likely to be exceeded (Defra (2022) Local Air Quality Management Technical Guidance (TG22) Chapter 7, 7.97), and the annual mean objective concentration of 40µg/m^3. Epping Forest District Council are about to revoke the management area in respect of the exceedance of the hourly objective, however the AQMA designation in respect of the annual mean objective will remain until sufficient evidence has been collected to demonstrate that its exceedance in the future is unlikely.

Details of AQMA, Epping Forest District Council (No.2) can be found at: https://www.essexair.org.uk/local-authorities/epping-forest , alternatively a map showing its location can be found in Appendix D of this report. This AQMA includes 2 properties, which according to council records currently each have 2 adult occupants who therefore could potentially be exposed to elevated concentrations of nitrogen dioxide.

Following a review of nitrogen dioxide diffusion tube monitoring locations, it was considered that locations likely to exceed the air quality objectives were already being assessed, and the Council did not receive any complaints of road traffic causing residents to experience poor air quality in their homes. No changes were therefore made to the programme in 2023 from those monitored in 2022.

Where the Councils Development Management Service refer planning applications to Environmental Health, they are screened to determine if there is potential for the proposed development to have a negative impact on human health due to poor air quality. Such applications are both those that are likely to increase pollution in an area as well as those that bring additional people to an area of existing pollution, and include applications for new residential properties, schools, commercial and industrial activities. Where it is considered likely that negative impacts may result, applicants are required to undertake an

air quality assessment of the proposed development and the associated likely changes in emissions. Assessments include measures to be implemented which will mitigate all negative air quality impacts resulting from the development. Measures such as providing electric vehicle charge points, filtration systems and the use of sustainable power sources may be included as part of a mitigation package. If insufficient mitigation is included in the application, Environmental Health would recommend that the development control team refuse the application. All sites given consent during 2023 were assessed in respect of air quality where it was considered that there was potential for a development to have a negative impact, and comments were provided to the Development Control team in order to obtain appropriate mitigation against these impacts.

The Council continues to work with our partners including Essex County Council and the Environment Agency on environmental protection and air quality matters. In particular, we are working together in respect of an effective permanent solution to further the reduction of nitrogen dioxide concentrations within AQMA Epping Forest District Council No.2.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan[3] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter ($PM_{2.5}$), the pollutant most harmful to human health. The Air Quality Strategy[4] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero[5] details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of

[3] Defra. Environmental Improvement Plan 2023, January 2023

[4] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

[5] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

personal travel and the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Whilst we consider the migration to electric vehicles as crucial to the reduction of nitrogen dioxide, we are also actively encouraging road users to turn their engines off whilst stationary rather than allowing them to idle. We have produced a number of banners which continue to be rotated around various hotspots in the district to provide a visual reminder to drivers. These were updated in 2023 to ensure they continue to catch the attention of drivers.

Traffic congestion along the B1393 is responsible for the main source nitrogen dioxide at the AQMA Epping Forest District Council No.2. Figure 3.1 provides a chart illustrating traffic flows on Epping High Road. It shows that whilst traffic volumes are slightly less than before the pandemic, fluctuations are largely tracking those seen pre-pandemic. It can now be assumed that traffic seen in 2023 reflects the “new normal” due to many people now working from home part of the week on a permanent basis.

The Council continues to encourage its own officers to work from home for much of the week, providing a limited number of desks at the Civic Offices which are available to be booked as required. This reduced capacity office has enabled a reduction in the number of parking spaces at the Civic Offices, which further encourages those attending the offices to utilise local sustainable transport options. Staff have also been encouraged to sign up to the Councils car share scheme for those attending the offices.

The Council has 8 electric vehicle charge points located across 4 sites for its fleet and staff use. This includes vehicle to grid charging. This is one less charge point than 2022 as one had to be removed for health and safety reasons. There are plans to add further charge points to enable effective charging of the growing fleet of electric vehicles.

The Councils Air Quality Action Plan was revised in 2023. The Action Plan includes a range of new measures focussing on reducing concentrations of nitrogen dioxide in the AQMA Epping Forest District Council No.2 (Bell Common), as well as across the district. We are in discussions with partners with a view to exploring the possibilities of taking steps that will directly improve traffic flow through the AQMA at Bell Common.

In addition, measures are 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 for use by both local businesses and residents.

The measures identified in the new Air Quality Action Plan are reported in table 2.2 of this document with updates on progress provided.

The Council continues to employ a Sustainable Transport Officer and a Climate Change Officer whose actions feed into this report.

Conclusions and Priorities

The results from diffusion tube monitoring undertaken show that the annual mean concentration of nitrogen dioxide in the district decreased at 36 out of 42 of the sites during 2023 compared to the concentrations measured during 2022.

Travel patterns appear to have permanently changed since the pandemic as many people no longer travel to their place of work five days a week and when they do travel, they tend to have a more flexible working pattern which allows them to avoid peak traffic periods. Information provided by the Highways authority supports this as they confirm that whilst traffic levels are roughly equal to those on the roads pre-pandemic, fewer cars have been using the roads during rush hours, which should help to reduce congestion and associated pollution.

The concentration of nitrogen dioxide at '(3) Epping Bell Vue' which is representative of AQMA Epping Forest District Council No.2, decreased dramatically in 2020 as a direct result of the national lockdown imposed during the height of the COVID-19 pandemic. However, if we ignore the result from 2020, looking at the general trend across the last 5 years, there has been a steady decrease in concentrations at this location (see Figure A.1a). The annual mean concentration recorded in 2023 (33.1µg/m^3) is the second year (apart from 2020) that the concentration measured has been under the objective. It is likely that the decreasing trend is due to both the uptake of cleaner vehicles and the long term shift in travel behaviours as a result of the pandemic.

No exceedances were identified in the district, and therefore the Council does not propose to declare any further AQMAs at this time.

The Council is in the process of revoking the declaration of the AQMA in respect of the hourly mean concentration of nitrogen dioxide. This revocation is appropriate following 6 consecutive years during which the annual mean concentration of nitrogen dioxide has measured below 60µg/m^3, the concentration considered by Defra (Local Air Quality Management Technical Guidance TG22 Chapter 7, 7.97) to represent an exceedance of the hourly objective.

Planning applications that had the potential to have a likely significant effect on the Epping Forest Special Area of Conservation were also assessed in accordance with the Habitats Regulations and advice provided by Natural England.

The main priorities for EFDC in 2024 are:

- Continue to work with colleagues and partners to ensure future annual mean concentrations of nitrogen dioxide do not exceed the objective despite the anticipated development of sites identified in the Local Plan, which are likely to increase traffic levels using the B1393 / Theydon Road junction at Bell Common, Epping.
- Continue work to increase electric vehicle charging points in the district. This will involve collaboration with the Councils Fleet Manager, the Sustainable Transport officer, Parking and Estates teams, as well as Essex County Council.

The challenges that EFDC anticipate are in respect of implementing effective actions that directly target air quality in the AQMA. The approach to date has been to promote measures that improve air quality district wide, which may only have a limited impact on concentrations at the AQMA. Since the COVID-19 pandemic, many people have not returned to their previous travel habits, and the change in commuter patterns together with an increased uptake of low emissions vehicles has lead to a reduction in the annual average concentration of nitrogen dioxide in the AQMA during 2022 and 2023. It appears that these working patterns may be the new normal. Despite the improvements that they have already brought, Epping Forest District Council will continue to work towards a further reduction in concentrations to ensure ongoing compliance and a long-term improvement in nitrogen dioxide concentrations, especially in the vicinity of the AQMA at Bell Common, Epping.

Local Engagement and How to get Involved

With an increased awareness of environmental matters in recent years, has come an increase in interest from residents as to what is being done to minimise the effects of pollution in the local area.

The Council plays a pivotal role in addressing air quality issues, but the effectiveness of measures will be determined by the level of their adoption through behaviour change. There are many ways in which members of the public can act to reduce their impact on local air quality:

- Riding bicycles, walking or scooting to work and school.

- Use public transport rather than a private vehicle or taxi,
- Turning your vehicles engine off when you are stationary. Not only does idling use fuel and cost money, it pollutes the environment, and is illegal.
- Consider changing to an electric vehicle. There may be grants available to assist with the cost of doing so.
- Compost your garden waste rather than burning it. Using compost in your garden brings other benefits to your environment too.
- Use central heating to heat your home rather than relying on a log burner.
- Ensure your gas boiler is serviced annually in order to ensure effective operation.
- If you must use a log burner make sure it is serviced regularly and always use the appropriate fuel for your appliance. Make sure that all fuel is fully dry (less than 20% moisture content) before burning it as this will improve combustion, increase the heat produced and reduce pollution.
- Reduce household energy bills and reduce pollution by turning down the thermostat in your home by one or two degrees when the outside temperature allows.
- Improving your home's insulation may help to reduce heating bills. You may be eligible for a grant to improve insulation.
- Consider installing solar panels or a heat pump to your property. This will reduce your contribution to air pollution as well as your ongoing fuel bills.

The Essex Air Web site provides useful information with regards to air quality in the various district and unitary authorities in Essex: http://www.essexair.org.uk/

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Epping Forest District Council with the support and agreement of the following officers and departments:

- Sustainable Transport
- Climate Change
- Development Management service
- Planning Policy and Implementation Teams
- GIS Team
- Essex County Council Highways

This ASR has been approved by:

Regulatory Services Portfolio Holder: Cllr Paul Keska

Regulatory Services Manager: Mandy Thompson.

This ASR has been signed off by Jyoti Atri, Director of Public Health, Essex County Council.

If you have any comments on this ASR please send them to Claire Jaggard at:

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1 Local Air Quality Management

This report provides an overview of air quality in Epping Forest District during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. 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 are presented in Table E.1 – Air Quality Objectives in England.

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 should prepare an Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained and provide dates by which measures will be carried out.

A summary of AQMAs declared by Epping Forest District Council can be found in Table 2.1 – Declared Air Quality Management Areas . The table presents a description of the AQMA that is currently designated within Epping Forest District.

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

- NO_2 annual mean;
- NO_2 hourly mean (although this is in the process of being revoked as the objective has not been exceeded since 2017)

Another AQMA (Epping Forest AQMA) had previously been declared in 2008, in respect of the nitrogen dioxide annual mean concentration affecting 7 residential properties on the High Street, Epping. It was subsequently revoked in 2011 following a Detailed Assessment which demonstrated that it was not required. Details of both the current and previous AQMAs can be found at: https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=99.

- We are in the process of revoking AQMA Epping Forest District Council No.2 in respect of the hourly mean objective only. As the annual mean concentration at this location has been below 60 µg/m^3 for 6 years, this provides us with confidence that the hourly objective is unlikely to be exceeded in the future (Defra (2022) Local Air Quality Management Technical Guidance (TG22) Chapter 7, 7.97)
- The designation in respect of the annual mean objective at AQMA Epping Forest District Council No.2 will remain in place.
- No other declarations are required at present.

Epping Forest District Council

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	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
AQMA Epping Forest District Council No. 2	Declared 1st August 2010	NO2 Annual Mean	An area encompassing 2 properties at the junction of Epping High Road and Theydon Road.	NO	68 µg/m^3	No Exceedance (33µg/m^3)	2 years	Epping Forest District Council Air Quality Action Plan March 2023	https://www.eppingforestdc.gov.uk/wp-content/uploads/2023/06/Air-Quality-Action-Plan-final.pdf
AQMA Epping Forest District Council No. 2	Declared 1st August 2010	NO2 1 Hour Mean	An area encompassing 2 properties at the junction of Epping High Road and Theydon Road.	NO	68µg/m^3 (see comment 1 below)	No Exceedance (33µg/m^3)	6 years	Epping Forest District Council Air Quality Action Plan March 2023	https://www.eppingforestdc.gov.uk/wp-content/uploads/2023/06/Air-Quality-Action-Plan-final.pdf

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

☒ **Epping Forest District Council confirm that all current AQAPs have been submitted to Defra.**

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

Defra's appraisal of last year's ASR concluded:

The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports.

1. Trends are clearly presented and discussed and a robust comparison with air quality objectives is provided.
2. The diffusion tube mapping is comprehensive and clearly demonstrates the monitoring network. AQMA boundaries are also clearly shown on the map.
3. The current AQAP was adopted in 2023 and this is welcomed.
4. The Council has reviewed their monitoring network and an additional site has been added to the network in 2022, however this is not stated within the report. As such, there is no justification for the increase and it is unclear whether any site has been decommissioned. The Council should ensure they justify any changes to the monitoring strategy in their next ASR.
5. No automatic monitoring is undertaken within the AQMA, therefore it is difficult to determine whether there are any exceedances of the 1-hour mean NO_2 objective. The current diffusion tube has not reported a concentration of greater than 60µg/m^3 since 2017. The Council could consider installing a temporary automatic monitoring, or additional diffusion tube locations to provide some additional supporting evidence. This was highlighted within the Appraisal Letter for the 2022 ASR and there is no update in the 2023 ASR.
6. The 'Valid Data Capture for Monitoring Period' and 'Valid Data Capture 2022' have not been calculated correctly in Table A.2. The 'Valid Data Capture for Monitoring Period' is in cases where monitoring was only carried out for part of the year. If monitoring has only been undertaken for part of the year, this should be stated within the report. If monitoring was intended to be carried out for the full calendar year, then the entries in this column will be the same as the 'Valid Data Capture 2022'. The 'Valid Data Capture 2022' is the 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%). The council should contact the LAQM Helpdesk for further assistance on these calculations if required.

7. There are some of the formatting errors throughout the report. The Council should ensure future reports are checked thoroughly prior to submission.

Epping Forest District Council has taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2 – Progress on Measures to Improve Air Quality . 37 measures are included within Table 2.2 – Progress on Measures to Improve Air Quality , with the type of measure and the progress Epping Forest District Council have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2 – Progress on Measures to Improve Air Quality .

More detail on these measures can be found in the Epping Forest District Council Air Quality Action Plan 2023 at https://www.eppingforestdc.gov.uk/environment/aqap/

The following documents produced by Epping Forest District Council also address measures relating to air quality in the district:

- Epping Forest District Local Plan 2011 to 2033 (Adopted March 2023) https://www.eppingforestdc.gov.uk/planning-and-building/planning-policy/adopted-local-plan-march-2023/
- Interim Epping Forest Air Pollution Mitigation Strategy EB212-Final-Interim-APM-Strategy-for-EFSAC-101220.pdf (efdclocalplan.org)
- Epping Forest District Council Climate Change Action Plan 2021 https://www.eppingforestdc.gov.uk/wp-content/uploads/2023/02/Climate-Change-Action-Plan-Final.pdf

Key completed measures are:

- The completion of a real time monitoring project at two receptor sites in close proximity to the Epping Ongar Heritage Railway. This measure was completed and is summarised in Appendix F to this report. The full report produced by the consultant undertaking the project is accessible online at https://www.eppingforestdc.gov.uk/wp-content/uploads/2024/06/EFDC_Epping-Ongar-Railway-Sensor-Report_Apr_2024.html
- Air Quality is taken into consideration as a material consideration in planning decision making. All large developments are referred to Environmental health for

consideration with regards to Air Quality issues as part of the planning process. This is a requirement of Local Plan policy DM22 which was adopted in 2023.

- Introduction of a Local Plan policy requiring submission and implementation of Routing Management Plans to manage the sustainable delivery of goods and materials. This measure is a requirement of Local Plan policy T1(c) which was adopted in 2023.
- Ensuring developments have and follow a construction management plan. Whilst this is an ongoing measure, an improvement has been made to the Councils standard construction management plan conditions and its effectiveness is demonstrated by the fact that no complaints have been received since implementation.
- Installation of energy efficiency measures in low income, low efficiency homes using grant funding. With greater energy efficiency, residents will use less fuel in heating their homes and create less pollution in the process. A £6m regeneration project has been completed to improve insulation and energy efficiency in Council owned properties.
- Council utilities are all on a 100% renewable electricity tariff. There are no plans to change this in the future.

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

- The assessment of the feasibility of introducing non road mobile machinery (NRMM) emissions planning guidance for large developments has been completed and we are now progressing to writing and rolling out this guidance. By requiring developers to only use non road machinery that meets certain standards, pollution from large developments is reduced.
- Work with colleagues in Trading Standards to ensure the Domestic Solid Fuel Regulations are complied with. Whilst this measure is ongoing, Environmental Health have plans to promote compliance with this legislation and assist with enforcement where required.
- The assessment of the feasibility of introducing an air quality neutral planning guidance document has been completed. It has been established that it is possible to link a guidance document to local plan policy DM22, and over the next year we will be drafting this documentation.

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

- Continue to work with colleagues and partners to ensure future annual mean concentrations of nitrogen dioxide do not exceed the objective despite the development of sites identified in the Local Plan, which is likely to increase traffic using the B1393 / Theydon Road junction at Bell Common, Epping.
- Continue work to increase the number of electric vehicle charging points in the district. This will involve collaboration with the Councils Fleet Manager, the Sustainable Transport officer, Parking and Estates teams, and the County Council.

Epping Forest District Council worked to implement these measures in partnership with the following stakeholders during 2023:

- Essex County Council
- Qualis Property Management
- City of London, Epping Forest Conservators
- Local Bus and Taxi Companies
- Local Housing Associations
- Freight Operators

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

- The processes and timescales for bringing forward adjustments to the road network in association with Local Plan development and therefore improve traffic flow through the Bell Common area. Whilst the concentrations of nitrogen dioxide recorded at this location have reduced below the objective in recent years, we are keen to ensure that this improvement is permanent.
- Effective partnership working where interests and required outcomes differ.
- Financial costs of implementing preferred options for measures to reduce pollution concentrations.
- A site has been allocated in the adopted Local Plan for large scale residential development some 0.5km to the south-east of the AQMA. This is likely to result in an increase in traffic using the local road network in the vicinity of the AQMA. Epping Forest Councils Environmental Health Team will liaise with the Councils Planning

Service to mitigate the impacts of development however it will not be possible to remove all new sources of pollution.

- Transport for London have now extended the Ultra Low Emission Zone to include the outer London Boroughs (with effect from August 2023). The revised zone is immediately adjacent to the southern part of our District and this could lead to an increase in non-compliant vehicles using our roads to avoid entering the charging zone. The impact of this change is yet to be fully understood.
- Essex County Council have consulted on their Electric Vehicle Charging Strategy, and it is hoped that this will lead to funding via a LEVI bid which would then role out widespread Electric Vehicle Charge Points on and off street throughout the County.

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

- The measure to “review and consult on Hackney Carriage/Private Hire policy to include transitional requirement for minimum euro 6 emission vehicles and encourage low/zero emission vehicles” has made progress, although this has been slower than initially anticipated. A review of tariffs was undertaken and revealed that those set in the district were below neighbouring areas. This was considered prohibitive to the upgrade of vehicles and changes to tariffs were considered necessary. This change has been undertaken, and the next stage is to review the policy. This policy is not due to be reviewed until 2025, and its anticipated implementation date is early 2026.

Epping Forest District Council anticipates that the measures stated above and in Table 2.2 – Progress on Measures to Improve Air Quality will continue to achieve compliance in “AQMA Epping Forest District Council No. 2” with both the hourly and annual mean objectives.

Whilst a Source Apportionment Assessment undertaken by Bureau Veritas in 2021 stated an estimated compliance date with the annual objective of 2024, as compliance was achieved in 2022 and 2023, we would hope to maintain this concentration, but ideally see a further reduction in concentrations of nitrogen dioxide at the AQMA. The hourly objective has been complied with for 6 years and is awaiting confirmation of revocation.

The Source Apportionment Assessment is available at http://www.essexair.org.uk/

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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
A01	Continue providing a demand responsive transport service (DRT)	Alternatives to private vehicle use	Bus based Park & Ride	2023	2024	Epping Forest District Council Epping Forest Community Transport Essex County Council	Epping Forest District Council (subsidized) and fare revenue	NO	Not Funded	< £10k	Implementation	Reduced private vehicle usage Reduced tailpipe and brake wear emissions Reduced traffic congestion	Passenger numbers	Whilst funding for the DRT scheme is no longer available and the service is therefore currently not operational, We are working with colleagues in the Development Control and Planning joint Implementation team to secure funding for alternative services in the future. We are also in discussion with Essex County Council in order to seek funding to expand DRT schemes operating in other areas of the County to cover Epping Forest District.	Securing funding is key to the continuation of such schemes especially where they are not commercially successful.
A02	Promote Essex Car Share Scheme (Liftshare)	Alternatives to private vehicle use	Car & lift sharing schemes	2022	2028	Epping Forest District Council Essex County Council	Essex County Council Epping Forest District Council	NO	Funded	< £10k	Implementation	Reduced private vehicle usage Reduced tailpipe and brake wear emissions Reduced traffic congestion	No of members in scheme	Across Essex 2388 people have signed up to the Liftshare scheme. Figures for the EFDC area are unknown however we operate our own staff car sharing database which was upgraded in 2023. This scheme continues to operate.	The effectiveness of the EFDC staff scheme is limited as most employees work from home for a significant part of the week.
A03	Review the Council's grey fleet and where feasible reduce its usage	Alternatives to private vehicle use	Other	2023	2024	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Planning	Reduced grey vehicle usage, associated emissions to air & traffic congestion	Review completed by 2024 with summary of possible options	A review undertaken of high business mileage staff determined that pool cars would not be economically feasible due to distant home locations and the additional miles involved with travelling to pick up the pool car.	The Council will review the situation from time to time.
A04	Review the Council fleet and move towards cleaner vehicles when possible	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	2023	2024	Epping Forest District Council Qualis Group	Epping Forest District Council Qualis Group	NO	Funded	< £10k	Planning	Cleaner vehicles, fewer emissions to air	No of cleaner fuel vehicles in fleet	Target for 100% fleet to be electric by 2030. As of April 2024 the fleet make up was: 50% Diesel; 4% Hybrid; 46% Electric	The Electric Vehicle percentage in the Council fleet has increased by 2% since July 2023. There are plans to purchase 4 additional electric vehicles in the next financial year. N.B. Housing Repairs fleet not included in these

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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
															figures as this work is now undertaken by Qualis Property Services, not EFDC.
A05	Work with ECC to ensure schools have travel plans and encourage the use of Modeshift STARS programme	Alternatives to private vehicle use	Other	2023	2028	Essex County Council Epping Forest District Council	Essex County Council Epping Forest District Council	NO	Funded	< £10k	Implementation	Fewer vehicles driving children to school Reduced air pollution around schools and surrounding areas Reduced road congestion	No of Schools Signed up to the scheme	6 Schools are actively engaged with the Travel Planner in relation to their schools Travel Plan. A further school has recently expressed an interest in a "School Streets" type scheme which will encourage active travel.	
A06	Support and influence Essex County Council's Epping Forest District Cycling Action Plan	Alternatives to private vehicle use	Other	2023	2028	Essex County Council Epping Forest District Council	Essex County Council Epping Forest District Council	NO	Funded	< £10k	Implementation	Increased modal shift to cycling will remove motor vehicles from the roads	None	Promotions undertaken in respect of Bike Month, Cycle to work scheme, Love to Ride & Essex's sustainability app. Developments are required to consider sustainable options which may include cycling provision.	Ride London took place in the district in early summer, involving 30,000 cyclists. It raises the profile of cycling and encourages community involvement.
A07	Improve experiences of EFDC staff working remotely to reduce the need to commute and travel for business	Alternatives to private vehicle use	Other	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Implementation	Reduced vehicles on roads as employees working from home	none	Jan 1- Dec 31 2023: 95% of ICT survey respondents ‘very satisfied’ with the service provided. Whilst this was a slight fall from last year, it is a 7% increase from 2021.	Homeworking emissions for 2023-24 are estimated as 161 tCO2e using published emissions factors

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A08	Work with ECC and developers to ensure the provision of infrastructure to support walking, cycling and public transport use	Alternatives to private vehicle use	Other	2023	2024	Essex County Council Epping Forest District Council	Essex County Council Epping Forest District Council	NO	Funded	< £10k	Planning	Encourage a reduction of vehicle usage	None	**(1)** Secured funding for Waltham Abbey, from UK Shared Prosperity Fund for Local Cycling & Walking Infrastructure Plan (LCWIP) to undertake data analysis and then design the most appropriate infrastructure design. **(2)** EFDC's Local plan (adopted March 2023) includes policy T1 which provides the framework for securing the provision of sustainable transport choices. This is supported by the Councils Infrustructure Delivery Plan.	**(1)** Once data analysis is complete ECC can bid to Active Travel England in order to build the infrastructure identified. **(2)** Aspiration to achieve 60% non-car journeys to & from the new Harlow and Gilston Garden Town Development
A09	Promote car free days	Alternatives to private vehicle use	Other	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Planning	Encourage a reduction of vehicle usage	One car free day event delivered per year	World car free day is 22nd Sept each year. In addition to this, parents and children are encouraged to walk to school, especially as part of Clean Air Day.	
B01	Continuing environmental permitting activities throughout the District	Environmental Permits	Other	2023	2040	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Implementation	Reduction in emissions to air	All permitted activities inspected in line with risk assessment timetable	All permitted activities inspected by the dates required (as calculated by the risk assessment score determined at the previous inspection)	
B02	Continue to promote and enforce anti idling	Public Information	Other	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Implementation	Reduction of tailpipe emissions	Minimum 1 anti idling event per year	Collaborative event promoting Anti-idling took place on 15th June 2023. Event was promotional. No fixed penalty notices were served.	Resources do not allow for extensive work regarding this action.
B03	Review and consult on Hackney Carriage/Private Hire policy to include a transitional requirement for minimum euro 6 emission vehicles and encourage low/zero emission vehicles.	Promoting Low Emission Transport	Taxi Licensing conditions	2023	2026	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Planning	Reduction of tailpipe emissions	Review with conclusions and recommendations completed by 2024	Taxi Tariff has recently been increased as this was identified as being below that of neighbouring districts and therefore considered prohibitive to the upgrade of vehicles. Taxi policy to be reviewed in 2025.	Following the expansion of the ULEZ zone to include outer London Boroughs, there has been a significant increase in taxis that are compliant with the ULEZ requirements (83% to 91%) however only 5 out of 217 Taxis (2.3%)

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															are currently fully electric vehicles.
B04	Ensure Smoke Control areas are promoted within the District and enforce when necessary	Public Information	Other	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded		Planning	Reduced smoke from chimneys in Smoke Control Areas	At least 2 social media campaigns per year	Up to date information regarding legislation around Smoke Control Areas and the areas designated within EFDC is available on the Councils website at https://www.eppingforestdc.gov.uk/environment/smoke-control-areas/	EFDC are currently looking into the revision of Smoke Control Areas within the district.
B05	Work with colleagues in Trading Standards to ensure the Domestic Solid Fuels Regulations are complied with	Promoting Low Emission Plant	Regulations for fuel quality for low emission fuels for stationary and mobile sources	2023	2028	Essex County Council, Epping Forest District Council	Essex County Council, Epping Forest District Council	NO	Funded	< £10k	Planning	Reduced emissions from chimneys in Smoke Control Areas	Pass intelligence of any premises suspected of supplying non-compliant fuel to Trading Standards	No intelligence received to date regarding illegal sales.	EFDC to undertake further awareness campaign targeting local retailers to ensure full compliance with the legislation.
C01	Introduce a Local Plan policy requiring submission and implementation of Routing Management Plans (for construction and operational phases) to manage the sustainable delivery of goods and materials	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	2023	2024	Essex County Council, Epping Forest District Council	Essex County Council, Epping Forest District Council	NO	Funded	< £10k	Planning	Reduced HGVs on smaller roads in closer proximity to residential properties	Routing Management plan submitted as part of planning application for large developments	Local Plan Policy T1 (c) addresses this action. Development proposals which are likely to generate a significant number of Heavy Goods Vehicle movements are required to demonstrate by way of a Routing Management Plan that no severe impacts are caused to the efficient and safe operation of the road network and no material harm is caused to the living conditions of residents.	These policies are part of the Council's decision-making framework for planning applications.
C02	Work with ECC to lower bus emissions	Promoting Low Emission Transport	Other	2023	2028	Essex County Council DfT	Essex County Council DfT				Planning	Cleaner vehicles, fewer emissions to air	Bus fleet at least euro 6 compliant by 2028	ECC consulted with Districts regarding Bus Service Improvement Plan (BSIP). EFDC voiced concern that our local bus fleet should include more low emission vehicles.	
C03	Register fleet with FORS (Fleet Operators Recognition Scheme)	Freight and Delivery Management	Other	2023	2024	Qualis Group	Qualis Group	NO	Funded	< £10k	Implementation		Number of drivers who use the system	Qualis Property Solutions (the Council services provider) has registered status, having applied for and activated an online FORS account, the next step is to undergo a bronze audit.	Bronze audit has been delayed due to staff turnover but it is anticipated

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															that this will start in 2024
D01	Ensure air quality is taken into account as a material consideration in planning decision making	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Implementation	Reduced Exposure due to reduced emissions & location of receptors	Planning Guidance on air quality produced The number of Air Quality Assessments submitted in accordance with the Planning Application Local Validation Checklist	All Large developments referred to environmental health have been assessed in respect of Air Quality. This is a requirement of our Local Plan Policy DM22. Mitigation measures are required in order to protect human health.	Workshops have taken place with Development Control Officers to emphasize importance of consultation for a range of scenarios.
D02	Assess the feasibility of introducing air quality neutral planning guidance for developments	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Planning		Planning Guidance on air quality produced The number of Air Quality Assessments submitted in accordance with the Planning Application Local Validation Checklist	Development control team have confirmed that this can link up with policy DM22 of the Local Plan and therefore it is feasible to introduce this policy	Next step is to draft a document for discussion with the Development Control Team
D03	Ensure large developments have and follow a construction management plan	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Implementation	Minimise Dust from Construction sites	Fewer resident complaints 100% of developments having a CMP when required	Construction Management Conditions have been improved to ensure better compliance with dust control measures. All large developments with construction/demolition are required to meet requirements.	No complaints have been received since the upgrade of the planning condition.
D04	Assess the feasibility of introducing a non road mobile machinery (NRMM) emissions planning guidance for large developments	Policy Guidance and Development Control	Other policy	2023	2023	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Planning		Feasibility exercise completed by end of 2023	Development control team have confirmed that this can link up with policy DM22 of the Local Plan and therefore it is feasible to introduce this policy	Next step is to produce the guidance document. A first draft of the document has been produced and is currently being considered by development control .

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D05	Limit parking spaces for new developments in sustainable locations, ensure that provision of EV charge points is maximised, cycle storage and associated facilities are provided in accordance with ECC standards	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2023	2028	Epping Forest District Council, Essex County Council	Epping Forest District Council, Essex County Council	NO	Funded	< £10k	Planning	Reduction of pollution associated with road traffic	Production of an electric vehicle charging point strategy	Essex CC's adopted parking standards which cover vehicles and cycles apply to new developments. EFDC does however actively seek reduced vehicle parking allocation or car free developments at sustainable locations. In 2023 Essex CC consulted on a proposed revision to their parking standards to include increased cycling provision and location specific criteria informing parking allocations.	EFDC's policy T1 to require Electric Vehicle Charging Points (EVCPs) to all new developments was removed by the planning inspector due to the introduction of standards for EVCPs in Building Regulations (Approved Document S). Whilst the Council proposes to develop its own EVCP Strategy until this is completed there are currently barriers to maximising opportunities for their provision, especially on non-residential development sites. Building Regulations do not require the level of EVCPs that EFDC was looking to achieve by the removed sections in Policy T1.

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D06	Encourage the uptake of zero emission / net zero carbon technology in new developments	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Planning	Reduced emissions from petrol and diesel vehicle usage	Number of planning applications where the submitted Sustainability Checklist states that a Medium or High Quality rating will be achieved	Design Codes promoting net zero have been produced for large developments such as Latton Priory, which has been identified as a site for 1050 homes plus associated community infrastructure. In addition, where opportunities for zero emission are identified, these are brought to the attention of Climate Change and Development Control Officers. These include opportunities for heat recovery.	The wording of the ECC Net Zero policy is more restrictive than that in EFDCs adopted local plan. EFDC are not currently able to enforce this policy without an amendment to the local plan.
D07	Support the measures within the Council's Interim Air Pollution Mitigation Strategy	Policy Guidance and Development Control	Other policy	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Implementation	Minimise air pollution in the Epping Forest SAC area	Monitoring around the EFSAC shows decreased pollution levels	Results of Air Quality Monitoring in relation to the EFSAC are undergoing ratification at the time of publication of this report. They will be published in subsequent ASRs.	Local plan ensures that the air pollution mitigation strategy is taken into consideration within the planning regime
D08	Support the measures within the Council's Climate Change Action Plan as well as the Essex Climate Action Plan	Policy Guidance and Development Control	Other policy	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Implementation	Work to minimise the impact of climate change on Epping Forest District	Calculation of emission reductions	EFDC Emissions calculations : Baseline year 2018-19 = 2067 tCO2e Last Financial Year 2023-24 = 1491 tCO2e Therefore 27.9% reduction achieved	Environmental Health are part of a Climate Change Steering group working in partnership with others to progress the Climate Change Action Plan both locally and across the County

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D09	Secure the provision and implementation of Travel Plans in accordance with Local Plan policy	Policy Guidance and Development Control	Other policy	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Planning	Reduction in pollution from transport as modal shift to sustainable transport methods is facilitated	Increase in number of trips by means other than private vehicle	The planning validation process requires the production of a Travel Plan setting out a range of measures to bring about a reduction in reliance on the private motor car. This is required for residential developments of 250+ units and non-residential developments where there are 50+ employees. Under Local Plan Policy T1 (C), Transport Assessments / Statements are required where significant vehicle movements are anticipated as a result of a development. These will normally also require a Travel Plan to be submitted. Routing Management Plans are required where proposals suggest a significant number of Heavy Goods Vehicle movements will be generated.	During 2023 there were 4 major applications that met the threshold for requiring a travel plan. 1 was refused permission, 1 was granted permission with a condition set requiring a travel plan, and the other 2 provided the travel plan as part of their applications.
E01	Increase the amount of public EV charge points in the District	Promoting Low Emission Plant	Other Policy	2023	2028	Essex County Council Epping Forest District Council	Essex County Council Epping Forest District Council	NO	Funded	< £10k	Implementation	Reduction in pollution from transport as more people convert to electric vehicles	Adoption of Epping Forest District Electric Vehicle Charging Strategy DfT EV public charger statistics figure to increase annually	By the end of 2023 there were 47 Electric Vehicle Charge Points in the District that were available for public use. During 2023, 8 additional rapid chargers were installed in existing Council Car Parks and a further 17 fast chargers were installed in a new multi-stored car park.	EFDC's Local Plan policy T1 to require Electric Vehicle Charging Points (EVCPs) on all new developments was removed by the planning inspector due to the introduction of standards for EVCPs in Building Regulations (Approved Document S). Whilst the Council proposes to develop its own EVCP Strategy until this is completed there are currently barriers to maximising opportunities for their

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															provision, especially on non- residential development sites, which may be publicly available for use. Building Regulations do not require the level of EVCPs that EFDC was looking to achieve by the removed sections in Policy T1.
E02	Assess the suitability of installing cleaner energy and heating technology on council owned sites	Promoting Low Emission Plant	Other Policy	2023	2030	Epping Forest District Council Qualis Group	Epping Forest District Council Qualis Group	NO	Funded	> £10 million	Planning	Reduction in air pollution as houses move away from fossil fuels	Number of properties with improved SAP score	Ongoing programme of retrofitting Council homes from Solid Fuel and gas to Air Source Heat Pumps. Properties are being upgraded as funds allow.	All properties are to achieve EPC band C (minimum SAP score 69) or above by 2030. No fossil fuel heating will be used by 2050. Asset Management Strategy is being commissioned to ensure Council operational sites work towards cleaner energy and technology.
E03	Maintain council utilities under renewable energy tariffs	Promoting Low Emission Plant	Other Policy	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Implementation	Reduced emissions / increased investment in sustainable methods	Reviewed every year to confirm renewable energy tariffs	EFDC has a 100% renewable electricity tariff and this will be the case for the foreseeable future	

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E04	Work with local residents associations, businesses, schools, and housing associations to bid for zero emission technology	Promoting Low Emission Plant	Other Policy	2023	2028	Epping Forest District Council, Qualis Group, Essex County Council	Epping Forest District Council, Qualis Group, Essex County Council	NO	Funded	< £10k	Planning	Reduced emissions from sustainable technology usage	Min 1 bid per year (where bids are available)	Promotion of grant for Heat Pump Engineer training in newsletter to local businesses.	Discussions regarding the inclusion of energy efficiency in the Housing Asset Management Strategy: Looking to develop a decarbonisation pathway using data from a stock condition survey and the commissioned data platform Parity Projects. This will then be used to inform further Social Housing Decarbonisation Fund bids.
E05	Installation of energy efficiency measures in low income, low efficiency homes using grant funding	Promoting Low Emission Plant	Other Policy	2023	2028	Epping Forest District Council, Great South East Net Zero Hub, Qualis Group	Department for Energy Security & Net Zero (DESNZ), Great South East Net Zero Hub	NO	Funded	£1 million - £10 million	Planning	Reduced energy requirements resulting in less emissions	Number of measures installed per year	(1) Home insulation and energy efficiency measures are being installed as part regeneration projects. Limes Farm Project completed May 2024. (2) Home Upgrade Grant 2 (HUG2) targets residents with properties that are off-gas and with household income less than £36K. Provides assistance to improve energy efficiency. Target for referrals has been exceeded by almost double in year 1. (3) Signed up to Energy Companies Obligation 4 (ECO4) Flexible Eligibility scheme. Enables those living in the least energy efficient properties who struggle to heat them to a comfortable standard, access to funding. Also for residents who are vulnerable to the effects of a cold home.	HUG2 is only available to specific residents however the ECO4 scheme is more flexible which we hope will provide more leads and in turn outcomes.

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E06	Assess if procurement policies can include a preference for zero/low emission suppliers/products	Promoting Low Emission Plant	Other Policy	2023	2023	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Planning	Reduced Emissions from EFDC activities	Assessment completed by end of 2023, if feasible procurement document updated by 2028	EFDC Procurement Strategy 2021 - 2026 includes a requirement to consider Sustainability and Climate Change when purchasing goods.	Electric alternatives for some vehicles required for specific tasks within the Council are not currently available.
F01	Work with our Public Health colleagues to increase awareness of air quality around our District	Public Information	Other	2023	2028	Epping Forest District Council, Essex County Council	Epping Forest District Council, Essex County Council	NO	Funded	< £10k	Planning	Reduced Emissions due to behaviour change	At least one public awareness campaign per year	Environmental Health has representation at the Epping Forest Built and Natural Environment Action Group	There is greater awareness of active travel in the district thanks to UK Shared Prosperity Funding being used for a Local Walking and Cycling infrastructure plan in Waltham Abbey and ECC funding a plan for Loughton Buckhurst Hill Chigwell. Further UKSPF funding has also gone towards supporting active travel and modal shift.
F02	Ensure the Director of Public Health signs off on Annual Status Reports and Air Quality Action Plans	Public Information	Other	2023	2028	Epping Forest District Council Essex County Council	Epping Forest District Council Essex County Council	NO	Funded	< £10k	Implementation	Transparency and information sharing assisting joined up working	Reports signed off when needed	The Director of Public Health will have sight of this document prior to its submission to Defra	
F03	Conduct air quality audits at schools around our District	Other	Other	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Planning	Reduced emissions from schools	No of schools audited	No progress to date regarding this measure	Limited staff resources have been available and this measure has not been started as a result

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F04	Ensure air quality is included in the JSNA	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2023	2028	Essex County Council Epping Forest District Council	Essex County Council Epping Forest District Council	NO	Funded	< £10k	Implementation	Reduced emissions from improved targeting of resources	inclusion in JSNA	Air Quality has been considered as party of the Essex JSNA.	
F05	Continue to monitor air quality throughout the District for both human health and the EFSAC	Other	Other	2023	2028	Epping Forest District Council	Epping Forest District Council	NO	Funded	< £10k	Implementation	Identification of problem areas will ensure continued focus	monitoring undertaken in line with programme	Air Quality is monitored throughout the district via a network of nitrogen dioxide tubes. The programme follows the national exposure calendar issued by Defra.	Additional monitoring is undertaken using low-cost analysers in order to assess specific projects, such as the potential for the Epping Ongar Railway to affect air quality in the locality.

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy[6], local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter ($PM_{2.5}$)). There is clear evidence that $PM_{2.5}$ (particulate matter smaller 2.5 micrometres) 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 $PM_{2.5}$:

Existing / Ongoing Measures:

- Authorisation of officers to issue fixed penalty notices in respect of idling vehicles on the public highway,
- 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 in relation to commercial activities that produce particulate matter, and work with operators to reduce their impact on the environment.
- 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 is an annual occurrence however due to the ongoing impact of COVID-19 on resources, our 2022 Clean Air Day campaign was undertaken via the distribution of electronic promotional material. This was resumed in 2023.

[6] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

- Consideration of planning applications to ensure that appropriate air quality mitigation measures have been identified in the application, and will be incorporated into the development to minimise the impact of the development on air quality
- Consideration of planning applications in respect of dust creation from demolition and construction activities on building sites and ensuring the appropriate mitigation strategies are employed.
- Update the Council's website, improving information for both residents and local businesses to enable them to make better informed decisions with regards to air quality, in particular the burning of solid fuels and the changes to enforcement in respect of Smoke Control Areas.
- The measures listed above in section 2.2 and Table 2.2 will have co-benefits on $PM_{2.5}$ concentrations as they impact sources of particulate pollution.
- Attendance of the Essex Pollution Group meetings where issues such as air quality are discussed with other local authorities, Essex County Council and the Environment Agency.

The above measures will link to the Public Health Outcomes Framework Indicator 'D01 : Fraction of mortality attributable to particulate air pollution' and help to bring about a reduction in particulate air pollution ($PM_{2.5}$).

The latest Public Health Outcomes Framework Indicator for Epping Forest shows that the district has a higher percentage of mortality attributed to particulate air pollution than both the East of England and England. The percentage has been tracking above the regional and national percentages in recent years.

The percentages for 2022 are as follows:

Epping Forest District	6.7%
East of England	6.2%
England	5.8%

*NB new method for calculation used in recent years

No information for 2023 is available at the time of writing this report. The above information was accessed online on 4.4.24. Further information regarding this indicator can be found at: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/1/gid/1000043/pat/6/par/E12000006/ati/301/are/E07000072/yrr/3/cid/4/tbm/1

Whilst Epping Forest District Council did monitor particulate matter as part of the Epping Ongar Railway project, this was undertaken using low-cost analysers which do not meet the required criteria for LAQM. We have therefore used Defra's background maps to provide modelled $PM_{2.5}$ background concentrations for each 1km grid square. These maps, which can be found at https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

show a maximum modelled $PM_{2.5}$ background for Epping Forest District of 11.19 $\mu g/m^3$ in 2023. The location of this concentration was grid reference 542500 192500, which covers part of Chigwell, to the east of the M11 motorway and including West Hatch High School. Much of this area is school playing fields and other green space.

Whilst we are unable to determine the effectiveness of measures in reducing concentrations of $PM_{2.5}$, modelling for this location shows a decrease over the last 5 years (2019: 11.90$\mu g/m^3$, 2020: 11.65$\mu g/m^3$; 2021: 11.49$\mu g/m^3$; 2022: 11.34$\mu g/m^3$; 2023: 11.19$\mu g/m^3$). 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.

The district has a number of historical Smoke Control Areas that cover much of the densely populated parts of Waltham Abbey and Loughton. Maps showing the locations of the smoke control areas together with a list of roads that have been designated as such, can be found on the District Councils website at https://www.eppingforestdc.gov.uk/environment/smoke-control-areas/ . Information and advice is targeted at the residents of these areas as well as encouraging others who enquire with regards to best practice. The Council will be looking to review areas designated for Smoke Control in the near future in order to increase consistency and protection of human health.

The Environment Act 2021 addresses the sale of fuels that are burnt within a Smoke Control Area. As these fuels are required to meet criteria aimed at minimising pollution, it is hoped that this will have a positive impact upon particulate $PM_{2.5}$ concentrations in Epping Forest District. The Council will be actively promoting the changes to legislation and assisting with enforcement where necessary.

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

This section sets out the monitoring undertaken within 2023 by Epping Forest District Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2019 and 2023 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Epping Forest District Council did not undertake automatic (continuous) monitoring to the standard required by LAQM process during 2023.

A short-term project was undertaken in order to analyse air quality in the vicinity of the Epping Ongar Heritage Railway. This project used low-cost analysers and was undertaken by Ricardo-AEA Limited. A summary of the project, including a map showing the location of the analysers and the project findings, is detailed in Appendix F. The full interactive report produced by Ricardo-AEA Limited can be found online at https://www.eppingforestdc.gov.uk/wp-content/uploads/2024/06/EFDC_Epping-Ongar-Railway-Sensor-Report_Apr_2024.html

3.1.2 Non-Automatic Monitoring Sites

Epping Forest District Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 42 sites during 2023. Table A.1 in Appendix A presents the details of the non-automatic sites.

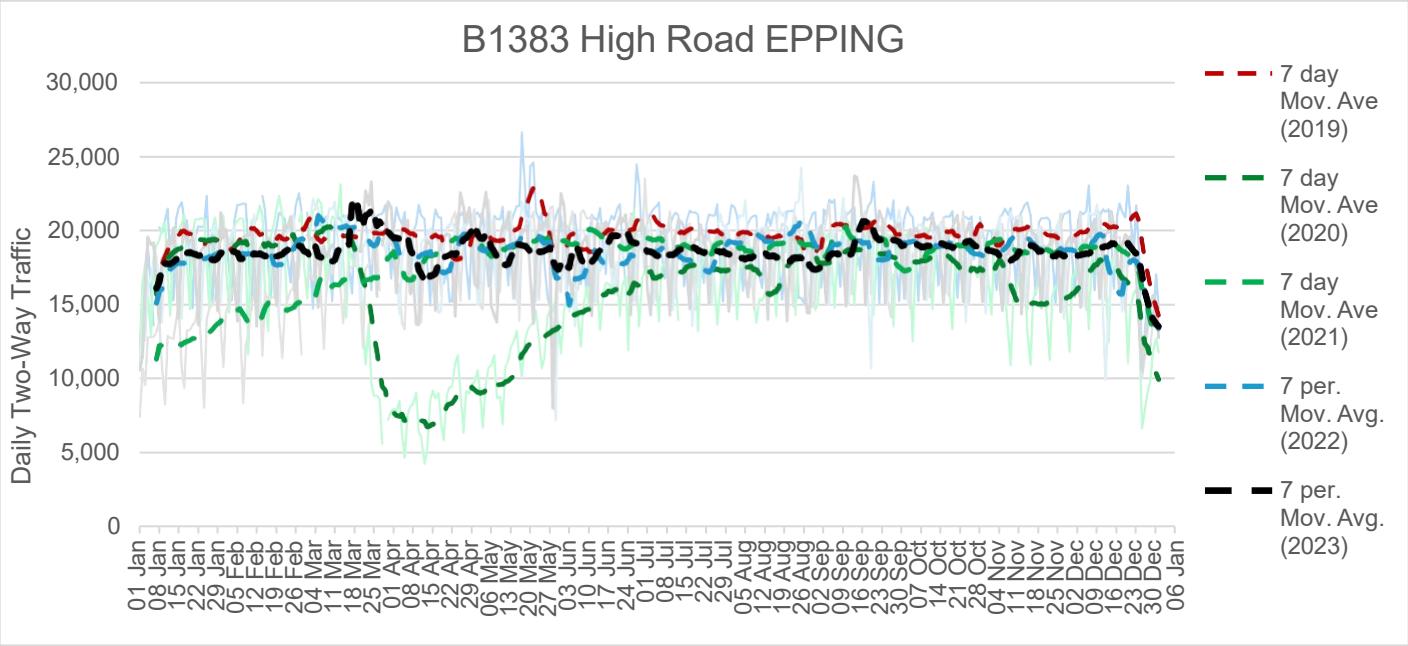
Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

The graphs in Appendix A (Figures A.1a to A.1h) show the trends of annual mean nitrogen dioxide concentrations over the last 5 years (where available) at all sites. It can be seen from these graphs that concentrations at 39 sites decreased in 2023, whilst 3 showed a slight increase from the concentrations recorded in 2022.

The 2023 annual mean concentration of nitrogen dioxide at the AQMA Epping Forest District Council No.2 decreased from 38µg/m^3 in 2022 to 33.1µg/m^3 in 2023. This is 6.9µg/m^3 below the annual mean objective of 40µg/m^3. Assuming that the concentration in 2020 was an outlier due to the impact of the COVID-19 pandemic, and traffic has now returned to the new normal, there has been a steady reduction in annual average nitrogen dioxide concentrations over the last 5 years. This is illustrated on Figure A.1a in Appendix A. Epping Forest District Council will continue to monitor concentrations at this location in order to obtain sufficient evidence for a revocation of the AQMA designation in respect of the annual mean objection in the future.

The Highways Department at Essex County Council have provided the following chart which illustrates traffic flow along the Epping High Road (which passes the AQMA at Bell Common), comparing 2019, 2020, 2021, 2022 and 2023.

Figure 3.1 – Traffic Flows on Epping High Road



The black dashed line represents the 2023 seven day average traffic and shows that overall traffic numbers although slightly lower, roughly tracked those in 2019 before the pandemic (shown by the red dashed line). Traffic shown in dark green is that recorded in 2020. This clearly shows a reduction in traffic as a result of the national lockdown due to COVID-19. Traffic levels in 2021 and 2022 are also both slightly below that of 2019 before the pandemic. This is explained by the increase in home working which has largely continued to date.

2023 was the 5th year (not counting 2020) in which the annual mean concentration of nitrogen dioxide at (3) Bell Vue, High Road, Bell Common, Epping (the AQMA) was below 60µg/m^3. We are

currently in the process of revoking the AQMA in relation to the hourly mean objective. Whilst there may still be some fluctuations around the annual mean objective, it is considered unlikely that concentrations will increase to such a level that will lead to a further breach of the hourly objective. This does assume that any further development in the area is required to incorporate effective mitigation measures to ensure that it does not have a negative impact on the local environment.

Whilst the annual mean nitrogen dioxide concentration was below the objective during 2023, we require further evidence that this objective will not be exceeded in the future before a revocation for this objective will be considered.

3.2 Individual Pollutants

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 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

All monitoring data presented in this report has been properly ratified and corrected for bias where applicable.

Table A.2 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented 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).

For diffusion tubes, the full 2023 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 – NO_2 2023 Diffusion Tube Results (µg/m^3) includes distance corrected values, only where relevant.

All results obtained during 2023 were below both the hourly objective and the annual mean objective for nitrogen dioxide. In addition, as all results were below 36µg/m^3, being10% of the annual mean objective, it was not necessary to undertake a distance correction calculation.

The majority of sites (39 out of 42) measured a decrease in concentrations from those recorded in 2022. Only 3 sites recorded an increase in annual mean concentrations from that recorded in

2022. These were (21) 110 Roundhills, Waltham Abbey, (26) 131 High Street Ongar, and (31) Station House Station Approach, Epping Underground Station, Epping.

We continue to use the national bias adjustment factor as we do not have the ability to calculate a figure locally. This figure enables us to account for the inherent uncertainty involved in diffusion tube monitoring and report an adjusted concentration in line with Defra guidance (TG16, paragraph 7.78). Appendix C provides further detail on bias adjustment.

Data capture during 2023 was greater than 75% for all sites. As a result, we were not required to undertake annualisation calculations in line with Technical Guidance Note LAQM TG20, box 7.9.

As the 2023 monitoring data shows that no additional sites measured concentrations of nitrogen dioxide greater than the objective, no further designations are required at this time.

Following a review of monitoring sites at the end of 2023, two additional locations were set up and one was removed. It was considered that location (47) 76 Roding Road, Loughton could be removed from the monitoring programme as it had measured concentrations of 16.0µg/m^3 and 14.9µg/m^3 over the 2 years since it was set up. This location was chosen following a complaint from a member of the public however the results obtained demonstrate that it is well within the objective concentration set out in the Air Quality Regulations,

The new locations were set up in Sheering and Loughton. The monitoring location in Sheering is the replacement of a previous location that was lost due to the removal of a lamp post as part of roadworks during the addition of a new motorway junction (Junction 7A) on the M11. When the lamppost was replaced, we were able to recommence monitoring at this location which would then also provide information to demonstrate the change in air quality as a result of the addition of Junction 7A..

The other new location in Loughton was chosen as it was considered that queuing traffic along Chigwell Lane could lead to elevated concentrations of nitrogen dioxide and therefore impact a single residential property that is located on the southern side of the carriageway. Heavy traffic volumes are experienced here due to its location close to the M11 junction 5, local industrial and retail parks.

We will report the results from these monitoring locations in the ASR Report due in 2025.

The results obtained during 2023 have enabled Epping Forest District Council to conclude that whilst the AQMA designation in respect of the annual mean concentration of nitrogen dioxide

should remain at the current time, they confirm that the designation in respect of the hourly average concentration should be revoked. This will be completed as a priority.

3.2.2 Particulate Matter (PM_{10})

Particulate matter (PM_{10}) monitoring is not undertaken in the district to the standard required by LAQM.

Low-cost analysers were used as part of a one year project to measure air quality in the vicinity of the Epping Ongar Railway, and Particulate Matter (PM_{10}) was included in this project. The results from this project are summarised in Appendix F.

3.2.3 Particulate Matter ($PM_{2.5}$)

Particulate matter ($PM_{2.5}$) monitoring is not undertaken in the district to the standard required by LAQM.

Low-cost analysers were used as part of a one year project to measure air quality in the vicinity of the Epping Ongar Railway, and Particulate Matter ($PM_{2.5}$) was included in this project. The results from this project are summarised in Appendix F.

3.2.4 Sulphur Dioxide (SO_2)

Sulphur dioxide (SO_2) monitoring is not undertaken in the district to the standard required by LAQM.

Low-cost analysers were used as part of a one year project to measure air quality in the vicinity of the Epping Ongar Railway, and sulphur dioxide (SO_2) was included in this project. The results from this project are summarised in Appendix F.

Appendix A: Monitoring Results

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)
1a, 1b, 1c	105 Hainault Road (junction with Fencepiece Road), Chigwell	Kerbside	544234	192236	NO2	No	8.5	1.0	No	2.0
2a, 2b, 2c	15 High Street, Epping	Urban Background	545555	201732	NO2	No	0.0	13.7	No	2.0
3a, 3b, 3c	Bell Vue, High Road, Bell Common, Epping	Roadside	544928	201281	NO2	Yes, AQMA Epping Forest District Council No.2	0.0	1.8	No	2.0
4a, 4b, 4c	254 High Street, Epping (Ladbrokes)	Roadside	546196	202355	NO2	No	0.0	5.6	No	2.5
5a, 5b, 5c	202 High Street, Epping (Superdrug)	Roadside	546058	202193	NO2	No	0.0	4.0	No	2.5
6a, 6b, 6c	1 Canes Cottages, Canes Lane A414, Hastingwood	Urban Background	547838	206819	NO2	No	0.0	15.6	No	2.0

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)
7a, 7b	1 Church Hill, Loughton	Roadside	542505	196668	NO2	No	2.5	4.2	No	2.0
8a, 8b	72 Church Hill, Loughton	Roadside	542664	196868	NO2	No	0.0	12.7	No	2.0
9a, 9b, 9c	249 High Road, Loughton (Timpson)	Roadside	542339	196360	NO2	No	0.0	6.4	No	2.5
10a, 10b	252 High Road, Loughton (Love Brownies)	Roadside	542373	196478	NO2	No	0.0	5.7	No	2.5
11a, 11b	5 Goldings Hill, Loughton	Roadside	543091	197316	NO2	No	4.8	1.0	No	2.5
12a, 12b, 12c	66 Tempest Mead, North Weald	Urban Background	549648	203671	NO2	No	4.2	1.0	No	2.0
13a, 13b, 13c	20 High Street, Roydon	Roadside	540919	209956	NO2	No	0.8	1.2	No	2.0
14a, 14b, 14c	Burles Farm, Netherhall Road, Roydon	Urban Background	539711	208662	NO2	No	16.0	1.7	No	2.0
15a, 15b	Albion Terrace, Sewardstone Road, Sewardstone	Roadside	537727	196187	NO2	No	3.1	4.6	No	2.0
17a, 17b, 17c	14 The Elms,Woodbine Close, Waltham Abbey	Urban Background	541320	200020	NO2	No	0.0	55.8	No	2.0

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)
18a, 18b	4 Leaview, Waltham Abbey (Abbeyview)	Roadside	537808	200644	NO2	No	6.1	1.5	No	2.0
19a, 19b	34 Hayden Road, Waltham Abbey	Roadside	538386	199557	NO2	No	0.0	12.0	No	2.0
20a, 20b, 20c	2 Lodge Lane, Waltham Abbey	Roadside	538710	199860	NO2	No	7.3	0.5	No	2.0
21a, 21b	110 Roundhills, Waltham Abbey	Urban Background	538954	199973	NO2	No	6.7	1.0	No	2.0
22a, 22b	26 Victoria Road, Buckhurst Hill (opposite Underground Station)	Roadside	541719	193979	NO2	No	7.0	1.6	No	2.0
23a, 23b, 23c	St Johns School, High Road, Buckhurst Hill	Roadside	540902	194240	NO2	No	11.0	2.5	No	2.0
25a, 25b, 25c	Regency Lodge, Roding Lane , Buckhurst Hill	Roadside	541913	194020	NO2	No	5.0	2.0	No	2.0
26a, 26b, 26c	131 High Street, Ongar	Roadside	555253	202921	NO2	No	0.0	1.0	No	2.0
27a, 27b, 27c	3 Queens Terrace, Epping Road, A414, Ongar	Roadside	555125	203944	NO2	No	0.0	7.0	No	2.0

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)
31a, 31b, 31c	Station House, Station Approach, Epping Underground Station, Epping	Other	546196	201563	NO2	No	0.0	1.5	No	2.5
32a, 32b, 32c	Copped Hall, Bell Common, Epping (Copped Hall Entrance)	Roadside	544709	201139	NO2	No	4.5	3.0	No	2.0
33a, 33b, 33c	281 Fencepiece Road, Chigwell	Roadside	544238	192212	NO2	No	0.0	10.0	No	2.5
34a, 34b, 34c	414 Fencepiece Road, Chigwell (Sherrell House)	Roadside	544268	192247	NO2	No	0.0	12.5	No	2.0
35a, 35b, 35c	120 Manor Road, Chigwell	Roadside	544183	192231	NO2	No	5.5	2.0	No	2.5
36a, 36b, 36c	107 High Street, Ongar (Anchor)	Roadside	555231	202875	NO2	No	0.0	2.0	No	2.5
37a, 37b, 37c	149 High Street, Ongar (Queen Bee)	Roadside	555253	202964	NO2	No	0.0	5.5	No	2.5
38a, 38b, 38c	204 High Street, Ongar (Watsons)	Roadside	555265	203108	NO2	No	0.0	2.5	No	2.0

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)
39a, 39b, 39c	224 High Street, Epping (Church's Butchers)	Roadside	546107	202254	NO2	No	0.0	4.0	No	2.0
40a, 40b, 40c	154 High Street, Epping (was Lloyds Bank)	Roadside	545991	202095	NO2	No	0.0	5.0	No	2.5
41a, 41b, 41c	259 High Street, Epping (Holland & Barrett)	Roadside	546075	202253	NO2	No	0.0	10.0	No	2.5
42a, 42b, 42c	Laurels, 2 Nazeing Road, Nazeing	Roadside	539015	205995	NO2	No	15.0	2.0	No	2.5
43a, 43b, 43c	4 North Street, Nazeing	Roadside	539084	206058	NO2	No	12.0	1.5	No	2.5
44a, 44b, 44c	Parsonage Court, Rectory Lane, Loughton	Roadside	543989	196472	NO2	No	0.0	9.8	No	2.0
45a, 45b, 45c	18 Chigwell Lane, Loughton (off Colson Road)	Roadside	544119	196133	NO2	No	3.5	2.0	No	2.5
46a, 46b, 46c	The Woodbine Public House, Honey Lane, Waltham Abbey	Roadside	541301	199731	NO2	No	0.0	5.0	No	2.5
47a, 47b, 47c	76 Roding Road, Loughton	Roadside	542634	195492	NO2	No	0.0	6.5	No	2.0

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 2023 (%) (2)	2019	2020	2021	2022	2023
1a, 1b, 1c	544234	192236	Kerbside	100	100.0	38.9	30.0	29.6	25.5	24.5
2a, 2b, 2c	545555	201732	Urban Background	100	100.0	23.9	18.1	17.9	16.8	15.8
3a, 3b, 3c	544928	201281	Roadside	100	100.0	47.6	32.5	41.0	38.0	33.1
4a, 4b, 4c	546196	202355	Roadside	100	100.0	28.2	21.3	20.0	19.8	18.6
5a, 5b, 5c	546058	202193	Roadside	100	100.0	33.5	24.0	24.8	24.3	22.3
6a, 6b, 6c	547838	206819	Urban Background	100	100.0	20.1	16.1	16.9	15.9	13.9
7a, 7b	542505	196668	Roadside	100	100.0	22.4	17.4	17.9	16.3	16.1
8a, 8b	542664	196868	Roadside	100	100.0	21.2	16.8	17.9	16.5	15.9
9a, 9b, 9c	542339	196360	Roadside	100	100.0	28.0	21.2	20.4	19.2	16.9
10a, 10b	542373	196478	Roadside	100	100.0	28.3	21.7	22.3	20.0	18.7
11a, 11b	543091	197316	Roadside	100	100.0	34.4	28.0	28.8	28.0	24.3
12a, 12b, 12c	549648	203671	Urban Background	100	100.0	15.1	11.5	12.1	11.9	11.2
13a, 13b, 13c	540919	209956	Roadside	100	100.0	20.5	16.1	16.8	16.8	14.9

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 2023 (%) (2)	2019	2020	2021	2022	2023
14a, 14b, 14c	539711	208662	Urban Background	100	100.0	15.8	13.4	13.2	12.4	10.4
15a, 15b	537727	196187	Roadside	100	100.0	27.2	22.6	23.2	23.0	19.7
17a, 17b, 17c	541320	200020	Urban Background	100	100.0	25.7	17.0	21.4	19.1	18.2
18a, 18b	537808	200644	Roadside	100	100.0	23.8	18.9	19.6	17.2	16.9
19a, 19b	538386	199557	Roadside	100	100.0	26.0	20.4	22.2	21.5	17.6
20a, 20b, 20c	538710	199860	Roadside	100	100.0	30.2	22.5	24.6	22.9	21.1
21a, 21b	538954	199973	Urban Background	100	100.0	28.2	21.0	20.8	17.8	19.3
22a, 22b	541719	193979	Roadside	100	91.8	25.2	19.4	21.5	18.3	18.2
23a, 23b, 23c	540902	194240	Roadside	100	100.0	25.7	20.1	20.6	17.9	16.3
25a, 25b, 25c	541913	194020	Roadside	100	100.0	33.3	26.1	27.1	23.5	21.5
26a, 26b, 26c	555253	202921	Roadside	100	100.0	33.4	27.8	31.3	25.6	26.4
27a, 27b, 27c	555125	203944	Roadside	100	100.0	24.2	18.3	18.7	19.9	17.1
31a, 31b, 31c	546196	201563	Other	100	100.0	37.9	25.3	28.2	26.1	26.4
32a, 32b, 32c	544709	201139	Roadside	100	100.0	30.9	23.2	22.2	20.5	19.8

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 2023 (%) [2]	2019	2020	2021	2022	2023
33a, 33b, 33c	544238	192212	Roadside	100	100.0	30.3	25.0	23.9	21.8	20.1
34a, 34b, 34c	544268	192247	Roadside	100	100.0	21.6	16.9	17.5	16.6	14.3
35a, 35b, 35c	544183	192231	Roadside	100	82.1	34.9	24.3	25.5	21.8	19.3
36a, 36b, 36c	555231	202875	Roadside	100	100.0	34.1	24.7	26.1	23.6	22.2
37a, 37b, 37c	555253	202964	Roadside	100	100.0	28.4	19.8	21.3	20.2	18.3
38a, 38b, 38c	555265	203108	Roadside	100	100.0	30.0	19.5	21.6	21.4	19.0
39a, 39b, 39c	546107	202254	Roadside	100	100.0	34.9	22.6	22.6	23.4	20.5
40a, 40b, 40c	545991	202095	Roadside	100	100.0	33.0	24.3	21.7	21.6	20.2
41a, 41b, 41c	546075	202253	Roadside	100	100.0	34.9	22.7	23.9	21.7	20.9
42a, 42b, 42c	539015	205995	Roadside	100	100.0		23.0	22.3	22.3	18.4
43a, 43b, 43c	539084	206058	Roadside	100	100.0		21.0	21.7	20.0	18.7
44a, 44b, 44c	543989	196472	Roadside	100	100.0		16.9	17.0	16.5	15.5
45a, 45b, 45c	544119	196133	Roadside	100	100.0		17.9	18.6	18.4	17.0
46a, 46b, 46c	541301	199731	Roadside	100	100.0			28.1	27.0	25.1

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 2023 (%) (2)	2019	2020	2021	2022	2023
47a, 47b, 47c	542634	195492	Roadside	100	100.0				16.0	14.9

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22**

☒ **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.

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**.

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

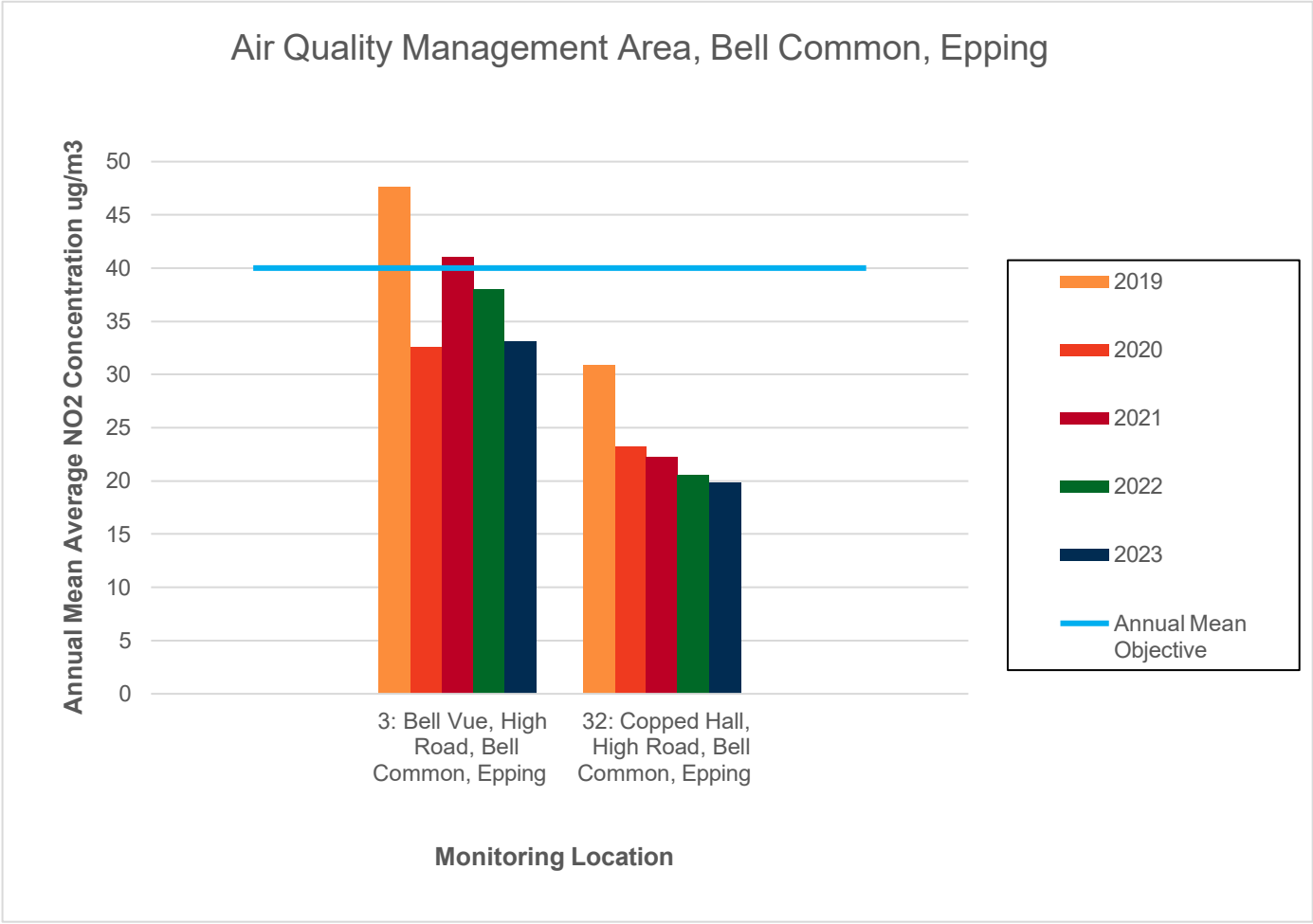
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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%).

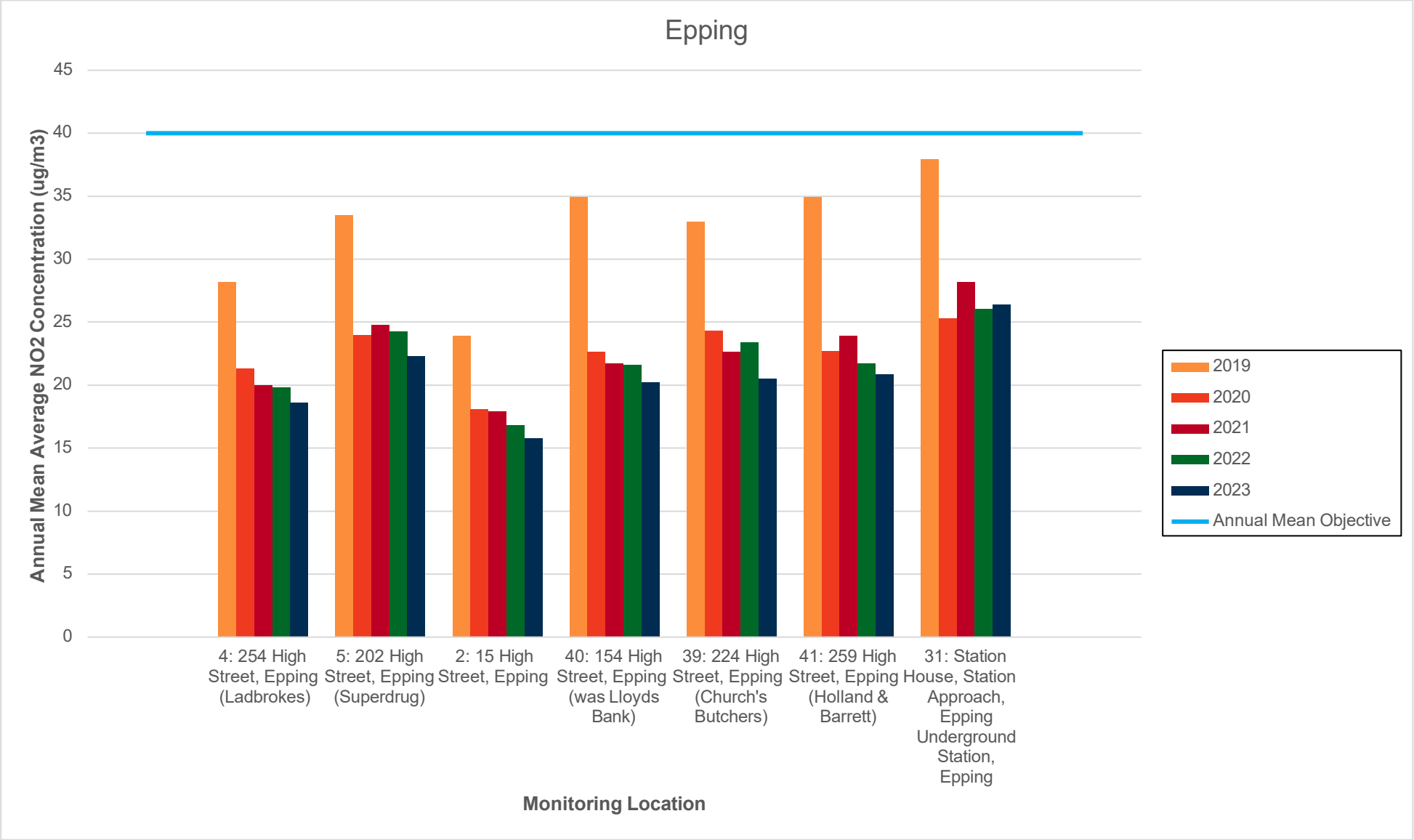
Figure A.1 – Trends in Annual Mean NO_2 Concentrations

Figure A.1a



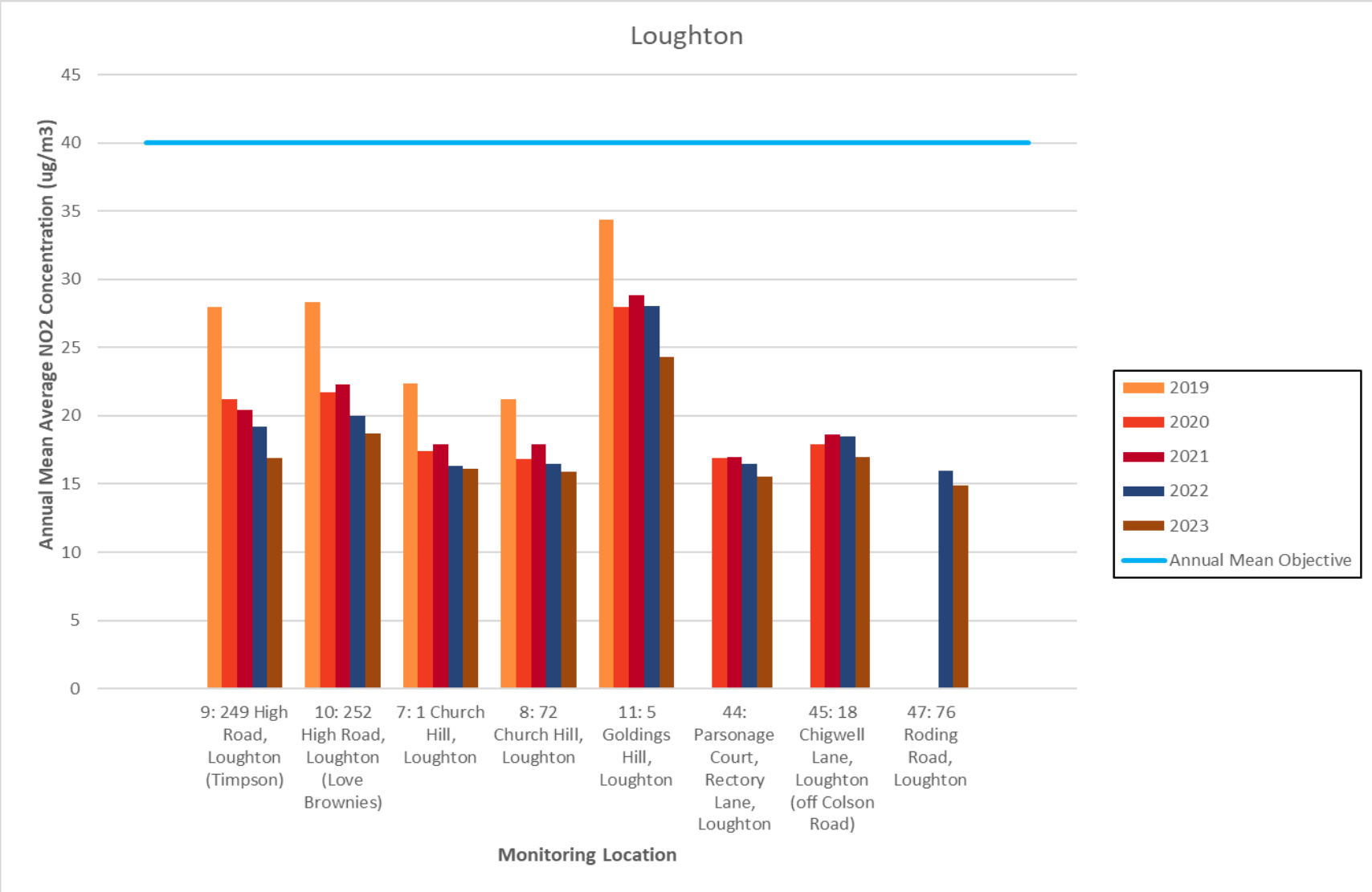
This graph shows a consistent decline in nitrogen dioxide concentrations at both sites.

Figure A.1b



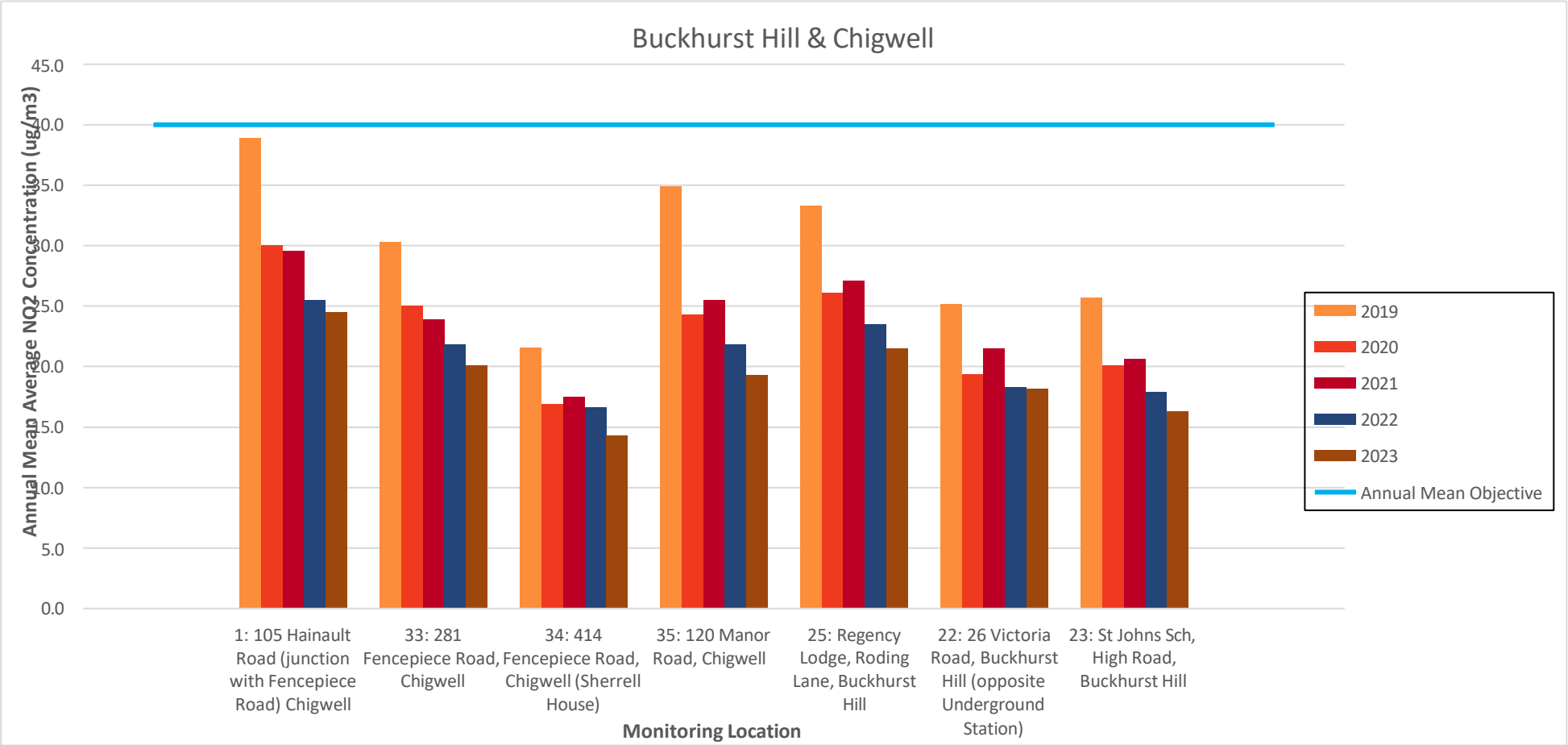
This graph shows a decline in nitrogen dioxide concentrations at all Epping sites except Station House, Station Approach.

Figure A.1c



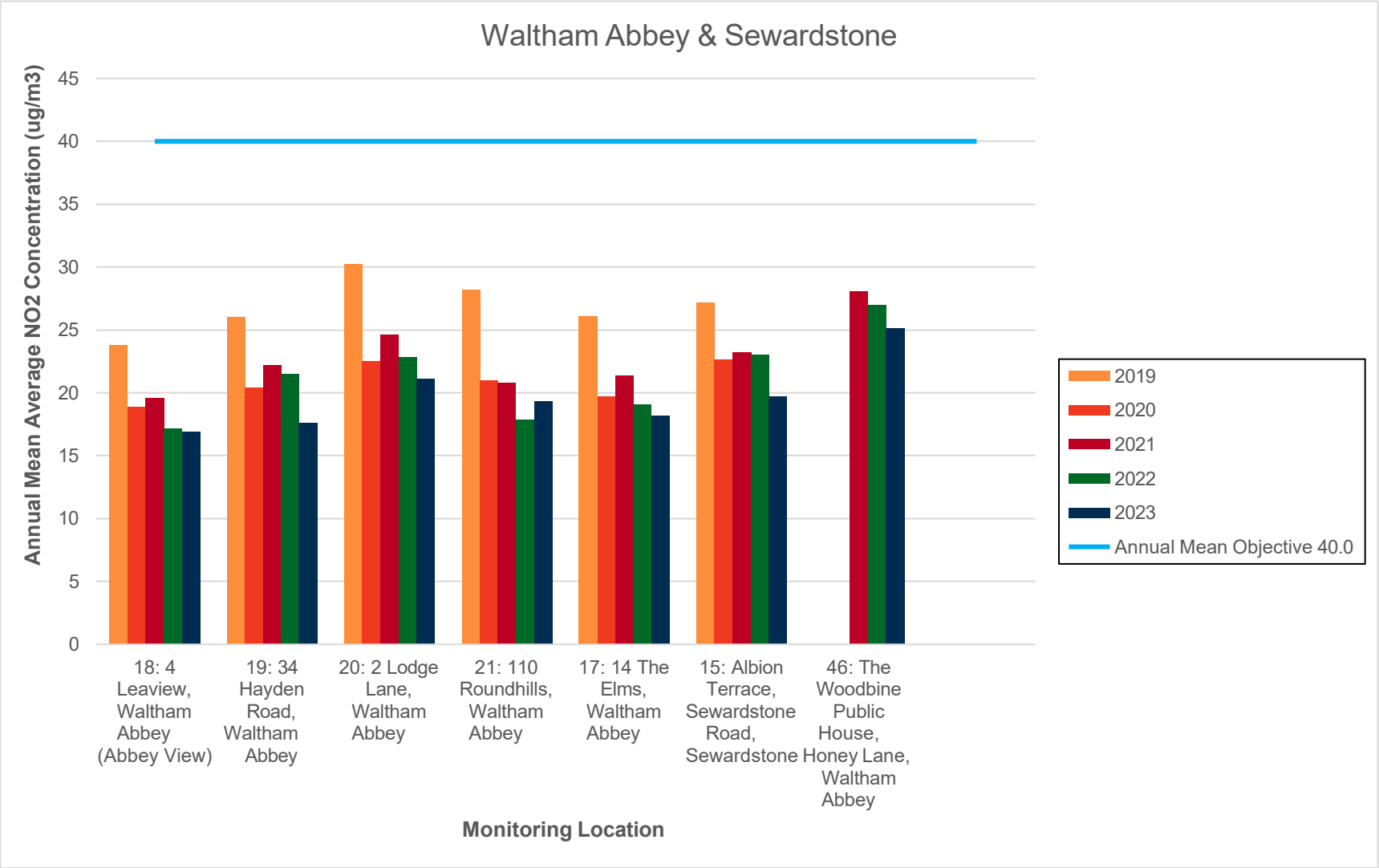
This graph shows a decline in nitrogen dioxide concentrations at all sites in Loughton.

Figure A.1d



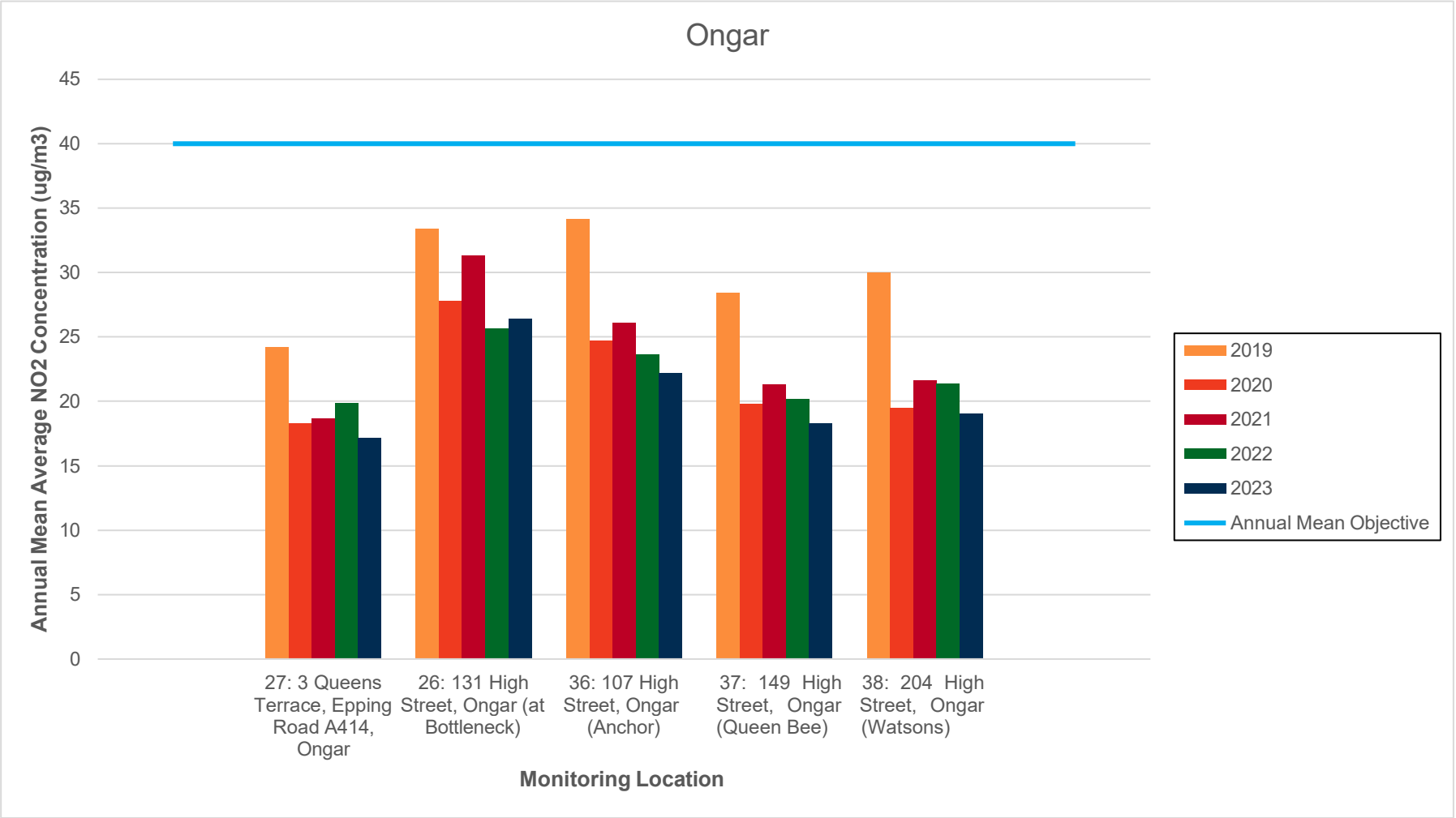
This graph shows a decline in nitrogen dioxide concentrations at all sites in Buckhurst Hill and Chigwell.

Figure A.1e



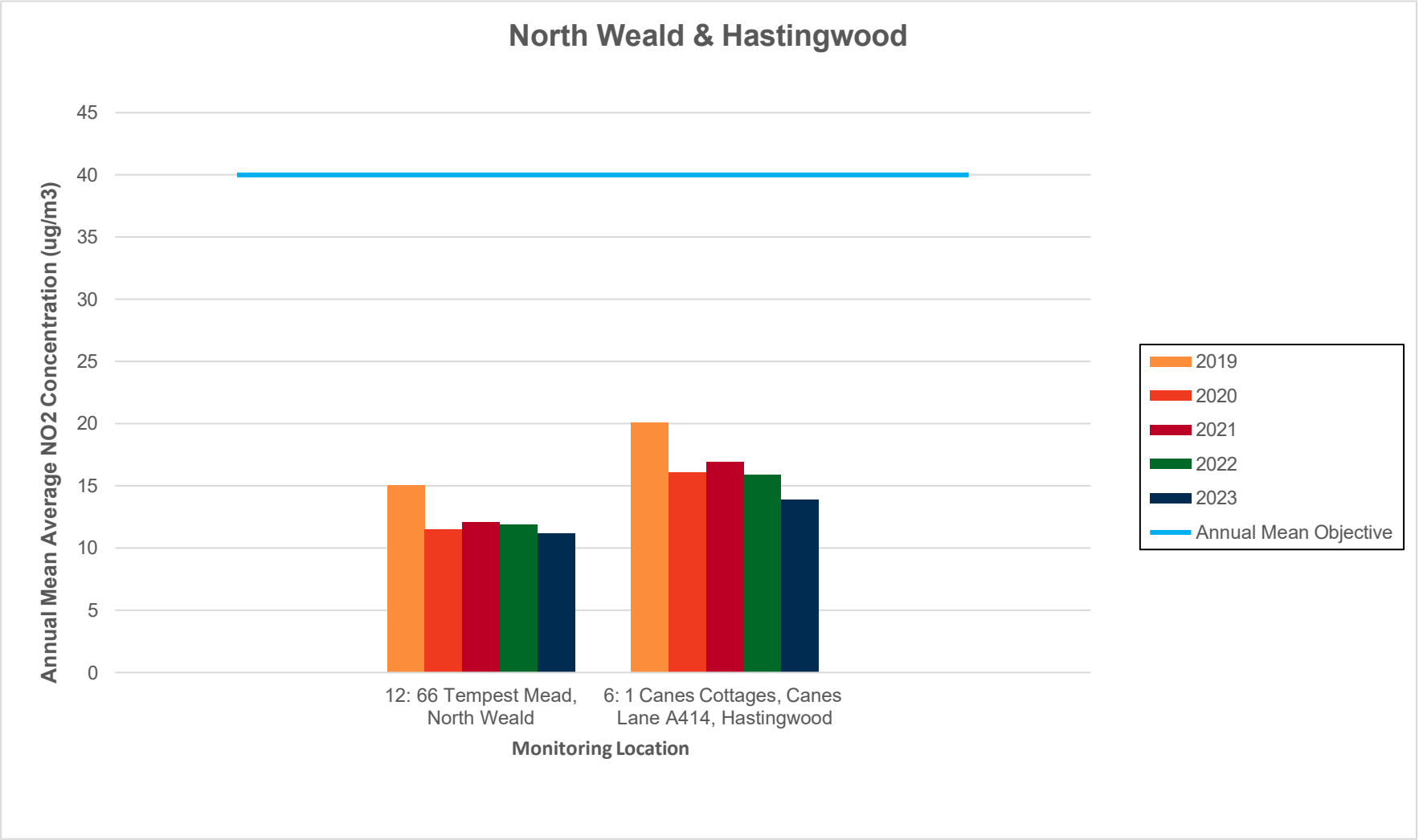
This graph shows a decline in nitrogen dioxide concentrations at all sites in Waltham Abbey except 110 Roundhills.

Figure A.1f



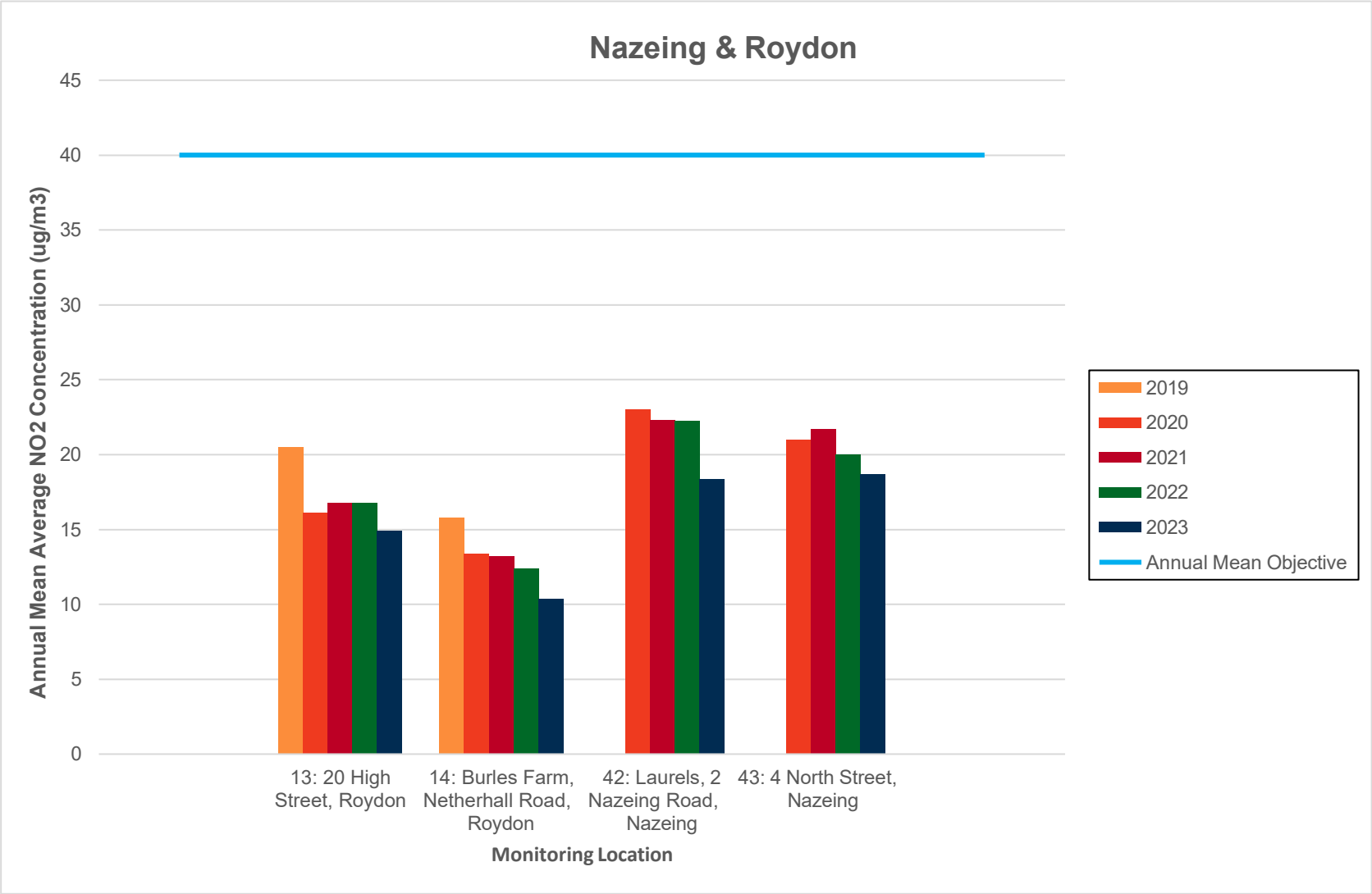
This graph shows a decline in nitrogen dioxide concentrations at all Ongar sites except 131 High Street.

Figure A.1g



This graph shows a consistent decline in nitrogen dioxide concentrations at both sites over the last 3 years.

Figure A1.h



This graph shows a decline in nitrogen dioxide concentrations at all sites in Roydon and Nazeing during 2023.

Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO_2 2023 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.77)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
1a	544234	192236	38.3	45.2	34.0		25.5	27.3	25.0	21.1	30.2	35.4	30.1		-	-	-	Triplicate Site with 1a, 1b and 1c - Annual data provided for 1c only
1b	544234	192236	34.9	48.4				28.0	29.0	28.0	31.9		36.4	32.8	-	-	-	Triplicate Site with 1a, 1b and 1c - Annual data provided for 1c only
1c	544234	192236	35.7	48.3		30.4		26.6	28.5	25.1	32.7	30.5		30.7	31.9	24.5	-	Triplicate Site with 1a, 1b and 1c - Annual data provided for 1c only
2a	545555	201732	24.8	30.7	24.0	18.0	14.4	15.6	15.4	13.7	21.6	25.6	24.9	16.4	-	-	-	Triplicate Site with 2a, 2b and 2c - Annual data provided for 2c only
2b	545555	201732	19.7	33.9	22.8	17.5		13.8	17.3	14.5	20.4	26.9	25.7	21.0	-	-	-	Triplicate Site with 2a, 2b and 2c - Annual data provided for 2c only
2c	545555	201732	24.9	28.0	23.0	21.6		15.3	16.8	15.6	24.4	22.8	21.9		20.6	15.8	-	Triplicate Site with 2a, 2b and 2c - Annual data provided for 2c only
3a	544928	201281	48.5	62.6	45.4	35.5		38.3	41.0	37.3	51.1	44.0	44.6	38.7	-	-	-	Triplicate Site with 3a, 3b and 3c - Annual data provided for 3c only
3b	544928	201281	52.4	63.1	44.4	40.8	33.6	39.5	35.8	37.7	43.0	49.4	46.3	31.4	-	-	-	Triplicate Site with 3a, 3b and 3c - Annual data provided for 3c only
3c	544928	201281	55.6	64.3	48.3	38.1		35.4	38.6	38.8	50.6	35.0	36.4	36.5	43.0	33.1	-	Triplicate Site with 3a, 3b and 3c - Annual data provided for 3c only
4a	546196	202355	30.2	34.3	28.5	18.4	16.0	18.8	21.3	20.8		27.4		24.2	-	-	-	Triplicate Site with 4a, 4b and 4c - Annual data provided for 4c only
4b	546196	202355	28.4	35.2	25.4	19.0		18.0			26.0	27.3	21.5	27.7	-	-	-	Triplicate Site with 4a, 4b and 4c - Annual data provided for 4c only
4c	546196	202355	31.5	33.7	28.9	17.3		17.0	21.5		26.2		27.7	24.0	24.1	18.6	-	Triplicate Site with 4a, 4b and 4c - Annual data provided for 4c only
5a	546058	202193	26.9	37.5	31.1	27.8	26.0	30.6	23.3	23.9	33.1	28.3		24.0	-	-	-	Triplicate Site with 5a, 5b and 5c - Annual data provided for 5c only
5b	546058	202193	32.2	40.5	30.5	30.3	24.8	30.3		25.5	34.0	30.9	29.0	22.8	-	-	-	Triplicate Site with 5a, 5b and 5c - Annual data provided for 5c only
5c	546058	202193	29.8	37.9	33.2	29.9	29.3	30.0	19.3	22.7	35.1	29.7		24.5	29.0	22.3	-	Triplicate Site with 5a, 5b and 5c - Annual data provided for 5c only
6a	547838	206819	25.6	26.7	20.0	12.4		10.9	13.3	14.4	15.9	17.2	23.6	14.9	-	-	-	Triplicate Site with 6a, 6b and 6c - Annual data provided for 6c only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.77)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
6b	547838	206819	22.8	29.3	20.1	17.9	12.4	12.2	13.6	14.1	17.0	21.7	25.6	19.6	-	-	-	Triplicate Site with 6a, 6b and 6c - Annual data provided for 6c only
6c	547838	206819	17.9	30.3	20.2	14.8	14.2	13.3	12.6	13.0	18.0	17.1		20.1	18.1	13.9	-	Triplicate Site with 6a, 6b and 6c - Annual data provided for 6c only
7a	542505	196668	27.5	31.1	21.8	15.2	12.9	16.0	14.0	28.0	25.8	18.8	24.3	20.1	-	-	-	Duplicate Site with 7a and 7b - Annual data provided for 7b only
7b	542505	196668	26.8	29.9	21.4	12.1	12.4	14.9	10.6	25.1		20.7		20.8	20.8	16.1	-	Duplicate Site with 7a and 7b - Annual data provided for 7b only
8a	542664	196868	27.2	29.9	20.4	16.2		13.7	13.2	26.6	18.0	20.4	24.6	21.4	-	-	-	Duplicate Site with 8a and 8b - Annual data provided for 8b only
8b	542664	196868	28.1	29.6	20.6		15.8	12.9	13.8	27.5	18.7	20.8	24.5	19.5	20.6	15.9	-	Duplicate Site with 8a and 8b - Annual data provided for 8b only
9a	542339	196360	25.4	29.2	25.1	18.5	13.3	20.1	15.3	17.5	24.8	25.1	24.1	22.6	-	-	-	Triplicate Site with 9a, 9b and 9c - Annual data provided for 9c only
9b	542339	196360	28.1	31.8	22.4	20.0	17.2	20.8	14.5	18.2	23.5	24.0	24.5	20.2	-	-	-	Triplicate Site with 9a, 9b and 9c - Annual data provided for 9c only
9c	542339	196360	25.7	32.3	24.4	18.7	16.1	20.2	16.1	18.5	24.6	19.8	25.6	20.9	21.9	16.9	-	Triplicate Site with 9a, 9b and 9c - Annual data provided for 9c only
10a	542373	196478	32.2	36.2	26.7	19.2	14.3	16.7	20.1	20.7	23.2	27.3	28.7	25.1	-	-	-	Duplicate Site with 10a and 10b - Annual data provided for 10b only
10b	542373	196478	30.3	37.5	25.8	17.9	14.2	19.0	21.5	20.7	22.4	26.5	29.2	26.1	24.2	18.7	-	Duplicate Site with 10a and 10b - Annual data provided for 10b only
11a	543091	197316	35.5	42.1	32.8	30.6	22.7	30.3	23.3	26.6	34.6	32.4	34.2	28.1	-	-	-	Duplicate Site with 11a and 11b - Annual data provided for 11b only
11b	543091	197316	37.2	43.5	34.9	33.8	26.0	29.8	21.8	27.5	35.0	34.3	32.7		31.6	24.3	-	Duplicate Site with 11a and 11b - Annual data provided for 11b only
12a	549648	203671	18.6	23.3	13.8	8.6	5.4	8.9	12.4	17.5	14.1	15.1	19.0	17.1	-	-	-	Triplicate Site with 12a, 12b and 12c - Annual data provided for 12c only
12b	549648	203671	19.3	24.4	13.9	9.8	7.0	8.7	11.0	18.2	13.3	16.6	17.5	15.5	-	-	-	Triplicate Site with 12a, 12b and 12c - Annual data provided for 12c only
12c	549648	203671	17.0	22.7	14.0	9.8	6.7	10.0	11.9	18.5	13.2	15.1	18.7	18.2	14.6	11.2	-	Triplicate Site with 12a, 12b and 12c - Annual data provided for 12c only
13a	540919	209956	27.1	30.4	23.5	14.5	11.6	11.9	11.7	14.9	19.9	20.7	23.2	20.3	-	-	-	Triplicate Site with 13a, 13b and 13c - Annual data provided for 13c only
13b	540919	209956	27.5	31.2	23.3	17.0	11.5	14.1	11.6	14.9	22.0	21.9	24.7	19.0	-	-	-	Triplicate Site with 13a, 13b and 13c - Annual data provided for 13c only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.77)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
13c	540919	209956	20.1	32.5	21.8	15.7	13.7	14.3	12.7	13.0	20.2	19.2		19.3	19.3	14.9	-	Triplicate Site with 13a, 13b and 13c - Annual data provided for 13c only
14a	539711	208662	21.9	22.9	14.1	8.1	7.3	8.0	9.7	8.9	12.1	15.8	16.5	17.0	-	-	-	Triplicate Site with 14a, 14b and 14c - Annual data provided for 14c only
14b	539711	208662	23.1	21.9	15.2	10.2	6.0	10.3	10.0	9.0	12.6	15.1	15.8	14.8	-	-	-	Triplicate Site with 14a, 14b and 14c - Annual data provided for 14c only
14c	539711	208662	19.0	22.8	12.4	11.3	7.7	9.0	9.3	10.0	12.7	13.7	16.2		13.5	10.4	-	Triplicate Site with 14a, 14b and 14c - Annual data provided for 14c only
15a	537727	196187	36.2	39.1	28.7	22.7	16.5	19.8	19.2	20.4	27.6	24.9	31.2	21.4	-	-	-	Duplicate Site with 15a and 15b - Annual data provided for 15b only
15b	537727	196187	32.5	33.3	28.3	22.5	20.4	19.5	21.1	19.9	28.0	25.8	31.0	23.9	25.6	19.7	-	Duplicate Site with 15a and 15b - Annual data provided for 15b only
17a	541320	200020	31.7	38.9	26.0	21.4	20.9	19.6	19.5	19.5	17.3	20.1	28.6	23.7	-	-	-	Triplicate Site with 17a, 17b and 17c - Annual data provided for 17c only
17b	541320	200020	31.7	34.9	29.0	22.4	18.8	17.1	16.7	18.6	20.3	20.9	27.4	20.8	-	-	-	Triplicate Site with 17a, 17b and 17c - Annual data provided for 17c only
17c	541320	200020	32.4	39.1	24.4	21.2	20.1	20.7		19.7	19.4	22.7	24.6		23.6	18.2	-	Triplicate Site with 17a, 17b and 17c - Annual data provided for 17c only
18a	537808	200644	31.2	33.6	23.0	18.5	13.4	17.6	13.3	16.7	20.0	24.4	25.8	26.0	-	-	-	Duplicate Site with 18a and 18b - Annual data provided for 18b only
18b	537808	200644	30.1	32.6	23.9	18.8	15.5	17.3	14.4	16.0	22.4	21.7	25.5	24.1	21.9	16.9	-	Duplicate Site with 18a and 18b - Annual data provided for 18b only
19a	538386	199557	31.0	32.8	28.3	25.2	17.9	17.4	14.0	19.2	23.9	17.9	27.5	18.9	-	-	-	Duplicate Site with 19a and 19b - Annual data provided for 19b only
19b	538386	199557	32.1	38.2	27.1	24.3	16.7	18.8	16.0	21.0	21.5	16.9	25.7	16.1	22.9	17.6	-	Duplicate Site with 19a and 19b - Annual data provided for 19b only
20a	538710	199860	36.4	40.8	29.7	24.9	16.3	25.0	20.4	21.6	22.2	28.5	30.1	28.8	-	-	-	Triplicate Site with 20a, 20b and 20c - Annual data provided for 20c only
20b	538710	199860	36.0	42.5	29.8	20.0	16.8	21.8	21.9	22.4	26.4	27.6	30.6	30.1	-	-	-	Triplicate Site with 20a, 20b and 20c - Annual data provided for 20c only
20c	538710	199860	39.2	41.7	28.3	23.4	20.2	22.3	21.2	24.1	26.4	26.0	31.6	30.5	27.4	21.1	-	Triplicate Site with 20a, 20b and 20c - Annual data provided for 20c only
21a	538954	199973	34.9	38.3	26.4	17.3	13.4	16.0	21.0	20.9	24.4	27.2	32.3	28.7	-	-	-	Duplicate Site with 21a and 21b - Annual data provided for 21b only
21b	538954	199973	35.9	35.9	26.8	19.1	12.1	16.2	21.3	18.3	25.1	30.9	25.9	34.4	25.1	19.3	-	Duplicate Site with 21a and 21b - Annual data provided for 21b only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.77)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
22a	541719	193979	29.2	37.6	25.4	23.1	18.5	16.2	14.0	20.7	24.1	25.6	28.1		-	-	-	Duplicate Site with 22a and 22b - Annual data provided for 22b only
22b	541719	193979	31.0	36.8	25.6	21.6	17.5	17.5	14.7	20.7	23.4	24.1	23.8		23.6	18.2	-	Duplicate Site with 22a and 22b - Annual data provided for 22b only
23a	540902	194240	28.7	34.1	22.3	15.0	12.4	16.7	17.1	17.1	23.9	23.0	26.0	20.8	-	-	-	Triplicate Site with 23a, 23b and 23c - Annual data provided for 23c only
23b	540902	194240	27.9	31.1	21.9	18.5	10.9	15.9	17.2	15.7		24.4	19.0	22.1	-	-	-	Triplicate Site with 23a, 23b and 23c - Annual data provided for 23c only
23c	540902	194240	29.3	33.7	23.1	17.7	12.7	13.8	14.7	16.8	23.8	23.4	25.7	21.2	21.2	16.3	-	Triplicate Site with 23a, 23b and 23c - Annual data provided for 23c only
25a	541913	194020	36.9	44.3	29.9	17.8	17.4	18.8	22.2	24.1	32.2	32.7			-	-	-	Triplicate Site with 25a, 25b and 25c - Annual data provided for 25c only
25b	541913	194020	38.3	42.0	27.4	21.2	18.3	20.4	23.5	23.7	32.6	35.3	32.3	25.1	-	-	-	Triplicate Site with 25a, 25b and 25c - Annual data provided for 25c only
25c	541913	194020	39.5	37.7	30.7	21.5	14.3	18.8	21.7	24.2	31.8	33.3	24.9	33.1	27.9	21.5	-	Triplicate Site with 25a, 25b and 25c - Annual data provided for 25c only
26a	555253	202921	39.2	47.4		30.3		31.0		29.5	34.9	31.6	38.2	31.0	-	-	-	Triplicate Site with 26a, 26b and 26c - Annual data provided for 26c only
26b	555253	202921	44.2	44.1	38.6		29.1	30.2	28.9	30.8	33.5	35.3	38.7	28.5	-	-	-	Triplicate Site with 26a, 26b and 26c - Annual data provided for 26c only
26c	555253	202921	41.8	48.9		30.8	24.9	32.3	30.4	30.0	33.2	31.4	41.2	28.7	34.3	26.4	-	Triplicate Site with 26a, 26b and 26c - Annual data provided for 26c only
27a	555125	203944	21.4	28.2	22.3	21.2	16.7	18.3	15.7	19.4	25.4	26.0	20.2	20.6	-	-	-	Triplicate Site with 27a, 27b and 27c - Annual data provided for 27c only
27b	555125	203944	26.7	33.6			14.8	16.3	16.8	19.0	25.9	27.3	23.2	23.2	-	-	-	Triplicate Site with 27a, 27b and 27c - Annual data provided for 27c only
27c	555125	203944	26.3	32.1	23.4	21.0	17.4	18.2	15.3	19.1	27.5	25.3		23.8	22.1	17.1	-	Triplicate Site with 27a, 27b and 27c - Annual data provided for 27c only
31a	546196	201563	32.7	45.2	30.1	31.2	26.5	50.0	40.4	41.3	35.9	36.5	28.2	14.9	-	-	-	Triplicate Site with 31a, 31b and 31c - Annual data provided for 31c only
31b	546196	201563		42.2	31.8	33.6	27.5	55.1	42.3	39.8	31.2	33.9		19.6	-	-	-	Triplicate Site with 31a, 31b and 31c - Annual data provided for 31c only
31c	546196	201563	31.5	45.2	33.6	32.0	27.8	49.5	40.1	36.9	30.9	33.3	25.8	20.1	34.3	26.4	-	Triplicate Site with 31a, 31b and 31c - Annual data provided for 31c only
32a	544709	201139	32.0	39.8	23.8	23.7	11.1	19.7	21.2	21.0	26.9	30.2	31.4	31.0	-	-	-	Triplicate Site with 32a, 32b and 32c - Annual data provided for 32c only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.77)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
32b	544709	201139	30.5	39.1	24.6	20.2	15.9	17.7	19.6	19.7	27.1	31.5	31.6	28.5	-	-	-	Triplicate Site with 32a, 32b and 32c - Annual data provided for 32c only
32c	544709	201139	33.7	42.5	25.0	20.3	12.7	18.7	22.0	19.8	28.1	27.6	26.7	28.7	25.7	19.8	-	Triplicate Site with 32a, 32b and 32c - Annual data provided for 32c only
33a	544238	192212	34.7	40.3	28.7	22.8	16.1	20.5	22.4	23.0	26.2	27.2	26.2	20.6	-	-	- -	Triplicate Site with 33a, 33b and 33c - Annual data provided for 33c only
33b	544238	192212	31.9	41.2	27.8	23.7	14.6	20.9	23.0	22.0	24.7	27.3	32.5	23.2	-	-	-	Triplicate Site with 33a, 33b and 33c - Annual data provided for 33c only
33c	544238	192212	36.6	41.2	29.1	21.7	16.3	18.6	22.4	21.2	27.2	29.6	30.0	23.8	26.1	20.1	-	Triplicate Site with 33a, 33b and 33c - Annual data provided for 33c only
34a	544268	192247	25.9	27.2	19.7	13.5	10.3	10.9	13.2	14.5	19.9	20.3	21.9	19.4	-	-	-	Triplicate Site with 34a, 34b and 34c - Annual data provided for 34c only
34b	544268	192247	24.3	32.9	19.5	14.3	9.5	11.7	13.5	14.6	19.0	21.1	24.3	19.8	-	-	-	Triplicate Site with 34a, 34b and 34c - Annual data provided for 34c only
34c	544268	192247	24.5	32.5	18.1	15.6	11.7	12.8	14.9	14.7	18.5	19.8	24.5	17.7	18.5	14.3	-	Triplicate Site with 34a, 34b and 34c - Annual data provided for 34c only
35a	544183	192231	35.5	45.5	8.8	21.8		19.2	23.9	22.2	27.1	30.7			-	-	-	Triplicate Site with 35a, 35b and 35c - Annual data provided for 35c only
35b	544183	192231	35.9	42.2		22.1	20.2	19.1	22.0	20.3	28.7	29.6			-	-	-	Triplicate Site with 35a, 35b and 35c - Annual data provided for 35c only
35c	544183	192231	31.8	42.6				19.6	23.8	22.8	26.4				25.1	19.3	-	Triplicate Site with 35a, 35b and 35c - Annual data provided for 35c only
36a	555231	202875	34.7	41.1	29.2	23.2	23.8	27.1	25.2	22.6	24.7	31.0	32.7	24.2	-	-	-	Triplicate Site with 36a, 36b and 36c - Annual data provided for 36c only
36b	555231	202875	35.4	43.4	30.7	25.5			25.4	24.6	29.8	25.5		26.9	-	-	-	Triplicate Site with 36a, 36b and 36c - Annual data provided for 36c only
36c	555231	202875	34.2	41.9	30.7	24.5	20.2	26.2	25.5	25.8	30.4	30.8	31.8	27.6	28.8	22.2	-	Triplicate Site with 36a, 36b and 36c - Annual data provided for 36c only
37a	555253	202964	29.1	30.5	27.0	21.9	15.4	18.7	21.9	20.8	22.0	22.8	30.5	24.5	-	-	-	Triplicate Site with 37a, 37b and 37c - Annual data provided for 37c only
37b	555253	202964	31.0	35.3	24.0	17.7	14.6	18.3	17.1	22.2	24.7	25.8			-	-	-	Triplicate Site with 37a, 37b and 37c - Annual data provided for 37c only
37c	555253	202964	31.6	34.9	24.9	20.8	17.0	19.1	18.5	19.3	24.2	21.5	30.4	24.0	23.8	18.3	-	Triplicate Site with 37a, 37b and 37c - Annual data provided for 37c only
38a	555265	203108	30.2	31.3	27.6	23.1	18.8	21.0	17.6	20.7	27.2	24.5	31.7	25.3	-	-	-	Triplicate Site with 38a, 38b and 38c - Annual data provided for 38c only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.77)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
38b	555265	203108	35.6	34.0	27.8	23.2	14.6	19.2	18.3	21.4	25.7	24.2	23.8	22.4	-	-	-	Triplicate Site with 38a, 38b and 38c - Annual data provided for 38c only
38c	555265	203108	28.2	36.5	27.4	26.1	17.5	17.6	18.1	18.4	27.8	29.0	29.1	24.2	24.7	19.0	-	Triplicate Site with 38a, 38b and 38c - Annual data provided for 38c only
39a	546107	202254	28.3	36.9	30.0	23.4	20.4	26.1	21.4	23.7	33.2	28.3	28.7	20.2	-	-	-	Triplicate Site with 39a, 39b and 39c - Annual data provided for 39c only
39b	546107	202254	28.1	36.8	30.6	22.5	17.1	24.0	23.6	23.8	33.1	32.4	24.0	23.1	-	-	-	Triplicate Site with 39a, 39b and 39c - Annual data provided for 39c only
39c	546107	202254	26.8	36.9	31.2	20.2	21.7	25.2	20.5	24.4	30.6	32.6	28.8	22.0	26.7	20.5	- -	Triplicate Site with 39a, 39b and 39c - Annual data provided for 39c only
40a	545991	202095		37.7	29.6	30.8	22.0	25.8	24.4	22.7	30.2	28.8	27.4	21.8	-	-	-	Triplicate Site with 40a, 40b and 40c - Annual data provided for 40c only
40b	545991	202095	28.7	34.0	28.6		18.6	25.0	25.0	21.1	29.7	28.3	25.4	21.3	-	-	-	Triplicate Site with 40a, 40b and 40c - Annual data provided for 40c only
40c	545991	202095	24.5	36.7	22.8	25.9	15.7	27.2	22.9	21.5	31.2	27.8	20.6	25.7	26.2	20.2	-	Triplicate Site with 40a, 40b and 40c - Annual data provided for 40c only
41a	546075	202253	36.7	40.2	27.3	22.8	16.3	22.9	19.8	24.0	30.0	31.4	30.2	23.8	-	-	-	Triplicate Site with 41a, 41b and 41c - Annual data provided for 41c only
41b	546075	202253	34.3	40.6	28.8	21.3	19.4	25.0	19.5	23.8	30.5	29.1	31.8	24.5	-	-	-	Triplicate Site with 41a, 41b and 41c - Annual data provided for 41c only
41c	546075	202253	34.1	36.6	28.8	22.8	22.1	21.4	18.4	24.4	29.4	30.7	32.9	21.6	27.1	20.9	-	Triplicate Site with 41a, 41b and 41c - Annual data provided for 41c only
42a	539015	205995	27.8	33.9	22.6	16.7	13.2	19.2	21.0	21.2	26.2	25.2	28.1	24.4	-	-	-	Triplicate Site with 42a, 42b and 42c - Annual data provided for 42c only
42b	539015	205995	28.6	34.6	24.8	18.9	17.5	20.4	20.9	21.7	28.5	25.0	26.6	22.8	-	-	-	Triplicate Site with 42a, 42b and 42c - Annual data provided for 42c only
42c	539015	205995	29.4	34.2	22.6		18.3	18.5	20.5	22.1	27.9	28.4	27.3	23.5	23.9	18.4	-	Triplicate Site with 42a, 42b and 42c - Annual data provided for 42c only
43a	539084	206058	32.4	36.1	27.2	20.6	15.0	16.9	18.1	19.5	30.2	25.7	26.6	20.3	-	-	-	Triplicate Site with 43a, 43b and 43c - Annual data provided for 43c only
43b	539084	206058	28.8	34.4	27.1	20.6	19.2	18.6	16.2	20.4	29.7	27.7	29.0	22.6	-	-	-	Triplicate Site with 43a, 43b and 43c - Annual data provided for 43c only
43c	539084	206058	27.1	38.3			18.3	20.0	18.2	19.8	31.2	27.5	26.0	18.4	24.3	18.7	-	Triplicate Site with 43a, 43b and 43c - Annual data provided for 43c only
44a	543989	196472	27.5	32.9	20.4	15.3	11.7	13.4	14.8	15.3	30.0	23.8	26.9	16.1	-	-	-	Triplicate Site with 44a, 44b and 44c - Annual data provided for 44c only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.77)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
44b	543989	196472	26.3	34.2	20.1	17.1	9.5	11.4	13.6	16.6	30.5	22.7	20.7	18.2	-	-	-	Triplicate Site with 44a, 44b and 44c - Annual data provided for 44c only
44c	543989	196472	25.7	31.9	18.5	15.9	11.3	12.2	15.5	16.0	29.4	24.9	23.9	12.7	20.2	15.5	-	Triplicate Site with 44a, 44b and 44c - Annual data provided for 44c only
45a	544119	196133	28.1	36.6	23.0	20.6	14.7	16.5	13.1	16.5	26.2			15.9	-	-	-	Triplicate Site with 45a, 45b and 45c - Annual data provided for 45c only
45b	544119	196133	27.0	35.6	22.4	19.1	17.8	15.0	13.9	16.3	28.5	24.0	22.8	20.7	-	-	-	Triplicate Site with 45a, 45b and 45c - Annual data provided for 45c only
45c	544119	196133	31.7	34.8	22.6	19.4	15.8	17.2	14.2	16.3	27.9	25.1	26.0	21.5	22.1	17.0	-	Triplicate Site with 45a, 45b and 45c - Annual data provided for 45c only
46a	541301	199731	33.3	47.2	32.6	30.2	25.6	35.0	28.0	30.6	37.5		28.7	26.0	-	-	-	Triplicate Site with 46a, 46b and 46c - Annual data provided for 46c only
46b	541301	199731	38.3	48.4	32.5	28.5	22.2	32.8	25.2	28.3	39.1	32.2	34.4	26.3	-	-	-	Triplicate Site with 46a, 46b and 46c - Annual data provided for 46c only
46c	541301	199731	35.8	44.0	33.8	31.9	26.3	36.3	24.9	30.3	38.1	34.7	31.9	27.9	32.6	25.1	- -	Triplicate Site with 46a, 46b and 46c - Annual data provided for 46c only
47a	542634	195492	25.0	31.6	19.4	17.7	13.5	13.0	13.8	13.5	18.1	21.1	21.4	21.9	-	-	-	Triplicate Site with 47a, 47b and 47c - Annual data provided for 47c only
47b	542634	195492	25.3	30.7	21.5	16.2		15.1	13.3	14.0	18.6	21.2	24.9	21.3	-	-	-	Triplicate Site with 47a, 47b and 47c - Annual data provided for 47c only
47c	542634	195492	26.2	28.1	22.3	14.9		14.0	12.1	14.7	19.2	20.3	22.4		19.3	14.9	-	Triplicate Site with 47a, 47b and 47c - Annual data provided for 47c only

☒ **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 >25% in line with LAQM.TG22.**

☒ **National bias adjustment factor used.**

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

☒ **Epping Forest District Council confirm that all 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System**.

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**.

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 Epping Forest District During 2023

Epping Forest District Council has not identified any new sources relating to air quality with the reporting year of 2023.

Additional Air Quality Works Undertaken by Epping Forest District Council During 2023

Heritage Railway Air Quality Monitoring Project

In October 2022 an independent consultant (Ricardo-AEA Limited) was commissioned to undertake a real time monitoring project at 2 receptor locations in the vicinity of the stations at either end of the Epping Ongar Railway. The railway is a private business operating a Heritage Railway providing recreational trips and experience days using diesel and steam locomotives.

This project was initiated due to complaints of poor air quality from local residents and its purpose was to determine whether the operation of the railway was likely to elevate concentrations of pollutants in the local area above the Air Quality Objectives. Low-cost analysers were placed in residents' gardens where they were set up to monitor nitrogen dioxide, particulate matter and sulphur dioxide over a period of one year.

Whilst there were occasional elevated spikes in pollution, the project did not identify concentrations in excess of the Air Quality Objectives.

Further information regarding this project is provided in Appendix **F.**

QA/QC of Diffusion Tube Monitoring

Epping Forest District Council undertook its monitoring programme in adherence with the 2023 Diffusion tube monitoring calendar.

The supplier used for diffusion tubes was SOCOTEC and the method of preparation was 50% TEA in acetone. SOCOTEC provided the following information with regards to their performance:

NO2 Diffusion Tube Information 2023

SOCOTEC

Diffusion Tube Performance Summary 2023:

Tube Type:	50% TEA : 50% Acetone/ 20% TEA : 80% Water
Uncertainty:	"Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance" categorises diffusion tubes as an indicative method, and as such the uncertainty is defined as ± 25%. During in field intercomparisons, SOCOTEC's diffusion tubes perform at ±10% uncertainty.
Quality Control:	A quality control (QC) sample of known concentration is run with the samples. The data generated is then assessed using a Shewhart control chart to determine the process is under statistical control.
Analytical Repeatability:	In 2023 ~8100 QC samples were analysed, achieving a relative standard deviation of 0.98%
Confidence Intervals:	2σ ±2.18% 3σ ±3.27%
Limit of Detection:	The analytical limit of detection is 0.03µg NO_2. Over a 4-week exposure this would equate to 0.6µg/m^3, or 0.3ppb

Quality Assurance:
The manufacture and analysis of NO_2 diffusion tubes is covered by our UKAS accreditation.

The laboratory has taken part in the AIR (previously WASP) proficiency scheme since its inception. To achieve the highest ranking of "Satisfactory" a laboratory must achieve a z-score of <2. For 2023, SOCOTEC had an average z-score of 0.20

Bought in ISO Guide 34 and ISO/IEC 17025 certified standards are used to prepare calibration and QC standards.

2% of tubes are checked for blankness during manufacture, to ensure there is no contamination introduced during the manufacturing process.

The method meets the requirements laid out in DEFRA's "Diffusion Tubes for Ambient NO2 Monitoring: A Practical Guidance."

Precision and Accuracy of Diffusion Tube Data

The monthly diffusion tube results have been checked for precision and accuracy using the tool provided by Defra for this purpose. This is in line with Chapter 7 of Technical Guidance LAQM.TG22, NO_X and NO_2 Monitoring, NO_2 by diffusion tubes. Where the tool identifies that the results are poor, data has been removed from the Annual NO_2 2023 Diffusion Tube Results (ug/m3) in Table B.1.

The precision and accuracy calculations for each site are provided on the following pages:

Tube ID 1 105 Hainault Road, Chigwell (junction with Fencepiece Road)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check: Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	38.3	34.9	35.7	36.3	1.78	4.90	4.42	Good
2	30/01/2023	27/02/2023	45.2	48.4	48.3	47.3	1.82	3.85	4.52	Good
3	27/02/2023	06/04/2023	34		22.4	28.2	8.20	29.09	73.70	Poor Precision
4	06/04/2023	02/05/2023	22.8		30.4	26.6	5.37	20.20	48.28	Poor Precision
5	02/05/2023	30/05/2023	25.5	17.1		21.3	5.94	27.89	53.37	Poor Precision
6	30/05/2023	03/07/2023	27.3	28	26.6	27.3	0.70	2.56	1.74	Good
7	03/07/2023	31/07/2023	25	29	28.5	27.5	2.18	7.93	5.41	Good
8	31/07/2023	05/09/2023	21.1	28	25.1	24.7	3.46	14.01	8.61	Good
9	05/09/2023	02/10/2023	30.2	31.9	32.7	31.6	1.28	4.04	3.17	Good
10	02/10/2023	30/10/2023	35.4		30.5	33.0	3.46	10.52	31.13	Good
11	30/10/2023	04/12/2023	30.1	36.4	22.7	29.7	6.86	23.06	17.03	Poor Precision
12	04/12/2023	03/01/2024		32.8	30.7	31.8	1.48	4.68	13.34	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	105 Hainault Road, Chigwell

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 32 µgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: µgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 30 µgm^{-3}
Average Precision (CV): 13
Adjusted Tube average: µgm^{-3}

Tube ID 2 15 High Street, Epping

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm $^{-3}$	Tube 2 µgm $^{-3}$	Tube 3 µgm $^{-3}$	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	24.8	19.7	24.9	23.1	2.97	12.85	7.39	Good
2	30/01/2023	27/02/2023	30.7	33.9	28	30.9	2.95	9.57	7.34	Good
3	27/02/2023	06/04/2023	24	22.8	23	23.3	0.64	2.76	1.60	Good
4	06/04/2023	02/05/2023	18	17.5	21.6	19.0	2.24	11.75	5.56	Good
5	02/05/2023	30/05/2023	14.4	7.8	10.6	10.9	3.31	30.30	8.23	Poor Precision
6	30/05/2023	03/07/2023	15.6	13.8	15.3	14.9	0.96	6.47	2.40	Good
7	03/07/2023	31/07/2023	15.4	17.3	16.8	16.5	0.98	5.97	2.45	Good
8	31/07/2023	05/09/2023	13.7	14.5	15.6	14.6	0.95	6.53	2.37	Good
9	05/09/2023	02/10/2023	21.6	20.4	24.4	22.1	2.05	9.27	5.10	Good
10	02/10/2023	30/10/2023	25.6	26.9	22.8	25.1	2.10	8.35	5.20	Good
11	30/10/2023	04/12/2023	24.9	25.7	21.9	24.2	2.00	8.29	4.98	Good
12	04/12/2023	03/01/2024	16.4	21	14.2	17.2	3.47	20.17	8.62	Poor Precision
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	15 High Street Epping

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	21 µgm^{-3}
Average Precision (CV):	8
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	20 µgm^{-3}
Average Precision (CV):	11
Adjusted Tube average:	µgm^{-3}

Tube ID 3 Bell Vue, High Road, Bell Common, Epping

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	48.5	52.4	55.6	52.2	3.56	6.82	8.83	Good
2	30/01/2023	27/02/2023	62.6	63.1	64.3	63.3	0.87	1.38	2.17	Good
3	27/02/2023	06/04/2023	45.4	44.4	48.3	46.0	2.03	4.40	5.03	Good
4	06/04/2023	02/05/2023	35.5	40.8	38.1	38.1	2.65	6.95	6.58	Good
5	02/05/2023	30/05/2023	21.5	33.6	23.2	26.1	6.55	25.10	16.27	Poor Precision
6	30/05/2023	03/07/2023	38.3	39.5	35.4	37.7	2.11	5.59	5.24	Good
7	03/07/2023	31/07/2023	41	35.8	38.6	38.5	2.60	6.77	6.47	Good
8	31/07/2023	05/09/2023	37.3	37.7	38.8	37.9	0.78	2.05	1.93	Good
9	05/09/2023	02/10/2023	51.1	43	50.6	48.2	4.54	9.41	11.28	Good
10	02/10/2023	30/10/2023	44	49.4	35	42.8	7.27	17.00	18.07	Good
11	30/10/2023	04/12/2023	44.6	46.3	36.4	42.4	5.29	12.48	13.15	Good
12	04/12/2023	03/01/2024	38.7	31.4	36.5	35.5	3.74	10.54	9.30	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	Bell Vue, Epping

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	44 µgm^{-3}
Average Precision (CV):	8
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	42 µgm^{-3}
Average Precision (CV):	9
Adjusted Tube average:	µgm^{-3}

Tube ID 4 254 High Street, Epping (Ladbrokes)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	30.2	28.4	31.5	30.0	1.56	5.18	3.87	Good
2	30/01/2023	27/02/2023	34.3	35.2	33.7	34.4	0.75	2.19	1.88	Good
3	27/02/2023	06/04/2023	28.5	25.4	28.9	27.6	1.92	6.94	4.76	Good
4	06/04/2023	02/05/2023	18.4	19	17.3	18.2	0.86	4.73	2.14	Good
5	02/05/2023	30/05/2023	16							
6	30/05/2023	03/07/2023	18.8	18	17	17.9	0.90	5.03	2.24	Good
7	03/07/2023	31/07/2023	21.3		21.5	21.4	0.14	0.66	1.27	Good
8	31/07/2023	05/09/2023	20.8							
9	05/09/2023	02/10/2023		26	26.2	26.1	0.14	0.54	1.27	Good
10	02/10/2023	30/10/2023	27.4	27.3		27.4	0.07	0.26	0.64	Good
11	30/10/2023	04/12/2023		21.5	27.7	24.6	4.38	17.82	39.39	Good
12	04/12/2023	03/01/2024	24.2	27.7	24	25.3	2.08	8.22	5.17	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	254 High Street Epping Ladbrokes

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	25 µgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	25 µgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	µgm^{-3}

Tube ID 5 202 High Street, Epping (Superdrug)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	26.9	32.2	29.8	29.6	2.65	8.96	6.59	Good
2	30/01/2023	27/02/2023	37.5	40.5	37.9	38.6	1.63	4.22	4.05	Good
3	27/02/2023	06/04/2023	31.1	30.5	33.2	31.6	1.42	4.49	3.52	Good
4	06/04/2023	02/05/2023	27.8	30.3	29.9	29.3	1.34	4.58	3.34	Good
5	02/05/2023	30/05/2023	26	24.8	29.3	26.7	2.33	8.73	5.79	Good
6	30/05/2023	03/07/2023	30.6	30.3	30	30.3	0.30	0.99	0.75	Good
7	03/07/2023	31/07/2023	23.3		19.3	21.3	2.83	13.28	25.41	Good
8	31/07/2023	05/09/2023	23.9	25.5	22.7	24.0	1.40	5.85	3.49	Good
9	05/09/2023	02/10/2023	33.1	34	35.1	34.1	1.00	2.94	2.49	Good
10	02/10/2023	30/10/2023	28.3	30.9	29.7	29.6	1.30	4.39	3.23	Good
11	30/10/2023	04/12/2023	5.5	29	21.6	18.7	12.02	64.25	29.85	Poor Precision
12	04/12/2023	03/01/2024	24	22.8	24.5	23.8	0.87	3.68	2.17	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	202 High Street, Epping (Superdrug)

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	29 µgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	28 µgm^{-3}
Average Precision (CV):	11
Adjusted Tube average:	µgm^{-3}

Tube ID 6 1 Canes Cottages, Hastingwood

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	25.6	22.8	17.9	22.1	3.90	17.64	9.68	Good
2	30/01/2023	27/02/2023	26.7	29.3	30.3	28.8	1.86	6.46	4.62	Good
3	27/02/2023	06/04/2023	20	20.1	20.2	20.1	0.10	0.50	0.25	Good
4	06/04/2023	02/05/2023	12.4	17.9	14.8	15.0	2.76	18.34	6.85	Good
5	02/05/2023	30/05/2023	9.1	12.4	14.2	11.9	2.59	21.74	6.43	Poor Precision
6	30/05/2023	03/07/2023	10.9	12.2	13.3	12.1	1.20	9.90	2.98	Good
7	03/07/2023	31/07/2023	13.3	13.6	12.6	13.2	0.51	3.90	1.27	Good
8	31/07/2023	05/09/2023	14.4	14.1	13	13.8	0.74	5.33	1.83	Good
9	05/09/2023	02/10/2023	15.9	17	18	17.0	1.05	6.19	2.61	Good
10	02/10/2023	30/10/2023	17.2	21.7	17.1	18.7	2.63	14.08	6.53	Good
11	30/10/2023	04/12/2023	23.6	25.6	14.6	21.3	5.86	27.55	14.56	Poor Precision
12	04/12/2023	03/01/2024	14.9	19.6	20.1	18.2	2.87	15.76	7.13	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	1 Canes Cottages, Canes Lane, Hastingwood

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 18 µgm^{-3}
Average Precision (CV): 10
Adjusted Tube average: µgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 18 µgm^{-3}
Average Precision (CV): 12
Adjusted Tube average: µgm^{-3}

Tube ID 7 1 Church Hill, Loughton

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check: Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	27.5	26.8		27.2	0.49	1.82	4.45	Good
2	30/01/2023	27/02/2023	31.1	29.9		30.5	0.85	2.78	7.62	Good
3	27/02/2023	06/04/2023	21.8	21.4		21.6	0.28	1.31	2.54	Good
4	06/04/2023	02/05/2023	15.2	12.1		13.7	2.19	16.06	19.69	Good
5	02/05/2023	30/05/2023	12.9	12.4		12.7	0.35	2.79	3.18	Good
6	30/05/2023	03/07/2023	16	14.9		15.5	0.78	5.03	6.99	Good
7	03/07/2023	31/07/2023	14	10.6		12.3	2.40	19.55	21.60	Good
8	31/07/2023	05/09/2023	28	25.1		26.6	2.05	7.72	18.42	Good
9	05/09/2023	02/10/2023	25.8	17.8		21.8	5.66	25.95	50.82	Poor Precision
10	02/10/2023	30/10/2023	18.8	20.7		19.8	1.34	6.80	12.07	Good
11	30/10/2023	04/12/2023	24.3	17.6		21.0	4.74	22.61	42.57	Poor Precision
12	04/12/2023	03/01/2024	20.1	20.8		20.5	0.49	2.42	4.45	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: 1 Church Hill, Loughton

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 20 µgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: µgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 20 µgm^{-3}
Average Precision (CV): 10
Adjusted Tube average: µgm^{-3}

Tube ID 8 72 Church Hill, Loughton

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	27.2	28.1		27.7	0.64	2.30	5.72	Good
2	30/01/2023	27/02/2023	29.9	29.6		29.8	0.21	0.71	1.91	Good
3	27/02/2023	06/04/2023	20.4	20.6		20.5	0.14	0.69	1.27	Good
4	06/04/2023	02/05/2023	16.2	9.2		12.7	4.95	38.97	44.47	Poor Precision
5	02/05/2023	30/05/2023	10.6	15.8		13.2	3.68	27.86	33.04	Poor Precision
6	30/05/2023	03/07/2023	13.7	12.9		13.3	0.57	4.25	5.08	Good
7	03/07/2023	31/07/2023	13.2	13.8		13.5	0.42	3.14	3.81	Good
8	31/07/2023	05/09/2023	26.6	27.5		27.1	0.64	2.35	5.72	Good
9	05/09/2023	02/10/2023	18	18.7		18.4	0.49	2.70	4.45	Good
10	02/10/2023	30/10/2023	20.4	20.8		20.6	0.28	1.37	2.54	Good
11	30/10/2023	04/12/2023	24.6	24.5		24.6	0.07	0.29	0.64	Good
12	04/12/2023	03/01/2024	21.4	19.5		20.5	1.34	6.57	12.07	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	72 Church Hill, Loughton

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 22 μgm^{-3}
Average Precision (CV): 2
Adjusted Tube average: μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 20 μgm^{-3}
Average Precision (CV): 8
Adjusted Tube average: μgm^{-3}

Tube ID 9 249 High Road, Loughton (Timpson)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	25.4	28.1	25.7	26.4	1.48	5.61	3.68	Good
2	30/01/2023	27/02/2023	29.2	31.8	32.3	31.1	1.66	5.35	4.13	Good
3	27/02/2023	06/04/2023	25.1	22.4	24.4	24.0	1.40	5.85	3.48	Good
4	06/04/2023	02/05/2023	18.5	20	18.7	19.1	0.81	4.27	2.02	Good
5	02/05/2023	30/05/2023	13.3	17.2	16.1	15.5	2.01	12.95	5.00	Good
6	30/05/2023	03/07/2023	20.1	20.8	20.2	20.4	0.38	1.86	0.94	Good
7	03/07/2023	31/07/2023	15.3	14.5	16.1	15.3	0.80	5.23	1.99	Good
8	31/07/2023	05/09/2023	17.5	18.2	18.5	18.1	0.51	2.84	1.27	Good
9	05/09/2023	02/10/2023	24.8	23.5	24.6	24.3	0.70	2.88	1.74	Good
10	02/10/2023	30/10/2023	25.1	24	19.8	23.0	2.80	12.18	6.95	Good
11	30/10/2023	04/12/2023	24.1	24.5	25.6	24.7	0.78	3.14	1.93	Good
12	04/12/2023	03/01/2024	22.6	20.2	20.9	21.2	1.23	5.81	3.07	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	249 High Road, Loughton (Timpson)

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 22 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: µgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 22 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: µgm^{-3}

Tube ID 10 252 High Road, Loughton (Love Brownies)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	32.2	30.3		31.3	1.34	4.30	12.07	Good
2	30/01/2023	27/02/2023	36.2	37.5		36.9	0.92	2.49	8.26	Good
3	27/02/2023	06/04/2023	26.7	25.8		26.3	0.64	2.42	5.72	Good
4	06/04/2023	02/05/2023	19.2	17.9		18.6	0.92	4.96	8.26	Good
5	02/05/2023	30/05/2023	14.3	14.2		14.3	0.07	0.50	0.64	Good
6	30/05/2023	03/07/2023	16.7	19		17.9	1.63	9.11	14.61	Good
7	03/07/2023	31/07/2023	20.1	21.5		20.8	0.99	4.76	8.89	Good
8	31/07/2023	05/09/2023	20.7	20.7		20.7	0.00	0.00	0.00	Good
9	05/09/2023	02/10/2023	23.2	22.4		22.8	0.57	2.48	5.08	Good
10	02/10/2023	30/10/2023	27.3	26.5		26.9	0.57	2.10	5.08	Good
11	30/10/2023	04/12/2023	28.7	29.2		29.0	0.35	1.22	3.18	Good
12	04/12/2023	03/01/2024	25.1	26.1		25.6	0.71	2.76	6.35	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	252 High Road, Loughton (Love Brownies)

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 24 µgm^{-3}
Average Precision (CV): 3
Adjusted Tube average: µgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 24 µgm^{-3}
Average Precision (CV): 3
Adjusted Tube average: µgm^{-3}

Tube ID 11 5 Goldings Hill, Loughton

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	35.5	37.2		36.4	1.20	3.31	10.80	Good
2	30/01/2023	27/02/2023	42.1	43.5		42.8	0.99	2.31	8.89	Good
3	27/02/2023	06/04/2023	32.8	34.9		33.9	1.48	4.39	13.34	Good
4	06/04/2023	02/05/2023	30.6	33.8		32.2	2.26	7.03	20.33	Good
5	02/05/2023	30/05/2023	22.7	26		24.4	2.33	9.58	20.97	Good
6	30/05/2023	03/07/2023	30.3	29.8		30.1	0.35	1.18	3.18	Good
7	03/07/2023	31/07/2023	23.3	21.8		22.6	1.06	4.70	9.53	Good
8	31/07/2023	05/09/2023	26.6	27.5		27.1	0.64	2.35	5.72	Good
9	05/09/2023	02/10/2023	34.6	35		34.8	0.28	0.81	2.54	Good
10	02/10/2023	30/10/2023	32.4	34.3		33.4	1.34	4.03	12.07	Good
11	30/10/2023	04/12/2023	34.2	32.7		33.5	1.06	3.17	9.53	Good
12	04/12/2023	03/01/2024	28.1	16.1		22.1	8.49	38.39	76.24	Poor Precision
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	5 Goldings Hill, Loughton

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	32 μgm^{-3}
Average Precision (CV):	4
Adjusted Tube average:	μgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	31 μgm^{-3}
Average Precision (CV):	7
Adjusted Tube average:	μgm^{-3}

Tube ID 12 66 Tempest Mead, North Weald

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	18.6	19.3	17	18.3	1.18	6.44	2.93	Good
2	30/01/2023	27/02/2023	23.3	24.4	22.7	23.5	0.86	3.67	2.14	Good
3	27/02/2023	06/04/2023	13.8	13.9	14	13.9	0.10	0.72	0.25	Good
4	06/04/2023	02/05/2023	8.6	9.8	9.8	9.4	0.69	7.37	1.72	Good
5	02/05/2023	30/05/2023	5.4	7	6.7	6.4	0.85	13.36	2.11	Good
6	30/05/2023	03/07/2023	8.9	8.7	10	9.2	0.70	7.61	1.74	Good
7	03/07/2023	31/07/2023	12.4	11	11.9	11.8	0.71	6.03	1.76	Good
8	31/07/2023	05/09/2023	17.5	18.2	18.5	18.1	0.51	2.84	1.27	Good
9	05/09/2023	02/10/2023	14.1	13.3	13.2	13.5	0.49	3.64	1.23	Good
10	02/10/2023	30/10/2023	15.1	16.6	15.1	15.6	0.87	5.55	2.15	Good
11	30/10/2023	04/12/2023	19	17.5	18.7	18.4	0.79	4.31	1.97	Good
12	04/12/2023	03/01/2024	17.1	15.5	18.2	16.9	1.36	8.02	3.37	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	66 Tempest Mead, North Weald

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 15 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 15 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: μgm^{-3}

Tube ID 13 20 High Street, Roydon

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	27.1	27.5	20.1	24.9	4.16	16.71	10.34	Good
2	30/01/2023	27/02/2023	30.4	31.2	32.5	31.4	1.06	3.38	2.63	Good
3	27/02/2023	06/04/2023	23.5	23.3	21.8	22.9	0.93	4.06	2.31	Good
4	06/04/2023	02/05/2023	14.5	17	15.7	15.7	1.25	7.95	3.11	Good
5	02/05/2023	30/05/2023	11.6	11.5	13.7	12.3	1.24	10.13	3.09	Good
6	30/05/2023	03/07/2023	11.9	14.1	14.3	13.4	1.33	9.91	3.31	Good
7	03/07/2023	31/07/2023	11.7	11.6	12.7	12.0	0.61	5.07	1.51	Good
8	31/07/2023	05/09/2023	14.9	14.9	13	14.3	1.10	7.69	2.73	Good
9	05/09/2023	02/10/2023	19.9	22	20.2	20.7	1.14	5.49	2.82	Good
10	02/10/2023	30/10/2023	20.7	21.9	19.2	20.6	1.35	6.57	3.36	Good
11	30/10/2023	04/12/2023	23.2	24.7	12.2	20.0	6.83	34.07	16.95	Poor Precision
12	04/12/2023	03/01/2024	20.3	19	19.3	19.5	0.68	3.48	1.69	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	20 High Street, Roydon

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	19 µgm^{-3}
Average Precision (CV):	7
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	19 µgm^{-3}
Average Precision (CV):	10
Adjusted Tube average:	µgm^{-3}

Tube ID 14 Burles Farm, Netherhall Road, Roydon

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	21.9	23.1	19	21.3	2.11	9.88	5.24	Good
2	30/01/2023	27/02/2023	22.9	21.9	22.8	22.5	0.55	2.44	1.37	Good
3	27/02/2023	06/04/2023	14.1	15.2	12.4	13.9	1.41	10.15	3.50	Good
4	06/04/2023	02/05/2023	8.1	10.2	11.3	9.9	1.63	16.48	4.04	Good
5	02/05/2023	30/05/2023	7.3	6	7.7	7.0	0.89	12.70	2.21	Good
6	30/05/2023	03/07/2023	8	10.3	9	9.1	1.15	12.67	2.86	Good
7	03/07/2023	31/07/2023	9.7	10	9.3	9.7	0.35	3.63	0.87	Good
8	31/07/2023	05/09/2023	8.9	9	10	9.3	0.61	6.54	1.51	Good
9	05/09/2023	02/10/2023	12.1	12.6	12.7	12.5	0.32	2.58	0.80	Good
10	02/10/2023	30/10/2023	15.8	15.1	13.7	14.9	1.07	7.19	2.66	Good
11	30/10/2023	04/12/2023	16.5	15.8	16.2	16.2	0.35	2.17	0.87	Good
12	04/12/2023	03/01/2024	17	14.8	10.7	14.2	3.20	22.57	7.94	Poor Precision
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	Burles Farm, Netherhall Road, Roydon

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 13 μgm^{-3}
Average Precision (CV): 8
Adjusted Tube average: μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 13 μgm^{-3}
Average Precision (CV): 9
Adjusted Tube average: μgm^{-3}

Tube ID 15 Albion Terrace, Sewardstone Road, Sewardstone

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	36.2	32.5		34.4	2.62	7.62	23.51	Good
2	30/01/2023	27/02/2023	39.1	33.3		36.2	4.10	11.33	36.85	Good
3	27/02/2023	06/04/2023	28.7	28.3		28.5	0.28	0.99	2.54	Good
4	06/04/2023	02/05/2023	22.7	22.5		22.6	0.14	0.63	1.27	Good
5	02/05/2023	30/05/2023	16.5	20.4		18.5	2.76	14.95	24.78	Good
6	30/05/2023	03/07/2023	19.8	19.5		19.7	0.21	1.08	1.91	Good
7	03/07/2023	31/07/2023	19.2	21.1		20.2	1.34	6.67	12.07	Good
8	31/07/2023	05/09/2023	20.4	19.9		20.2	0.35	1.75	3.18	Good
9	05/09/2023	02/10/2023	27.6	28		27.8	0.28	1.02	2.54	Good
10	02/10/2023	30/10/2023	24.9	25.8		25.4	0.64	2.51	5.72	Good
11	30/10/2023	04/12/2023	31.2	31		31.1	0.14	0.45	1.27	Good
12	04/12/2023	03/01/2024	21.4	23.9		22.7	1.77	7.80	15.88	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	Albion Terrace, Sewardstone

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	26 μgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	μgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	26 μgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	μgm^{-3}

Tube ID 17 14 The Elms, Waltham Abbey

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	31.7	31.7	32.4	31.9	0.40	1.27	1.00	Good
2	30/01/2023	27/02/2023	38.9	34.9	39.1	37.6	2.37	6.30	5.89	Good
3	27/02/2023	06/04/2023	26	29	24.4	26.5	2.34	8.82	5.80	Good
4	06/04/2023	02/05/2023	21.4	22.4	21.2	21.7	0.64	2.97	1.60	Good
5	02/05/2023	30/05/2023	20.9	18.8	20.1	19.9	1.06	5.32	2.63	Good
6	30/05/2023	03/07/2023	19.6	17.1	20.7	19.1	1.84	9.64	4.58	Good
7	03/07/2023	31/07/2023	19.5	16.7	2.6	12.9	9.06	70.03	22.50	Poor Precision
8	31/07/2023	05/09/2023	19.5	18.6	19.7	19.3	0.59	3.04	1.46	Good
9	05/09/2023	02/10/2023	17.3	20.3	19.4	19.0	1.54	8.10	3.82	Good
10	02/10/2023	30/10/2023	20.1	20.9	22.7	21.2	1.33	6.27	3.31	Good
11	30/10/2023	04/12/2023	28.6	27.4	24.6	26.9	2.05	7.64	5.10	Good
12	04/12/2023	03/01/2024	23.7	20.8	10.1	18.2	7.16	39.36	17.79	Poor Precision
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	14 The Elms, Waltham Abbey

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 24 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 23 μgm^{-3}
Average Precision (CV): 14
Adjusted Tube average: μgm^{-3}

Tube ID 18 4 Leaview, Waltham Abbey (Abbeyview)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	31.2	30.1		30.7	0.78	2.54	6.99	Good
2	30/01/2023	27/02/2023	33.6	32.6		33.1	0.71	2.14	6.35	Good
3	27/02/2023	06/04/2023	23	23.9		23.5	0.64	2.71	5.72	Good
4	06/04/2023	02/05/2023	18.5	18.8		18.7	0.21	1.14	1.91	Good
5	02/05/2023	30/05/2023	13.4	15.5		14.5	1.48	10.28	13.34	Good
6	30/05/2023	03/07/2023	17.6	17.3		17.5	0.21	1.22	1.91	Good
7	03/07/2023	31/07/2023	13.3	14.4		13.9	0.78	5.62	6.99	Good
8	31/07/2023	05/09/2023	16.7	16		16.4	0.49	3.03	4.45	Good
9	05/09/2023	02/10/2023	20	22.4		21.2	1.70	8.00	15.25	Good
10	02/10/2023	30/10/2023	24.4	21.7		23.1	1.91	8.28	17.15	Good
11	30/10/2023	04/12/2023	25.8	25.5		25.7	0.21	0.83	1.91	Good
12	04/12/2023	03/01/2024	26	24.1		25.1	1.34	5.36	12.07	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	4 Leaview, Waltham Abbey

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	22 µgm^{-3}
Average Precision (CV):	4
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	22 µgm^{-3}
Average Precision (CV):	4
Adjusted Tube average:	µgm^{-3}

Tube ID 19 34 Hayden Road, Waltham Abbey

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	31	32.1		31.6	0.78	2.47	6.99	Good
2	30/01/2023	27/02/2023	32.8	38.2		35.5	3.82	10.76	34.31	Good
3	27/02/2023	06/04/2023	28.3	27.1		27.7	0.85	3.06	7.62	Good
4	06/04/2023	02/05/2023	25.2	24.3		24.8	0.64	2.57	5.72	Good
5	02/05/2023	30/05/2023	17.9	16.7		17.3	0.85	4.90	7.62	Good
6	30/05/2023	03/07/2023	17.4	18.8		18.1	0.99	5.47	8.89	Good
7	03/07/2023	31/07/2023	14	16		15.0	1.41	9.43	12.71	Good
8	31/07/2023	05/09/2023	19.2	21		20.1	1.27	6.33	11.44	Good
9	05/09/2023	02/10/2023	23.9	21.5		22.7	1.70	7.48	15.25	Good
10	02/10/2023	30/10/2023	17.9	16.9		17.4	0.71	4.06	6.35	Good
11	30/10/2023	04/12/2023	27.5	25.7		26.6	1.27	4.78	11.44	Good
12	04/12/2023	03/01/2024	18.9	16.1		17.5	1.98	11.31	17.79	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	34 Hayden Road, Waltham Abbey

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	23 µgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	23 µgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	µgm^{-3}

Tube ID 20 2 Lodge Lane, Waltham Abbey

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	36.4	36	39.2	37.2	1.74	4.69	4.33	Good
2	30/01/2023	27/02/2023	40.8	42.5	41.7	41.7	0.85	2.04	2.11	Good
3	27/02/2023	06/04/2023	29.7	29.8	28.3	29.3	0.84	2.87	2.08	Good
4	06/04/2023	02/05/2023	24.9	20	23.4	22.8	2.51	11.03	6.24	Good
5	02/05/2023	30/05/2023	16.3	16.8	20.2	17.8	2.12	11.94	5.27	Good
6	30/05/2023	03/07/2023	25	21.8	22.3	23.0	1.72	7.47	4.28	Good
7	03/07/2023	31/07/2023	20.4	21.9	21.2	21.2	0.75	3.55	1.86	Good
8	31/07/2023	05/09/2023	21.6	22.4	24.1	22.7	1.28	5.62	3.17	Good
9	05/09/2023	02/10/2023	22.2	26.4	26.4	25.0	2.42	9.70	6.02	Good
10	02/10/2023	30/10/2023	28.5	27.6	26	27.4	1.27	4.63	3.15	Good
11	30/10/2023	04/12/2023	30.1	30.6	31.6	30.8	0.76	2.48	1.90	Good
12	04/12/2023	03/01/2024	28.8	30.1	30.5	29.8	0.89	2.98	2.21	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	2 Lodge Lane, Waltham Abbey

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 27 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 27 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: μgm^{-3}

Tube ID 21 110 Roundhills, Waltham Abbey

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	34.9	35.9		35.4	0.71	2.00	6.35	Good
2	30/01/2023	27/02/2023	38.3	35.9		37.1	1.70	4.57	15.25	Good
3	27/02/2023	06/04/2023	26.4	26.8		26.6	0.28	1.06	2.54	Good
4	06/04/2023	02/05/2023	17.3	19.1		18.2	1.27	6.99	11.44	Good
5	02/05/2023	30/05/2023	13.4	12.1		12.8	0.92	7.21	8.26	Good
6	30/05/2023	03/07/2023	16	16.2		16.1	0.14	0.88	1.27	Good
7	03/07/2023	31/07/2023	21	21.3		21.2	0.21	1.00	1.91	Good
8	31/07/2023	05/09/2023	20.9	18.3		19.6	1.84	9.38	16.52	Good
9	05/09/2023	02/10/2023	24.4	25.1		24.8	0.49	2.00	4.45	Good
10	02/10/2023	30/10/2023	27.2	30.9		29.1	2.62	9.01	23.51	Good
11	30/10/2023	04/12/2023	32.3	25.9		29.1	4.53	15.55	40.66	Good
12	04/12/2023	03/01/2024	28.7	34.4		31.6	4.03	12.77	36.21	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	110 Roundhills, Waltham Abbey

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	25 µgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	25 µgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	µgm^{-3}

Tube ID 22 26 Victoria Road, Buckhurst Hill (opposite Underground Station)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2023	30/01/2023	29.2	31		30.1	1.27	4.23	11.44
2	30/01/2023	27/02/2023	37.6	36.8		37.2	0.57	1.52	5.08
3	27/02/2023	06/04/2023	25.4	25.6		25.5	0.14	0.55	1.27
4	06/04/2023	02/05/2023	23.1	21.6		22.4	1.06	4.75	9.53
5	02/05/2023	30/05/2023	18.5	17.5		18.0	0.71	3.93	6.35
6	30/05/2023	03/07/2023	16.2	17.5		16.9	0.92	5.46	8.26
7	03/07/2023	31/07/2023	14	14.7		14.4	0.49	3.45	4.45
8	31/07/2023	05/09/2023	20.7	20.7		20.7	0.00	0.00	0.00
9	05/09/2023	02/10/2023	24.1	23.4		23.8	0.49	2.08	4.45
10	02/10/2023	30/10/2023	25.6	24.1		24.9	1.06	4.27	9.53
11	30/10/2023	04/12/2023	28.1	23.8		26.0	3.04	11.72	27.32
12	04/12/2023	03/01/2024	43	11.6		27.3	22.20	81.33	199.49
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Poor Precision

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: 26 Victoria Road, Buckhurst Hill (opp. underground staion)

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 24 µgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: µgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 24 µgm^{-3}
Average Precision (CV): 10
Adjusted Tube average: µgm^{-3}

Tube ID 23 St Johns School, High Road, Buckhurst Hill

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	28.7	27.9	29.3	28.6	0.70	2.45	1.74	Good
2	30/01/2023	27/02/2023	34.1	31.1	33.7	33.0	1.63	4.94	4.05	Good
3	27/02/2023	06/04/2023	22.3	21.9	23.1	22.4	0.61	2.72	1.52	Good
4	06/04/2023	02/05/2023	15	18.5	17.7	17.1	1.83	10.75	4.56	Good
5	02/05/2023	30/05/2023	12.4	10.9	12.7	12.0	0.96	8.04	2.40	Good
6	30/05/2023	03/07/2023	16.7	15.9	13.8	15.5	1.50	9.68	3.72	Good
7	03/07/2023	31/07/2023	17.1	17.2	14.7	16.3	1.42	8.67	3.52	Good
8	31/07/2023	05/09/2023	17.1	15.7	16.8	16.5	0.74	4.46	1.83	Good
9	05/09/2023	02/10/2023	23.9	2.5	23.8	16.7	12.33	73.66	30.62	Poor Precision
10	02/10/2023	30/10/2023	23	24.4	23.4	23.6	0.72	3.06	1.79	Good
11	30/10/2023	04/12/2023	26	19	25.7	23.6	3.96	16.79	9.83	Good
12	04/12/2023	03/01/2024	20.8	22.1	21.2	21.4	0.67	3.12	1.65	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	St Johns School, High Road, Buckhurst Hill

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 21 µgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: µgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 21 µgm^{-3}
Average Precision (CV): 12
Adjusted Tube average: µgm^{-3}

Tube ID 25 Regency Lodge, Roding Lane, Buckhurst Hill

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2023	30/01/2023	36.9	38.3	39.5	38.2	1.30	3.40	3.23
2	30/01/2023	27/02/2023	44.3	42	37.7	41.3	3.35	8.11	8.32
3	27/02/2023	06/04/2023	29.9	27.4	30.7	29.3	1.72	5.87	4.28
4	06/04/2023	02/05/2023	17.8	21.2	21.5	20.2	2.06	10.19	5.11
5	02/05/2023	30/05/2023	17.4	18.3	14.3	16.7	2.10	12.59	5.21
6	30/05/2023	03/07/2023	18.8	20.4	18.8	19.3	0.92	4.78	2.29
7	03/07/2023	31/07/2023	22.2	23.5	21.7	22.5	0.93	4.14	2.31
8	31/07/2023	05/09/2023	24.1	23.7	24.2	24.0	0.26	1.10	0.66
9	05/09/2023	02/10/2023	32.2	32.6	31.8	32.2	0.40	1.24	0.99
10	02/10/2023	30/10/2023	32.7	35.3	33.3	33.8	1.36	4.03	3.38
11	30/10/2023	04/12/2023		32.3	24.9	28.6	5.23	18.30	47.01
12	04/12/2023	03/01/2024		25.1	33.1	29.1	5.66	19.44	50.82
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	Regency Lodge, Roding Lane, Buckhurst Hill

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 28 µgm^{-3}
Average Precision (CV): 8
Adjusted Tube average: µgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 28 µgm^{-3}
Average Precision (CV): 8
Adjusted Tube average: µgm^{-3}

Tube ID 26 131 High Street, Ongar (at bottleneck)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	39.2	44.2	41.8	41.7	2.50	5.99	6.21	Good
2	30/01/2023	27/02/2023	47.4	44.1	48.9	46.8	2.46	5.25	6.10	Good
3	27/02/2023	06/04/2023		38.6						
4	06/04/2023	02/05/2023	30.3		30.8	30.6	0.35	1.16	3.18	Good
5	02/05/2023	30/05/2023		29.1	24.9	27.0	2.97	11.00	26.68	Good
6	30/05/2023	03/07/2023	31	30.2	32.3	31.2	1.06	3.40	2.63	Good
7	03/07/2023	31/07/2023		28.9	30.4	29.7	1.06	3.58	9.53	Good
8	31/07/2023	05/09/2023	29.5	30.8	30	30.1	0.66	2.18	1.63	Good
9	05/09/2023	02/10/2023	34.9	33.5	33.2	33.9	0.91	2.68	2.25	Good
10	02/10/2023	30/10/2023	31.6	35.3	31.4	32.8	2.20	6.70	5.46	Good
11	30/10/2023	04/12/2023	38.2	38.7	41.2	39.4	1.61	4.08	3.99	Good
12	04/12/2023	03/01/2024	31	28.5	28.7	29.4	1.39	4.73	3.45	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	131 High Street Ongar (at bottleneck)

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	34 µgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	34 µgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	µgm^{-3}

Tube ID 27 3 Queens Terrace, A414, Ongar

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	21.4	26.7	26.3	24.8	2.95	11.90	7.33	Good
2	30/01/2023	27/02/2023	28.2	33.6	32.1	31.3	2.79	8.91	6.92	Good
3	27/02/2023	06/04/2023	22.3		23.4	22.9	0.78	3.40	6.99	Good
4	06/04/2023	02/05/2023	21.2	11.2	21	17.8	5.72	32.12	14.20	Poor Precision
5	02/05/2023	30/05/2023	16.7	14.8	17.4	16.3	1.35	8.25	3.34	Good
6	30/05/2023	03/07/2023	18.3	16.3	18.2	17.6	1.13	6.40	2.80	Good
7	03/07/2023	31/07/2023	15.7	16.8	15.3	15.9	0.78	4.87	1.93	Good
8	31/07/2023	05/09/2023	19.4	19	19.1	19.2	0.21	1.09	0.52	Good
9	05/09/2023	02/10/2023	25.4	25.9	27.5	26.3	1.10	4.18	2.73	Good
10	02/10/2023	30/10/2023	26	27.3	25.3	26.2	1.01	3.87	2.52	Good
11	30/10/2023	04/12/2023	20.2	23.2	11	18.1	6.36	35.06	15.79	Poor Precision
12	04/12/2023	03/01/2024	20.6	23.2	23.8	22.5	1.70	7.55	4.23	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	3 Queens Terrace, Epping Road, Ongar

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	22 µgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	22 µgm^{-3}
Average Precision (CV):	11
Adjusted Tube average:	µgm^{-3}

Tube ID 31 Station House, Station Approach, Epping (Epping Underground Station)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	32.7		31.5	32.1	0.85	2.64	7.62	Good
2	30/01/2023	27/02/2023	45.2	42.2	45.2	44.2	1.73	3.92	4.30	Good
3	27/02/2023	06/04/2023	30.1	31.8	33.6	31.8	1.75	5.50	4.35	Good
4	06/04/2023	02/05/2023	31.2	33.6	32	32.3	1.22	3.79	3.04	Good
5	02/05/2023	30/05/2023	26.5	27.5	27.8	27.3	0.68	2.50	1.69	Good
6	30/05/2023	03/07/2023	50	55.1	49.5	51.5	3.10	6.01	7.70	Good
7	03/07/2023	31/07/2023	40.4	42.3	40.1	40.9	1.19	2.91	2.96	Good
8	31/07/2023	05/09/2023	41.3	39.8	36.9	39.3	2.24	5.69	5.56	Good
9	05/09/2023	02/10/2023	35.9	31.2	30.9	32.7	2.80	8.58	6.97	Good
10	02/10/2023	30/10/2023	36.5	33.9	33.3	34.6	1.70	4.92	4.23	Good
11	30/10/2023	04/12/2023	28.2	4.5	25.8	19.5	13.05	66.90	32.41	Poor Precision
12	04/12/2023	03/01/2024	14.9	19.6	20.1	18.2	2.87	15.76	7.13	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	Station House, Station Approach, Epping

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	35 µgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	34 µgm^{-3}
Average Precision (CV):	11
Adjusted Tube average:	µgm^{-3}

Tube ID 32 Copped Hall, High Road, Bell Common, Epping

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	32	30.5	33.7	32.1	1.60	4.99	3.98	Good
2	30/01/2023	27/02/2023	39.8	39.1	42.5	40.5	1.80	4.44	4.46	Good
3	27/02/2023	06/04/2023	23.8	24.6	25	24.5	0.61	2.50	1.52	Good
4	06/04/2023	02/05/2023	23.7	20.2	20.3	21.4	1.99	9.31	4.95	Good
5	02/05/2023	30/05/2023	11.1	15.9	12.7	13.2	2.44	18.47	6.07	Good
6	30/05/2023	03/07/2023	19.7	17.7	18.7	18.7	1.00	5.35	2.48	Good
7	03/07/2023	31/07/2023	21.2	19.6	22	20.9	1.22	5.84	3.04	Good
8	31/07/2023	05/09/2023	21	19.7	19.8	20.2	0.72	3.59	1.80	Good
9	05/09/2023	02/10/2023	26.9	27.1	28.1	27.4	0.64	2.35	1.60	Good
10	02/10/2023	30/10/2023	30.2	31.5	27.6	29.8	1.99	6.67	4.93	Good
11	30/10/2023	04/12/2023	31.4	31.6	26.7	29.9	2.77	9.27	6.89	Good
12	04/12/2023	03/01/2024	31	28.5	28.7	29.4	1.39	4.73	3.45	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	Copped Hall, Bell Common, Epping

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 26 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 26 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: μgm^{-3}

Tube ID 33 281 Fencepiece Road, Chigwell

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	34.7	31.9	36.6	34.4	2.36	6.87	5.87	Good
2	30/01/2023	27/02/2023	40.3	41.2	41.2	40.9	0.52	1.27	1.29	Good
3	27/02/2023	06/04/2023	28.7	27.8	29.1	28.5	0.67	2.33	1.65	Good
4	06/04/2023	02/05/2023	22.8	23.7	21.7	22.7	1.00	4.41	2.49	Good
5	02/05/2023	30/05/2023	16.1	14.6	16.3	15.7	0.93	5.93	2.31	Good
6	30/05/2023	03/07/2023	20.5	20.9	18.6	20.0	1.23	6.14	3.05	Good
7	03/07/2023	31/07/2023	22.4	23	22.4	22.6	0.35	1.53	0.86	Good
8	31/07/2023	05/09/2023	23	22	21.2	22.1	0.90	4.09	2.24	Good
9	05/09/2023	02/10/2023	26.2	24.7	27.2	26.0	1.26	4.83	3.13	Good
10	02/10/2023	30/10/2023	27.2	27.3	29.6	28.0	1.36	4.84	3.37	Good
11	30/10/2023	04/12/2023	26.2	32.5	30	29.6	3.17	10.73	7.88	Good
12	04/12/2023	03/01/2024	20.6	23.2	23.8	22.5	1.70	7.55	4.23	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	281 Fencepiece Road, Chigwell

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	26 μgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	μgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	26 μgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	μgm^{-3}

Tube ID 34 414 Fencepiece Road, Chigwell (Sherrell House)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	25.9	24.3	24.5	24.9	0.87	3.50	2.17	Good
2	30/01/2023	27/02/2023	27.2	32.9	32.5	30.9	3.18	10.31	7.90	Good
3	27/02/2023	06/04/2023	19.7	19.5	18.1	19.1	0.87	4.56	2.17	Good
4	06/04/2023	02/05/2023	13.5	14.3	15.6	14.5	1.06	7.33	2.63	Good
5	02/05/2023	30/05/2023	10.3	9.5	11.7	10.5	1.11	10.61	2.77	Good
6	30/05/2023	03/07/2023	10.9	11.7	12.8	11.8	0.95	8.08	2.37	Good
7	03/07/2023	31/07/2023	13.2	13.5	14.9	13.9	0.91	6.54	2.25	Good
8	31/07/2023	05/09/2023	14.5	14.6	14.7	14.6	0.10	0.68	0.25	Good
9	05/09/2023	02/10/2023	19.9	19	18.5	19.1	0.71	3.71	1.76	Good
10	02/10/2023	30/10/2023	20.3	21.1	19.8	20.4	0.66	3.21	1.63	Good
11	30/10/2023	04/12/2023	21.9	24.3	24.5	23.6	1.45	6.14	3.59	Good
12	04/12/2023	03/01/2024	19.4	19.8	17.7	19.0	1.12	5.88	2.77	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	414 Fencepiece Road, Chigwell

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	19 μgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	μgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	19 μgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	μgm^{-3}

Tube ID 35 120 Manor Road, Chigwell

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	35.5	35.9	31.8	34.4	2.26	6.57	5.62	Good
2	30/01/2023	27/02/2023	45.5	42.2	42.6	43.4	1.80	4.15	4.47	Good
3	27/02/2023	06/04/2023	8.8							
4	06/04/2023	02/05/2023	21.8	22.1		22.0	0.21	0.97	1.91	Good
5	02/05/2023	30/05/2023	15.2	20.2	13	16.1	3.69	22.87	9.17	Poor Precision
6	30/05/2023	03/07/2023	19.2	19.1	19.6	19.3	0.26	1.37	0.66	Good
7	03/07/2023	31/07/2023	23.9	22	23.8	23.2	1.07	4.60	2.66	Good
8	31/07/2023	05/09/2023	22.2	20.3	22.8	21.8	1.31	6.00	3.24	Good
9	05/09/2023	02/10/2023	27.1	28.7	26.4	27.4	1.18	4.30	2.93	Good
10	02/10/2023	30/10/2023	30.7	29.6		30.2	0.78	2.58	6.99	Good
11	30/10/2023	04/12/2023								
12	04/12/2023	03/01/2024								
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	120 Manor Road, Chigwell

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 28 μgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 26 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: μgm^{-3}

Tube ID 36 107 High Street, Ongar (Anchor)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	34.7	35.4	34.2	34.8	0.60	1.73	1.50	Good
2	30/01/2023	27/02/2023	41.1	43.4	41.9	42.1	1.17	2.77	2.90	Good
3	27/02/2023	06/04/2023	29.2	30.7	30.7	30.2	0.87	2.87	2.15	Good
4	06/04/2023	02/05/2023	23.2	25.5	24.5	24.4	1.15	4.73	2.86	Good
5	02/05/2023	30/05/2023	23.8		20.2	22.0	2.55	11.57	22.87	Good
6	30/05/2023	03/07/2023	27.1		26.2	26.7	0.64	2.39	5.72	Good
7	03/07/2023	31/07/2023	25.2	25.4	25.5	25.4	0.15	0.60	0.38	Good
8	31/07/2023	05/09/2023	22.6	24.6	25.8	24.3	1.62	6.64	4.02	Good
9	05/09/2023	02/10/2023	24.7	29.8	30.4	28.3	3.13	11.07	7.78	Good
10	02/10/2023	30/10/2023	31	25.5	30.8	29.1	3.12	10.72	7.75	Good
11	30/10/2023	04/12/2023	32.7	1.5	31.8	22.0	17.76	80.72	44.12	Poor Precision
12	04/12/2023	03/01/2024	24.2	26.9	27.6	26.2	1.80	6.84	4.46	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	107 High Street, Ongar (Anchor)

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 28 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: µgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 28 µgm^{-3}
Average Precision (CV): 12
Adjusted Tube average: µgm^{-3}

Tube ID 37 149 High Street, Ongar (Queen Bee)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	29.1	31	31.6	30.6	1.31	4.27	3.24	Good
2	30/01/2023	27/02/2023	30.5	35.3	34.9	33.6	2.66	7.93	6.62	Good
3	27/02/2023	06/04/2023	27	24	24.9	25.3	1.54	6.08	3.82	Good
4	06/04/2023	02/05/2023	21.9	17.7	20.8	20.1	2.18	10.82	5.41	Good
5	02/05/2023	30/05/2023	15.4	14.6	17	15.7	1.22	7.80	3.04	Good
6	30/05/2023	03/07/2023	18.7	18.3	19.1	18.7	0.40	2.14	0.99	Good
7	03/07/2023	31/07/2023	21.9	17.1	18.5	19.2	2.47	12.88	6.13	Good
8	31/07/2023	05/09/2023	20.8	22.2	19.3	20.8	1.45	6.98	3.60	Good
9	05/09/2023	02/10/2023	22	24.7	24.2	23.6	1.44	6.08	3.57	Good
10	02/10/2023	30/10/2023	22.8	25.8	21.5	23.4	2.21	9.44	5.48	Good
11	30/10/2023	04/12/2023	30.5	16.9	30.4	25.9	7.82	30.17	19.43	Poor Precision
12	04/12/2023	03/01/2024	24.5	15.9	24	21.5	4.83	22.49	11.99	Poor Precision
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	149 High Street, Ongar (Queen Bee)

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 23 μgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 23 μgm^{-3}
Average Precision (CV): 11
Adjusted Tube average: μgm^{-3}

Tube ID 38 204 High Street, Ongar (Watsons)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	30.2	35.6	28.2	31.3	3.83	12.22	9.51	Good
2	30/01/2023	27/02/2023	31.3	34	36.5	33.9	2.60	7.66	6.46	Good
3	27/02/2023	06/04/2023	27.6	27.8	27.4	27.6	0.20	0.72	0.50	Good
4	06/04/2023	02/05/2023	23.1	23.2	26.1	24.1	1.70	7.06	4.23	Good
5	02/05/2023	30/05/2023	18.8	14.6	17.5	17.0	2.15	12.67	5.34	Good
6	30/05/2023	03/07/2023	21	19.2	17.6	19.3	1.70	8.83	4.23	Good
7	03/07/2023	31/07/2023	17.6	18.3	18.1	18.0	0.36	2.00	0.90	Good
8	31/07/2023	05/09/2023	20.7	21.4	18.4	20.2	1.57	7.78	3.90	Good
9	05/09/2023	02/10/2023	27.2	25.7	27.8	26.9	1.08	4.02	2.69	Good
10	02/10/2023	30/10/2023	24.5	24.2	29	25.9	2.69	10.38	6.68	Good
11	30/10/2023	04/12/2023	31.7	23.8	29.1	28.2	4.03	14.28	10.00	Good
12	04/12/2023	03/01/2024	25.3	22.4	24.2	24.0	1.46	6.11	3.64	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	204 High Street, Ongar (Watsons)

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	25 μgm^{-3}
Average Precision (CV):	8
Adjusted Tube average:	μgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	25 μgm^{-3}
Average Precision (CV):	8
Adjusted Tube average:	μgm^{-3}

Tube ID 39 224 High Street, Epping (Church's Butchers)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	28.3	28.1	26.8	27.7	0.81	2.94	2.02	Good
2	30/01/2023	27/02/2023	36.9	36.8	36.9	36.9	0.06	0.16	0.14	Good
3	27/02/2023	06/04/2023	30	30.6	31.2	30.6	0.60	1.96	1.49	Good
4	06/04/2023	02/05/2023	23.4	22.5	20.2	22.0	1.65	7.49	4.10	Good
5	02/05/2023	30/05/2023	20.4	17.1	21.7	19.7	2.37	12.02	5.89	Good
6	30/05/2023	03/07/2023	26.1	24	25.2	25.1	1.05	4.20	2.62	Good
7	03/07/2023	31/07/2023	21.4	23.6	20.5	21.8	1.59	7.30	3.96	Good
8	31/07/2023	05/09/2023	23.7	23.8	24.4	24.0	0.38	1.58	0.94	Good
9	05/09/2023	02/10/2023	33.2	33.1	30.6	32.3	1.47	4.56	3.66	Good
10	02/10/2023	30/10/2023	28.3	32.4	32.6	31.1	2.43	7.80	6.03	Good
11	30/10/2023	04/12/2023	28.7	24	28.8	27.2	2.74	10.10	6.81	Good
12	04/12/2023	03/01/2024	20.2	23.1	22	21.8	1.46	6.73	3.64	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	224 High Street Epping, (Church's Butchers)

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	27 μgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	μgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	27 μgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	μgm^{-3}

Tube ID 40 154 High Street, Epping (was Lloyds Bank)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023		28.7	24.5	26.6	2.97	11.16	26.68	Good
2	30/01/2023	27/02/2023	37.7	34	36.7	36.1	1.91	5.30	4.75	Good
3	27/02/2023	06/04/2023	29.6	28.6	22.8	27.0	3.67	13.60	9.12	Good
4	06/04/2023	02/05/2023	30.8	20.5	25.9	25.7	5.15	20.02	12.80	Poor Precision
5	02/05/2023	30/05/2023	22	18.6	15.7	18.8	3.15	16.80	7.83	Good
6	30/05/2023	03/07/2023	25.8	25	27.2	26.0	1.11	4.28	2.77	Good
7	03/07/2023	31/07/2023	24.4	25	22.9	24.1	1.08	4.49	2.69	Good
8	31/07/2023	05/09/2023	22.7	21.1	21.5	21.8	0.83	3.83	2.07	Good
9	05/09/2023	02/10/2023	30.2	29.7	31.2	30.4	0.76	2.52	1.90	Good
10	02/10/2023	30/10/2023	28.8	28.3	27.8	28.3	0.50	1.77	1.24	Good
11	30/10/2023	04/12/2023	27.4	25.4	20.6	24.5	3.49	14.28	8.68	Good
12	04/12/2023	03/01/2024	21.8	21.3	25.7	22.9	2.41	10.50	5.98	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	154 High Street Epping (was Lloyds Bank)

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	26 µgm^{-3}
Average Precision (CV):	8
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	26 µgm^{-3}
Average Precision (CV):	9
Adjusted Tube average:	µgm^{-3}

Tube ID 41 259 High Street Epping (Holland & Barrett)

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	36.7	34.3	34.1	35.0	1.45	4.13	3.59	Good
2	30/01/2023	27/02/2023	40.2	40.6	36.6	39.1	2.20	5.63	5.47	Good
3	27/02/2023	06/04/2023	27.3	28.8	28.8	28.3	0.87	3.06	2.15	Good
4	06/04/2023	02/05/2023	22.8	21.3	22.8	22.3	0.87	3.88	2.15	Good
5	02/05/2023	30/05/2023	16.3	19.4	22.1	19.3	2.90	15.06	7.21	Good
6	30/05/2023	03/07/2023	22.9	25	21.4	23.1	1.81	7.83	4.49	Good
7	03/07/2023	31/07/2023	19.8	19.5	18.4	19.2	0.74	3.83	1.83	Good
8	31/07/2023	05/09/2023	24	23.8	24.4	24.1	0.31	1.27	0.76	Good
9	05/09/2023	02/10/2023	30	30.5	29.4	30.0	0.55	1.84	1.37	Good
10	02/10/2023	30/10/2023	31.4	29.1	30.7	30.4	1.18	3.88	2.93	Good
11	30/10/2023	04/12/2023	30.2	31.8	32.9	31.6	1.36	4.29	3.37	Good
12	04/12/2023	03/01/2024	23.8	24.5	21.6	23.3	1.51	6.49	3.76	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	259 High Street Epping (Holland & Barrett)

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	27 µgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	27 µgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	µgm^{-3}

Tube ID 42 Laurels, 2 Nazeing Road, Nazeing

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	27.8	28.6	29.4	28.6	0.80	2.80	1.99	Good
2	30/01/2023	27/02/2023	33.9	34.6	34.2	34.2	0.35	1.03	0.87	Good
3	27/02/2023	06/04/2023	22.6	24.8	22.6	23.3	1.27	5.44	3.16	Good
4	06/04/2023	02/05/2023	16.7	18.9		17.8	1.56	8.74	13.98	Good
5	02/05/2023	30/05/2023	13.2	17.5	18.3	16.3	2.74	16.79	6.81	Good
6	30/05/2023	03/07/2023	19.2	20.4	18.5	19.4	0.96	4.96	2.39	Good
7	03/07/2023	31/07/2023	21	20.9	20.5	20.8	0.26	1.27	0.66	Good
8	31/07/2023	05/09/2023	21.2	21.7	22.1	21.7	0.45	2.08	1.12	Good
9	05/09/2023	02/10/2023	26.2	28.5	27.9	27.5	1.19	4.33	2.96	Good
10	02/10/2023	30/10/2023	25.2	25	28.4	26.2	1.91	7.28	4.74	Good
11	30/10/2023	04/12/2023	28.1	26.6	27.3	27.3	0.75	2.75	1.86	Good
12	04/12/2023	03/01/2024	24.4	22.8	23.5	23.6	0.80	3.40	1.99	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	Laurels, 2 Nazeing Road, Nazeing

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	24 µgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	24 µgm^{-3}
Average Precision (CV):	5
Adjusted Tube average:	µgm^{-3}

Tube ID 43 4 North Street, Nazeing

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2023	30/01/2023	32.4	28.8	27.1	29.4	2.71	9.19	6.72
2	30/01/2023	27/02/2023	36.1	34.4	38.3	36.3	1.96	5.39	4.86
3	27/02/2023	06/04/2023	27.2	27.1	<0.5	27.2	0.07	0.26	0.64
4	06/04/2023	02/05/2023	20.6	20.6	<0.7	20.6	0.00	0.00	0.00
5	02/05/2023	30/05/2023	15	19.2	18.3	17.5	2.21	12.64	5.49
6	30/05/2023	03/07/2023	16.9	18.6	20	18.5	1.55	8.39	3.86
7	03/07/2023	31/07/2023	18.1	16.2	18.2	17.5	1.13	6.44	2.80
8	31/07/2023	05/09/2023	19.5	20.4	19.8	19.9	0.46	2.30	1.14
9	05/09/2023	02/10/2023	30.2	29.7	31.2	30.4	0.76	2.52	1.90
10	02/10/2023	30/10/2023	25.7	27.7	27.5	27.0	1.10	4.08	2.74
11	30/10/2023	04/12/2023	26.6	29	26	27.2	1.59	5.84	3.94
12	04/12/2023	03/01/2024	20.3	22.6	18.4	20.4	2.10	10.29	5.22
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	4 North Street, Nazeing

Adjusted measurement (95% confidence level)	
Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	24 µgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	µgm^{-3}

Adjusted measurement (95% confidence level)	
with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	24 µgm^{-3}
Average Precision (CV):	6
Adjusted Tube average:	µgm^{-3}

Tube ID 44 Parsonage Court, Rectory Lane, Loughton

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	27.5	26.3	25.7	26.5	0.92	3.46	2.28	Good
2	30/01/2023	27/02/2023	32.9	34.2	31.9	33.0	1.15	3.49	2.86	Good
3	27/02/2023	06/04/2023	20.4	20.1	18.5	19.7	1.02	5.19	2.54	Good
4	06/04/2023	02/05/2023	15.3	17.1	15.9	16.1	0.92	5.69	2.28	Good
5	02/05/2023	30/05/2023	11.7	9.5	11.3	10.8	1.17	10.82	2.91	Good
6	30/05/2023	03/07/2023	13.4	11.4	12.2	12.3	1.01	8.16	2.50	Good
7	03/07/2023	31/07/2023	14.8	13.6	15.5	14.6	0.96	6.57	2.39	Good
8	31/07/2023	05/09/2023	15.3	16.6	16	16.0	0.65	4.07	1.62	Good
9	05/09/2023	02/10/2023	30	30.5	29.4	30.0	0.55	1.84	1.37	Good
10	02/10/2023	30/10/2023	23.8	22.7	24.9	23.8	1.10	4.62	2.73	Good
11	30/10/2023	04/12/2023	26.9	20.7	23.9	23.8	3.10	13.01	7.70	Good
12	04/12/2023	03/01/2024	16.1	18.2	12.7	15.7	2.78	17.72	6.89	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	Parsonage Court, Rectory Lane, Loughton

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	20 μgm^{-3}
Average Precision (CV):	7
Adjusted Tube average:	μgm^{-3}

Adjusted measurement (95% confidence level) with all data	
Bias calculated using 0 periods of data	
Tube Precision:	
Bias factor A:	
Bias B:	
Information about tubes to be adjusted	
Diffusion Tube average:	20 μgm^{-3}
Average Precision (CV):	7
Adjusted Tube average:	μgm^{-3}

Tube ID 45 18 Chigwell Lane, Loughton

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	28.1	27	31.7	28.9	2.46	8.50	6.11	Good
2	30/01/2023	27/02/2023	36.6	35.6	34.8	35.7	0.90	2.53	2.24	Good
3	27/02/2023	06/04/2023	23	22.4	22.6	22.7	0.31	1.35	0.76	Good
4	06/04/2023	02/05/2023	20.6	19.1	19.4	19.7	0.79	4.03	1.97	Good
5	02/05/2023	30/05/2023	14.7	17.8	15.8	16.1	1.57	9.76	3.90	Good
6	30/05/2023	03/07/2023	16.5	15	17.2	16.2	1.12	6.92	2.79	Good
7	03/07/2023	31/07/2023	13.1	13.9	14.2	13.7	0.57	4.14	1.41	Good
8	31/07/2023	05/09/2023	16.5	16.3	16.3	16.4	0.12	0.71	0.29	Good
9	05/09/2023	02/10/2023	26.2	28.5	27.9	27.5	1.19	4.33	2.96	Good
10	02/10/2023	30/10/2023	14.6	24	25.1	21.2	5.77	27.18	14.34	Poor Precision
11	30/10/2023	04/12/2023		22.8	26	24.4	2.26	9.27	20.33	Good
12	04/12/2023	03/01/2024	15.9	20.7	21.5	19.4	3.03	15.64	7.52	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	18 Chigwell Lane, Loughton

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 22 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 22 μgm^{-3}
Average Precision (CV): 8
Adjusted Tube average: μgm^{-3}

Tube ID 46 The Woodbine Public House, Honey Lane, Waltham Abbey

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	33.3	38.3	35.8	35.8	2.50	6.98	6.21	Good
2	30/01/2023	27/02/2023	47.2	48.4	44	46.5	2.27	4.89	5.65	Good
3	27/02/2023	06/04/2023	32.6	32.5	33.8	33.0	0.72	2.19	1.80	Good
4	06/04/2023	02/05/2023	30.2	28.5	31.9	30.2	1.70	5.63	4.22	Good
5	02/05/2023	30/05/2023	25.6	22.2	26.3	24.7	2.19	8.88	5.45	Good
6	30/05/2023	03/07/2023	35	32.8	36.3	34.7	1.77	5.10	4.39	Good
7	03/07/2023	31/07/2023	28	25.2	24.9	26.0	1.71	6.57	4.25	Good
8	31/07/2023	05/09/2023	30.6	28.3	30.3	29.7	1.25	4.21	3.11	Good
9	05/09/2023	02/10/2023	37.5	39.1	38.1	38.2	0.81	2.11	2.01	Good
10	02/10/2023	30/10/2023	18	32.2	34.7	28.3	9.01	31.83	22.38	Poor Precision
11	30/10/2023	04/12/2023	28.7	34.4	31.9	31.7	2.86	9.02	7.10	Good
12	04/12/2023	03/01/2024	26	26.3	27.9	26.7	1.02	3.82	2.54	Good
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	The Woodbine Public House, Waltham Abbey

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 32 µgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: µgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 32 µgm^{-3}
Average Precision (CV): 8
Adjusted Tube average: µgm^{-3}

Tube ID 47 76 Roding Road, Loughton

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check: Diffusion Tubes Precision Check
1	04/01/2023	30/01/2023	25	25.3	26.2	25.5	0.62	2.45	1.55	Good
2	30/01/2023	27/02/2023	31.6	30.7	28.1	30.1	1.82	6.03	4.51	Good
3	27/02/2023	06/04/2023	19.4	21.5	22.3	21.1	1.50	7.11	3.72	Good
4	06/04/2023	02/05/2023	17.7	16.2	14.9	16.3	1.40	8.61	3.48	Good
5	02/05/2023	30/05/2023	13.5	9.6	9.5	10.9	2.28	20.99	5.67	Poor Precision
6	30/05/2023	03/07/2023	13	15.1	14	14.0	1.05	7.49	2.61	Good
7	03/07/2023	31/07/2023	13.8	13.3	12.1	13.1	0.87	6.69	2.17	Good
8	31/07/2023	05/09/2023	13.5	14	14.7	14.1	0.60	4.29	1.50	Good
9	05/09/2023	02/10/2023	18.1	18.6	19.2	18.6	0.55	2.96	1.37	Good
10	02/10/2023	30/10/2023	21.1	21.2	20.3	20.9	0.49	2.36	1.23	Good
11	30/10/2023	04/12/2023	21.4	24.9	22.4	22.9	1.80	7.87	4.48	Good
12	04/12/2023	03/01/2024	21.9	21.3	14.6	19.3	4.05	21.03	10.07	Poor Precision
13										

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	76 Roding Road, Buckhurst Hill

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 20 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: µgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 0 periods of data
Tube Precision:
Bias factor A:
Bias B:

Information about tubes to be adjusted
Diffusion Tube average: 19 µgm^{-3}
Average Precision (CV): 8
Adjusted Tube average: µgm^{-3}

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Epping Forest District recorded data capture of 75% or more and therefore it was not required to annualise any monitoring data.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 ASR has 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.TG22 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.

Epping Forest District Council have applied a national bias adjustment factor of 0.77 to the 2023 monitoring data. A summary of bias adjustment factors used by Epping Forest District Council over the past five years is presented in Table C.1 – Bias Adjustment Factor.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.77
2022	National	6/23	0.76
2021	National	6/22	0.78
2020	National	09/21	0.76
2019	National	09/20	0.75

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure is to 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

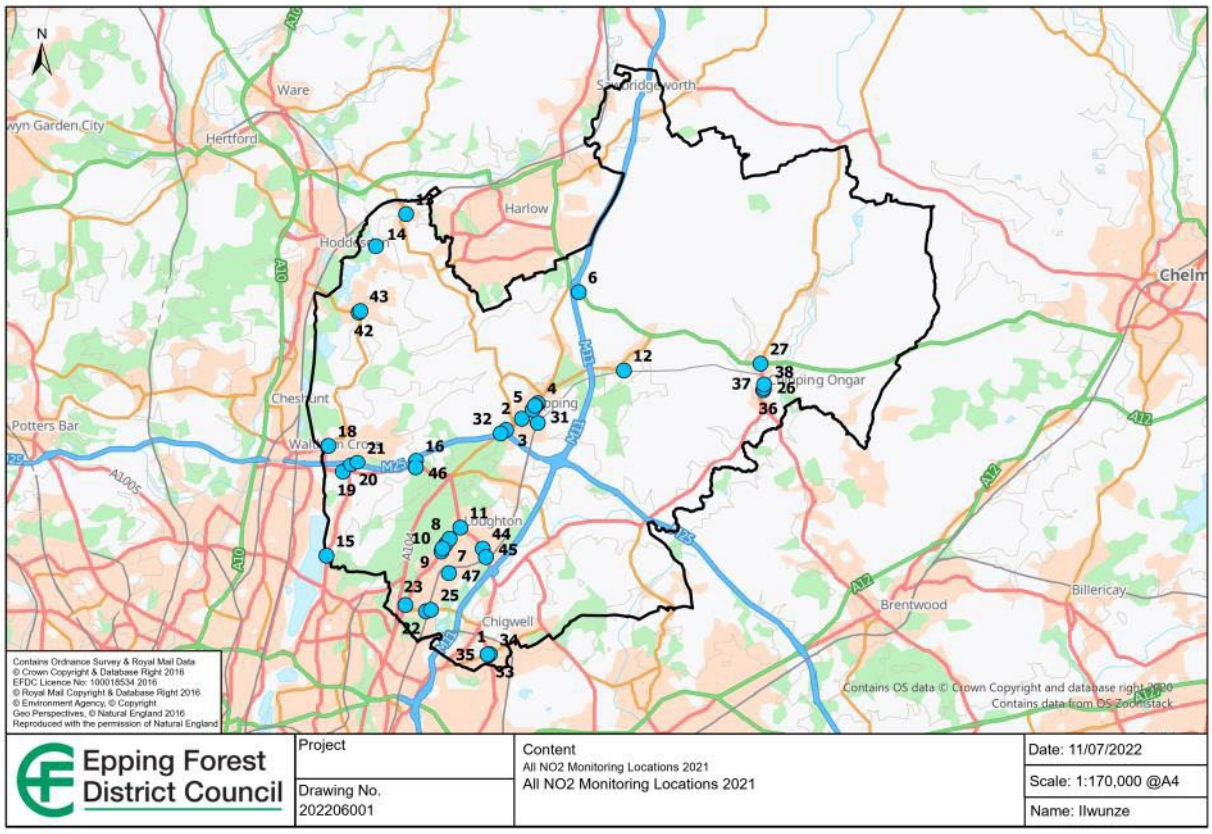
annual mean NO_2 concentrations corrected for distance are presented in Table B.1 – NO_2 2023 Diffusion Tube Results (µg/m^3).

No diffusion tube NO_2 monitoring locations within Epping Forest District required distance correction during 2023 as none of the locations were within 10% of the annual mean objective for nitrogen dioxide.

Appendix D: Maps of Monitoring Locations and AQMAs

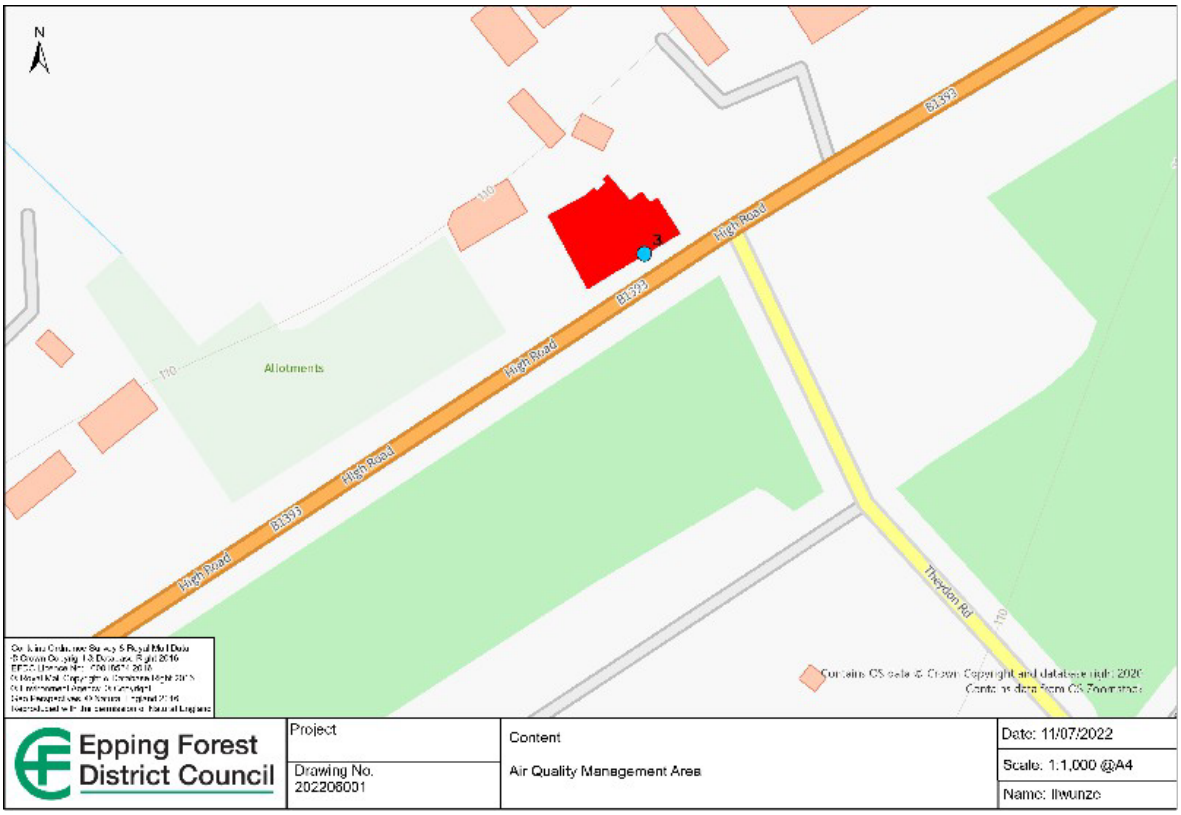
Figure D.1 – Maps of Non-Automatic Monitoring Sites

District Wide – All locations



For information regarding location names, please see the following larger scale maps:

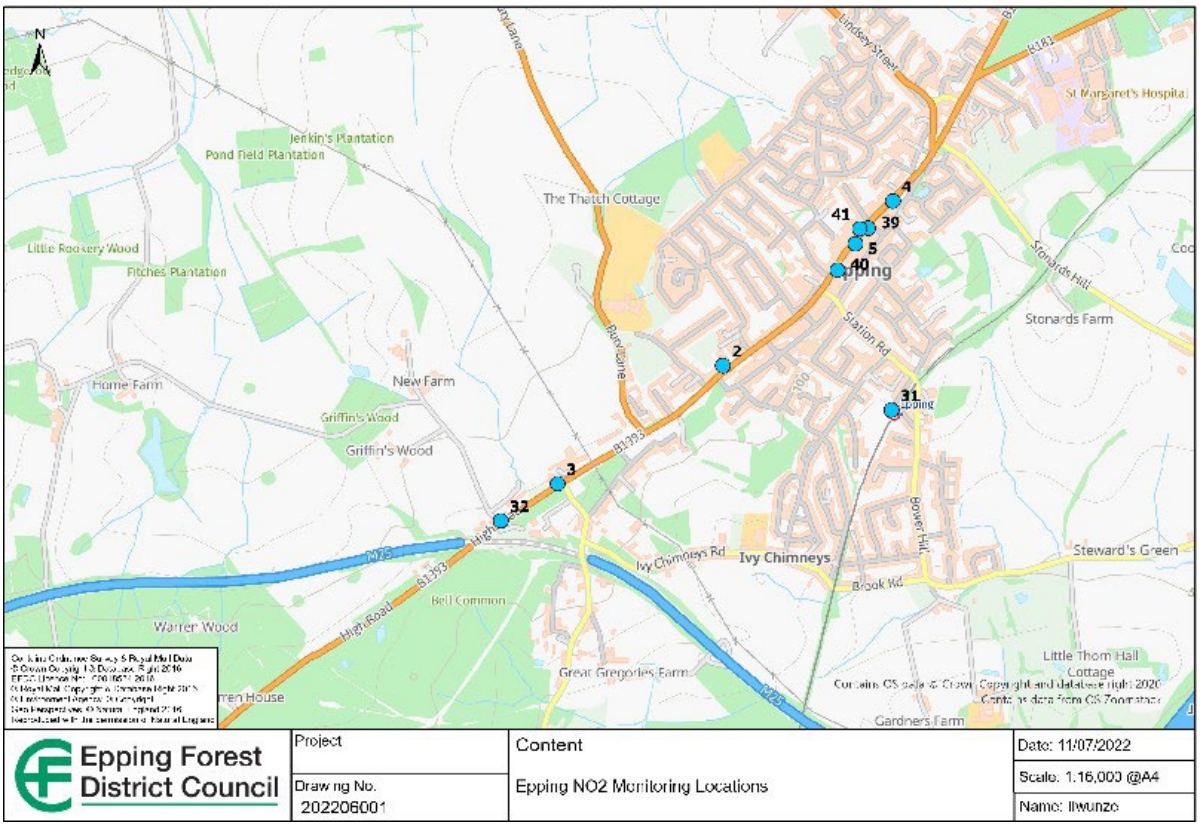
AQMA Epping Forest No2. Bell Common



3: Bell Vue, Epping High Street, Bell Common, Epping

Red area: Air Quality Management Area

Epping



2: 15 High Street, Epping

3: Bell Vue, High Road, Bell Common, Epping

4: 254 High Street, Epping (Ladbrokes)

5: 202 High Street, Epping (Superdrug)

31: Station Road, Station Approach, Epping Underground Station, Epping

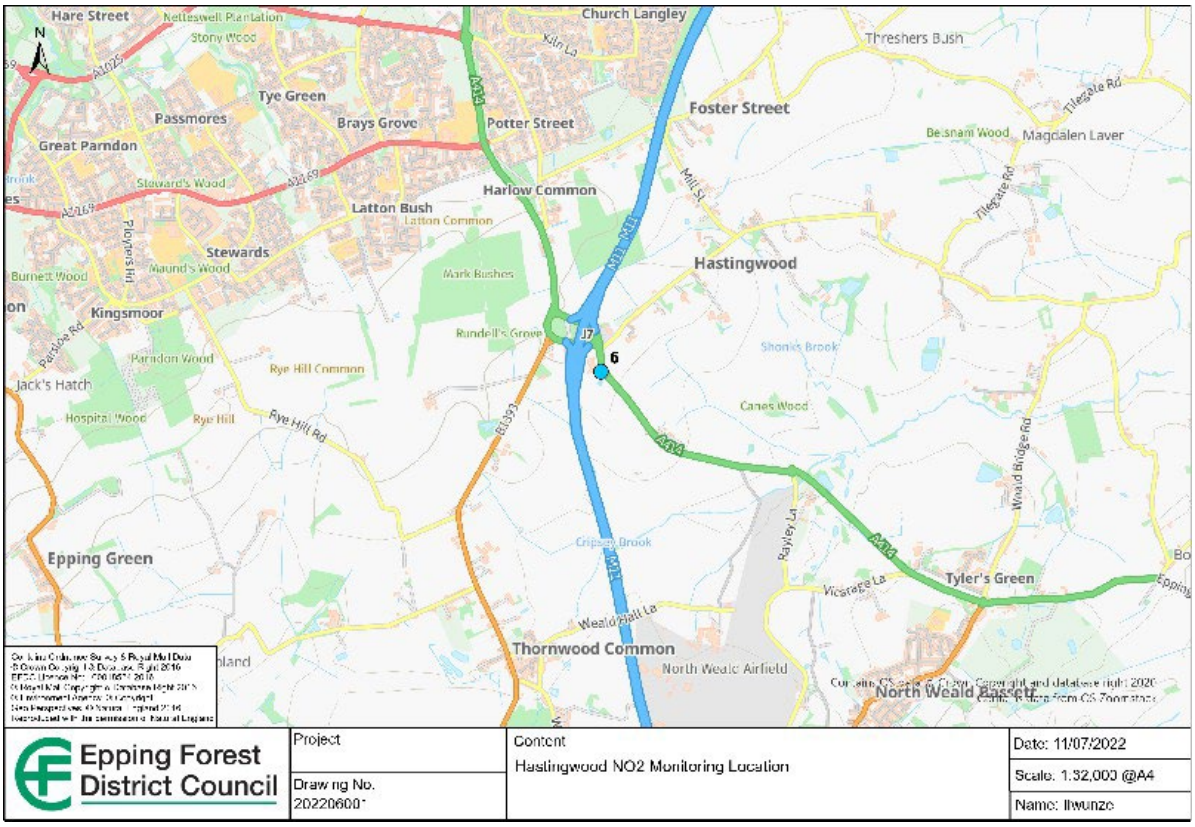
32: Copped Hall, High Road, Bell Common, Epping

39: 224 High Street, Epping (Church's Butchers)

40: 154 High Street, Epping (was Lloyds Banks)

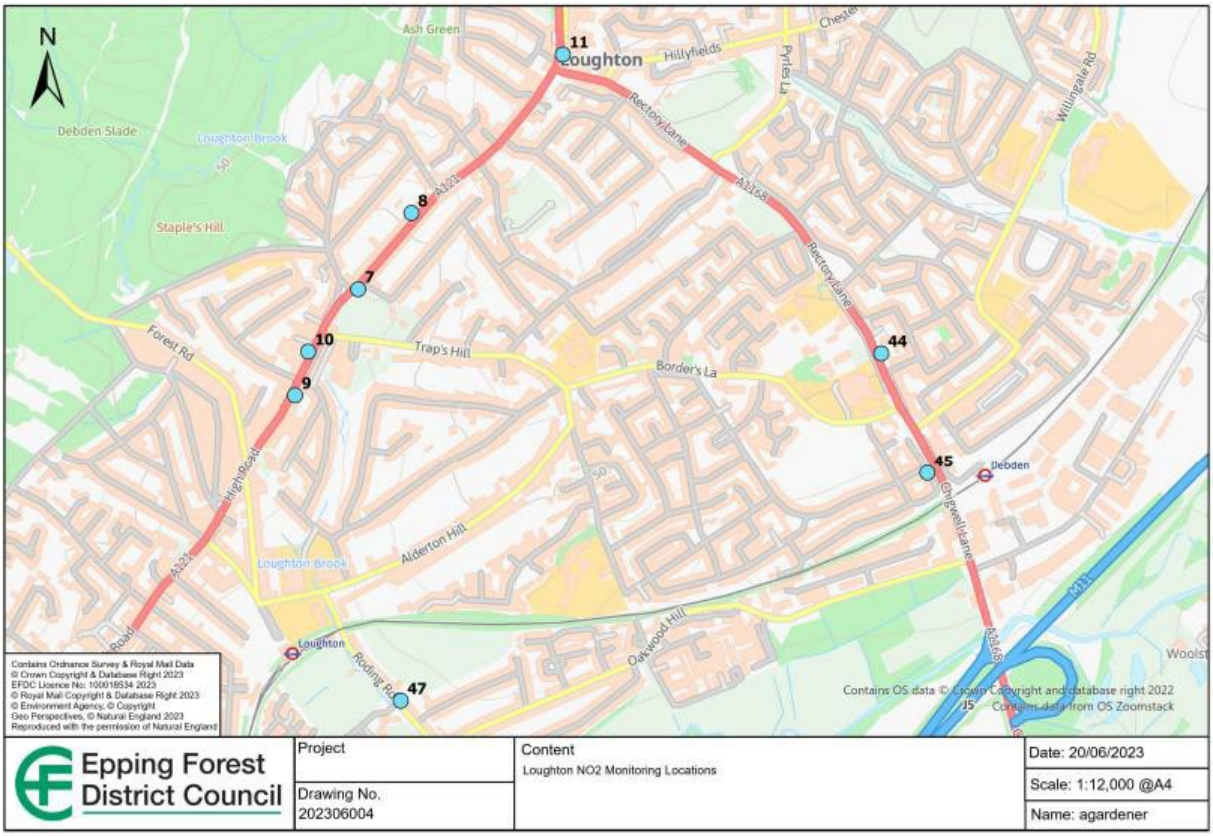
41: 259 High Street, Epping (Holland & Barrett)

Hastingwood



6: 1 Canes Cottages, Canes Lane A414 Hastingwood

Loughton



7: 1 Church Hill, Loughton

8: 72 Church Hill, Loughton

9: 249 High Road, Loughton (Timpson)

10: 252 High Road, Loughton (Love Brownies)

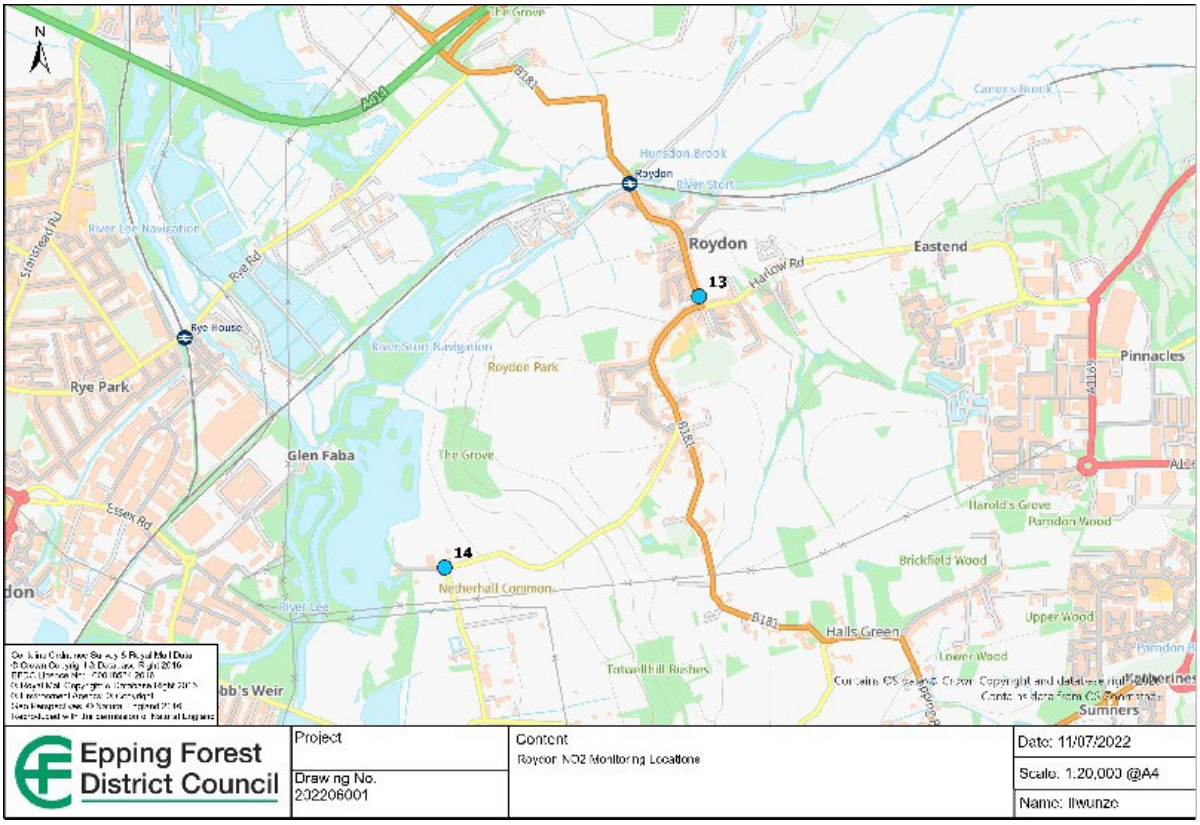
11: 5 Goldings Hill, Loughton

44: Parsonage Court, Rectory Lane, Loughton

45: 18 Chigwell Lane, Chigwell, (off Colson Road)

47. 76 Roding Road, Loughton

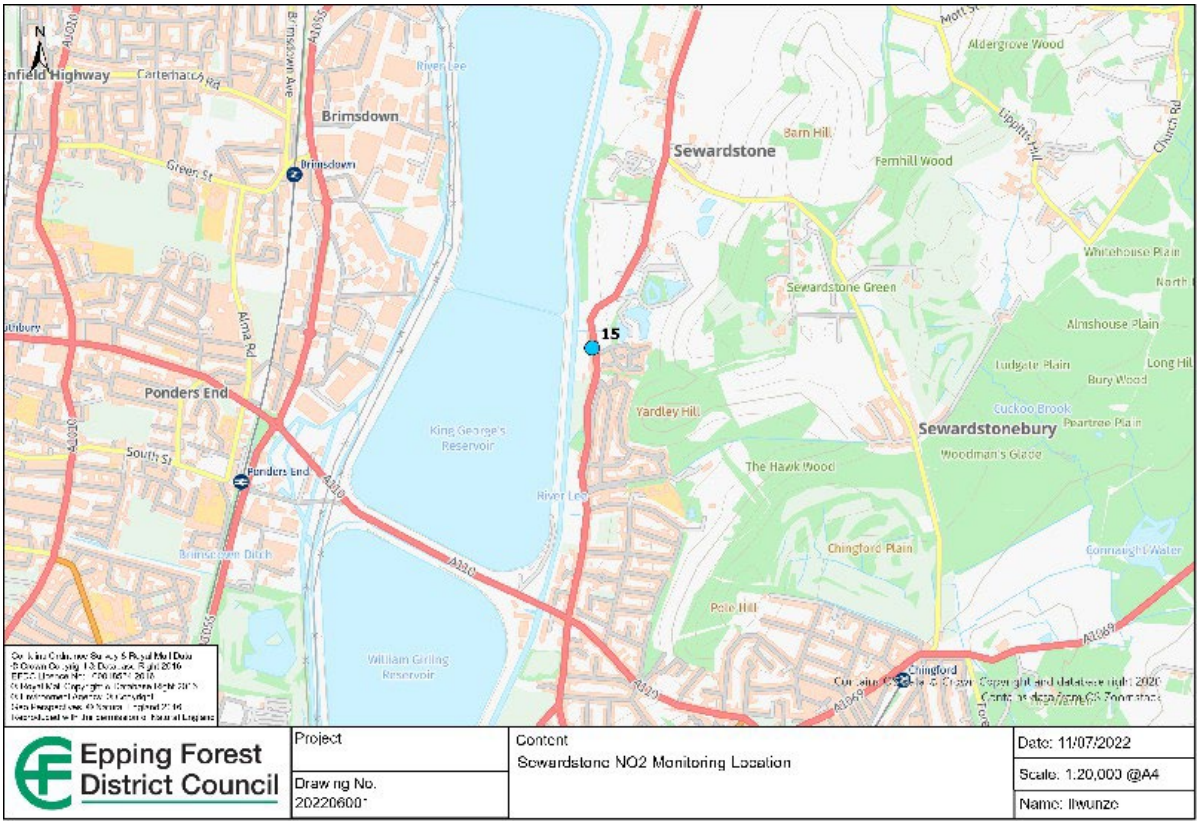
Roydon



13: 20 High Street, Roydon

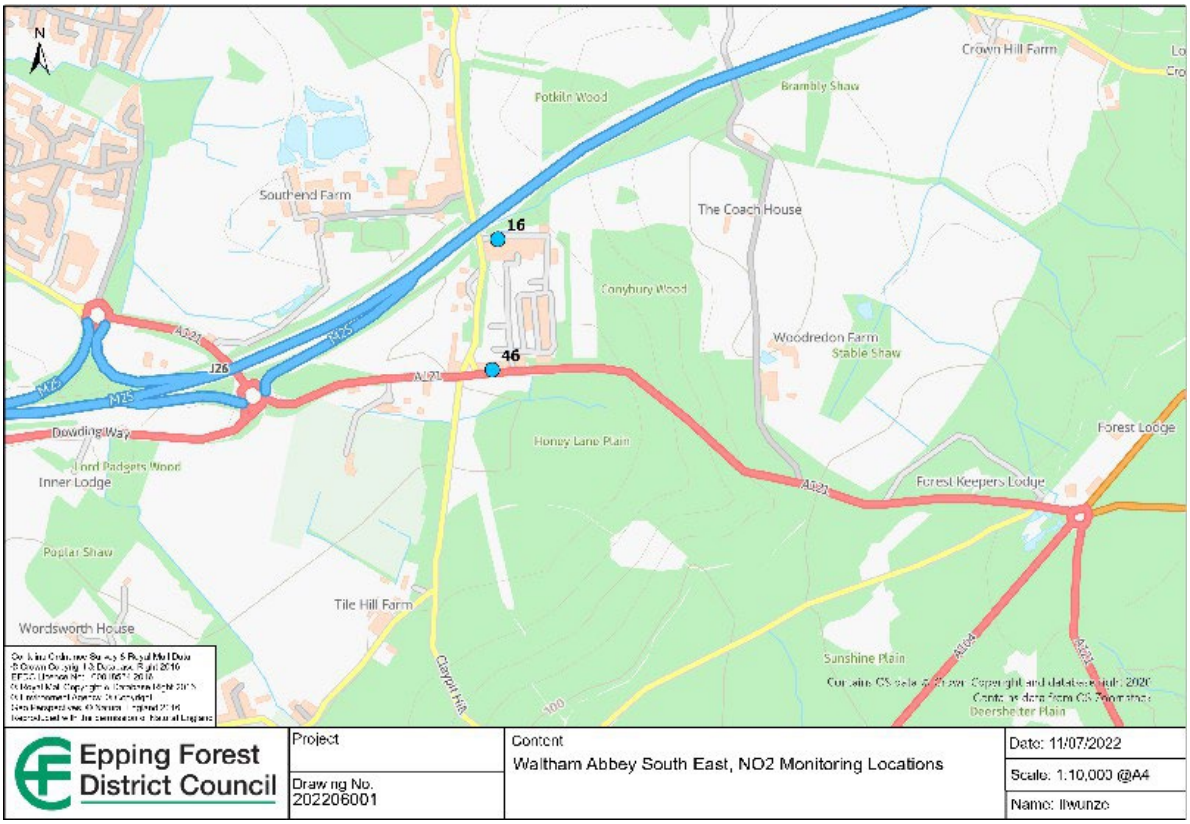
14: Burles Farm, Netherhall Road, Roydon

Sewardstone



15: Albion Terrace, Sewardstone Road, Sewardstone

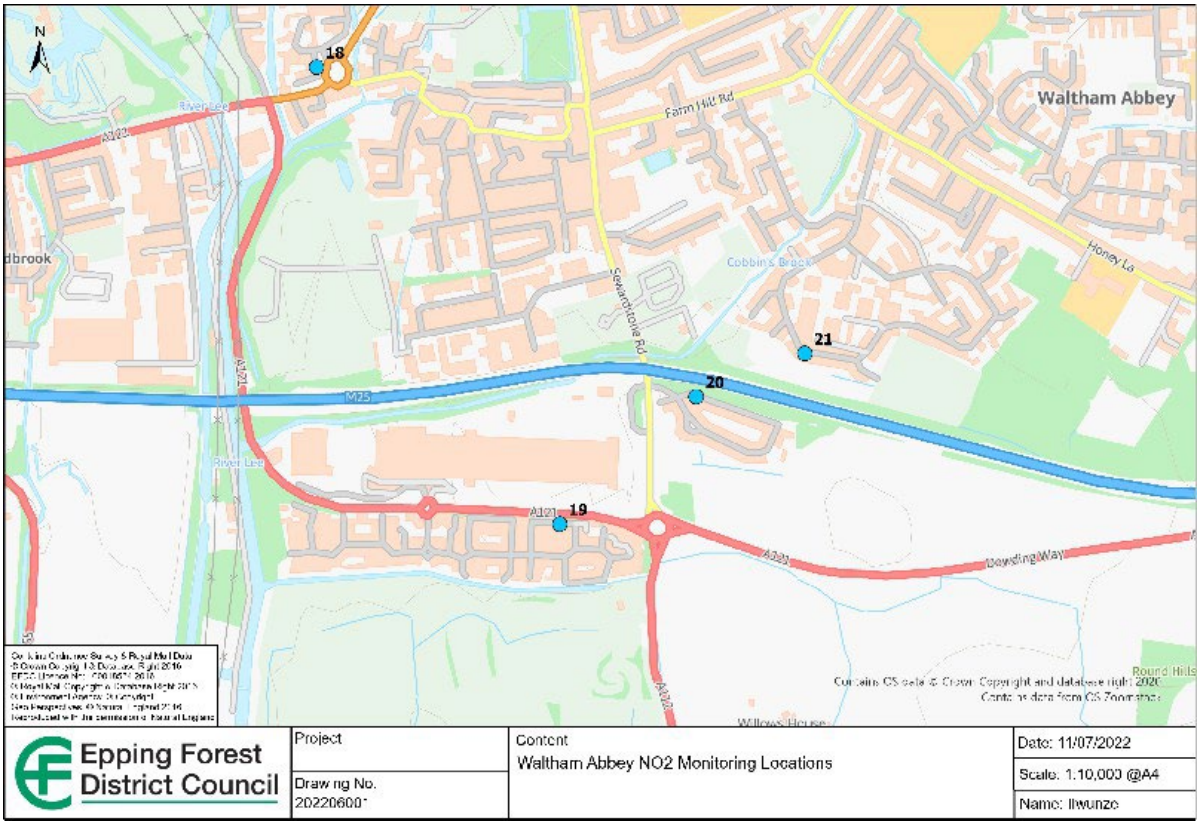
Waltham Abbey, Honey Lane



16: 14 The Elms, Waltham Abbey

46: The Woodbine Public House, Honey Lane, Waltham Abbey

Waltham Abbey



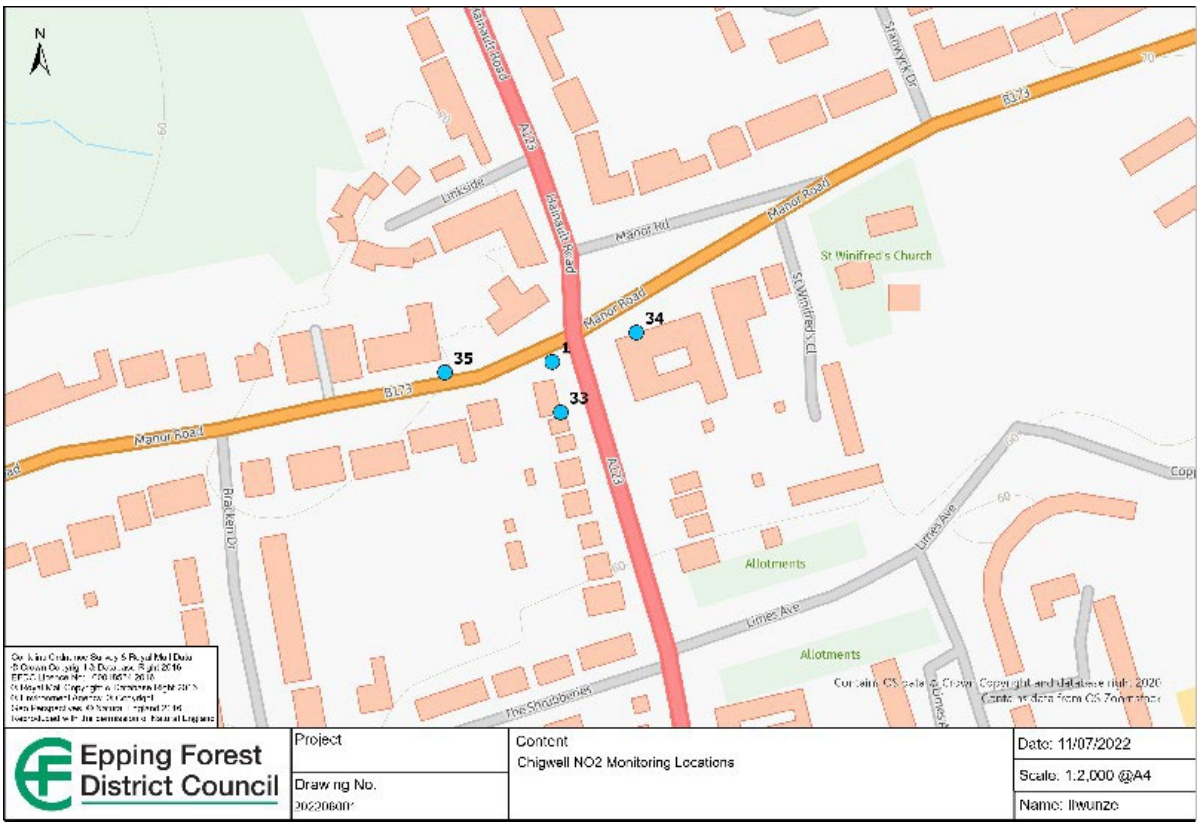
18: 4 Leaview, Waltham Abbey (Abbeyview)

19: 34 Hayden Road, Waltham Abbey

20: 2 Lodge Lane, Waltham Abbey

21: 110 Roundhills, Waltham Abbey

Chigwell



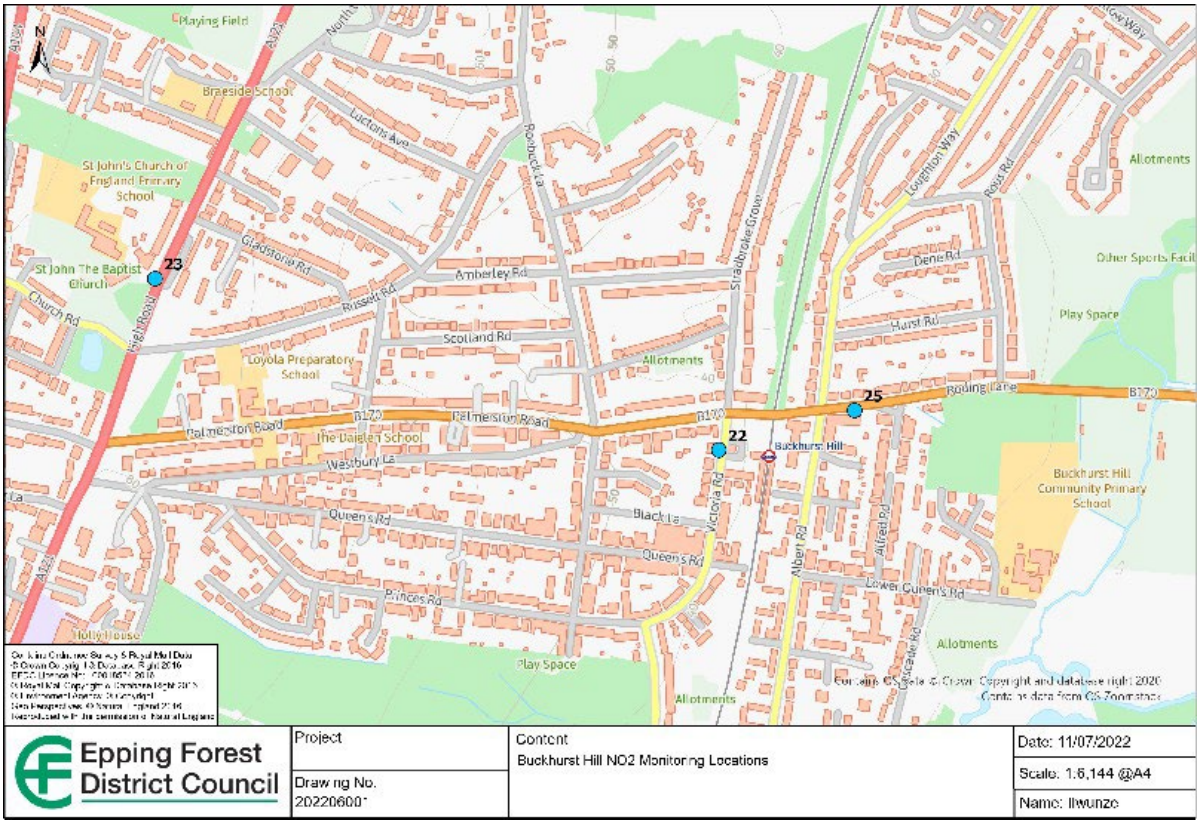
1 105 Hainault Road, Chigwell (junction with Fencepiece Road)

33: 281 Fencepiece Road, Chigwell

34: 414 Fencepiece Road, Chigwell (Sherrell House)

35: 120 Manor Road, Chigwell

Buckhurst Hill

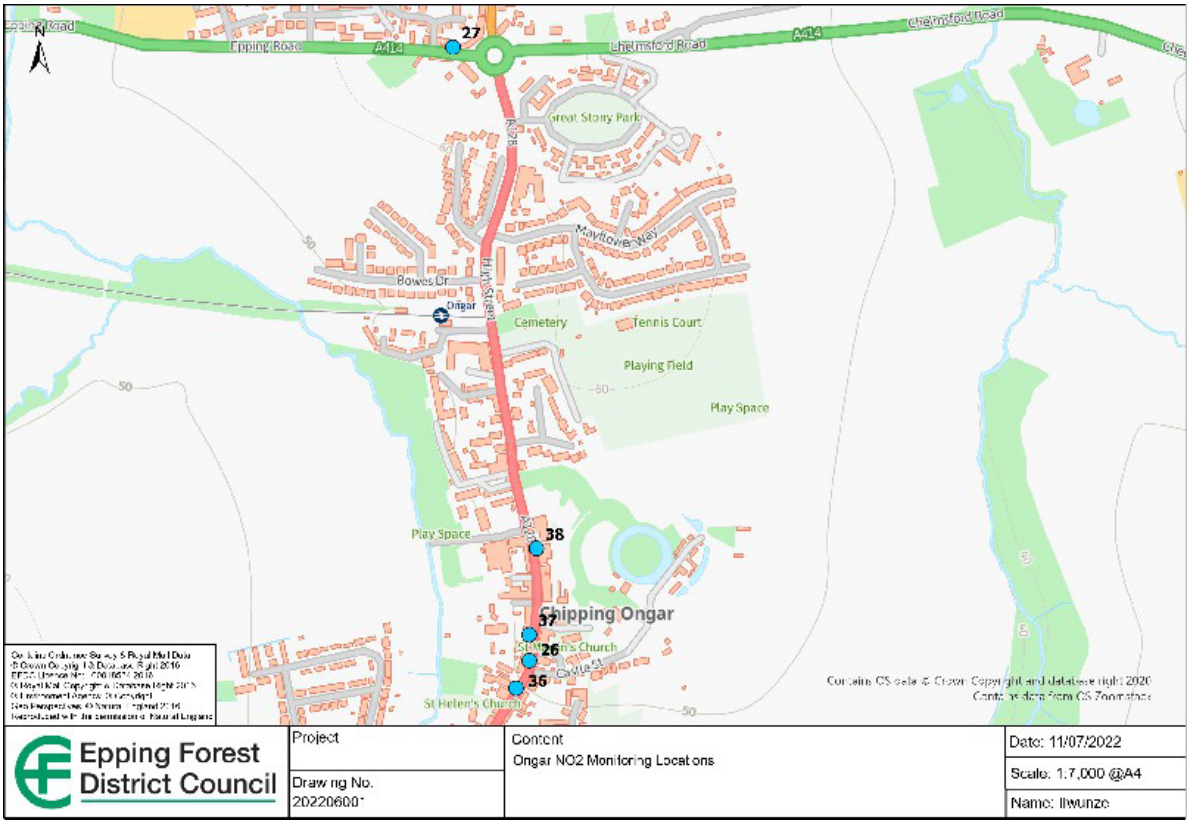


22: 26 Victoria Road, Buckhurst Hill, (opposite underground station)

23: St Johns School, Buckhurst Hill

25: Regency Lodge, Roding Lane, Buckhurst Hill

Ongar



26: 131 High Street, Ongar (at Bottleneck)

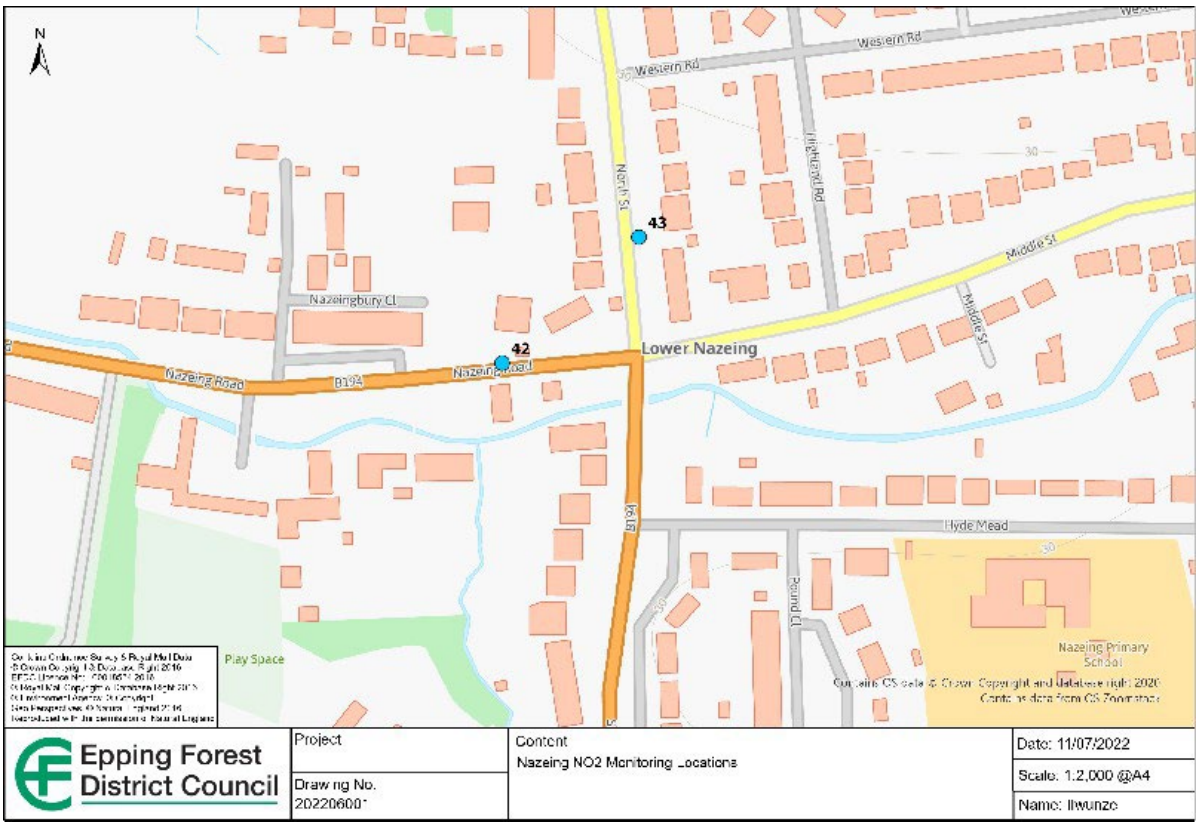
27: 3 Queens Terrace, A414, Ongar

36: 107 High Street, Ongar (Anchor)

37:149 High Street, Ongar (Queen Bee)

38: 204, High Street, Ongar, (Watsons)

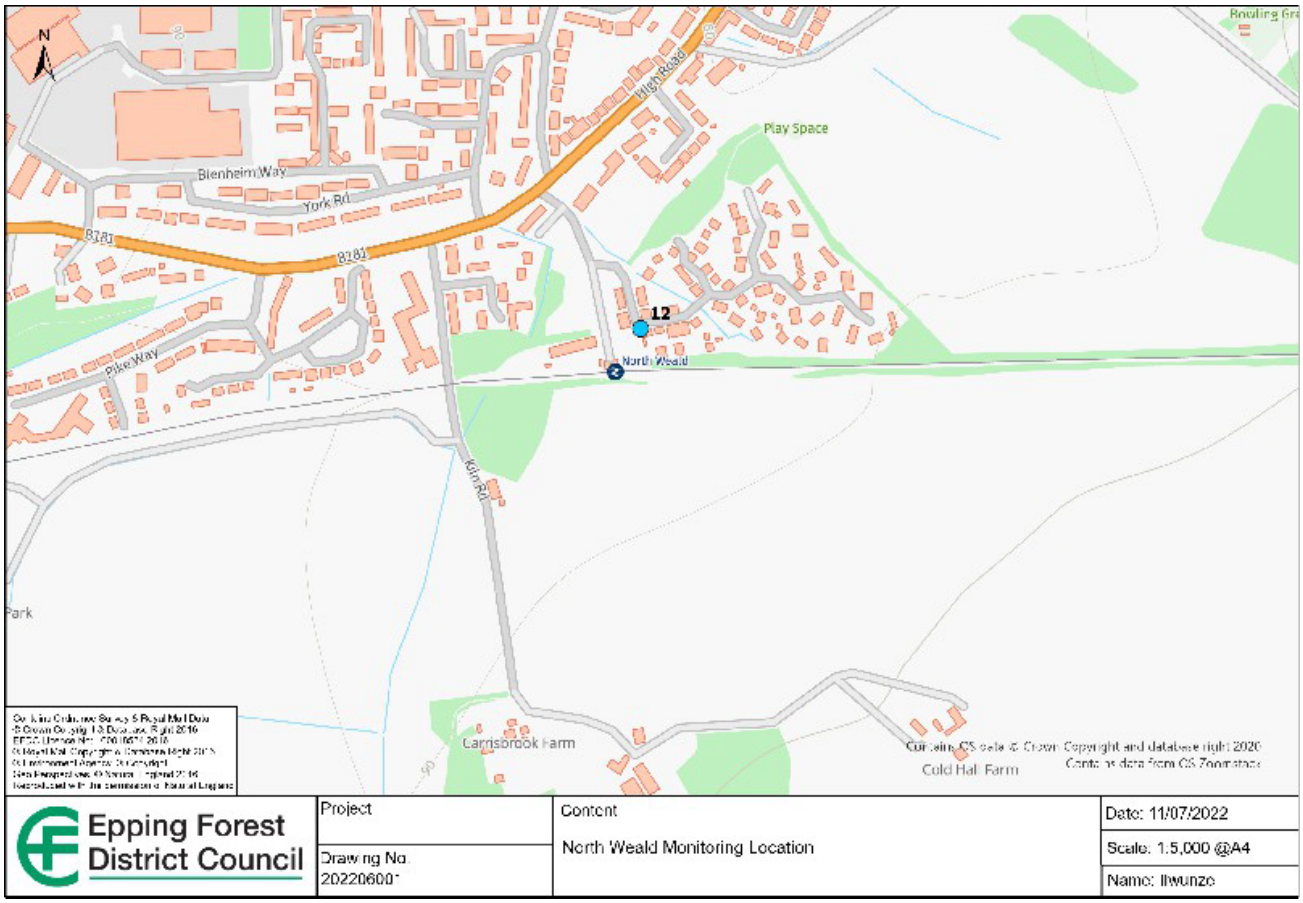
Nazeing



42: Laurels, 2 Nazeing Road, Nazeing

43: 4 North Street, Nazeing

North Weald



12: 66 Tempest Mead, North Weald

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

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

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

Appendix F: Summary of Epping Ongar Railway Air Quality Monitoring Report

Introduction:

Between August 2022 and September 2023, Ricardo deployed two South Coast Science Praxis/Urban air quality sensors at residential properties in Chipping Ongar and North Weald. The purpose of the project was to understand any impact on residential properties from steam and diesel locomotive operations between North Weald and Chipping Ongar on the Epping Ongar Railway.

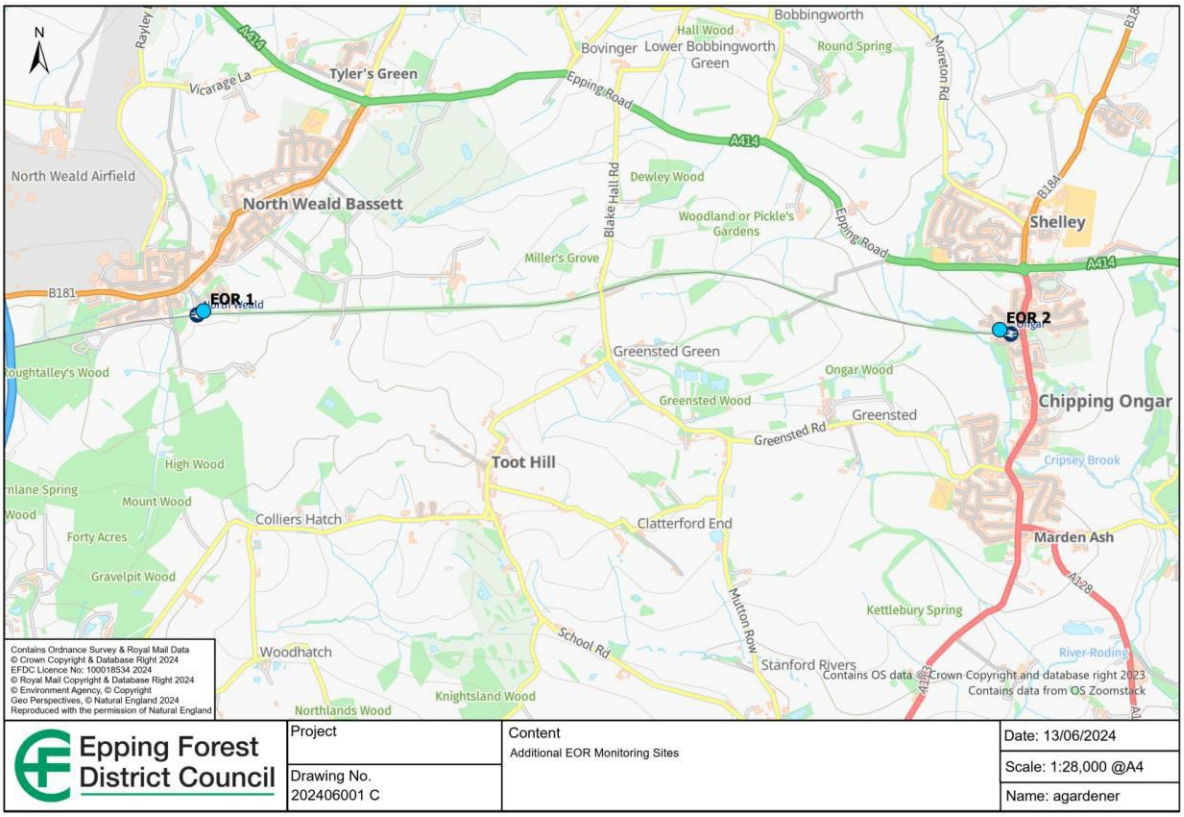
Residential back gardens within 25 metres of the stations at Chipping Ongar and North Weald respectively were chosen as locations for the sensors and they represent some of the nearest sensitive receptors to the railway.

As an indicative measurement methodology, and following best practice guidance, the sensors were characterised with an approved reference automatic air quality monitoring station at the start, middle and end of monitoring.

Pollutants measured were NO_2, SO_2, PM_{10} and $PM_{2.5}$ and the results of the monitoring are detailed in a report which can be accessed at https://www.eppingforestdc.gov.uk/wp-content/uploads/2024/06/EFDC_Epping-Ongar-Railway-Sensor-Report_Apr_2024.html This report is interactive, allowing the reader to select the time, location, pollutant of interest, and drill into the detail of the chosen scenario.

Epping Ongar Railway Location Map:

The following map shows the location and path of the Epping Ongar Railway.
“EOR1” is the monitoring location close to the station at North Weald, and “EOR” is the monitoring location close to the station in Ongar (Chipping Ongar). The grey line that links the two is the path of the Railway.



Summary and Conclusions:

The results, which are details in the full report (see link above) show two exceedances in 15-minute mean SO_2 concentrations at Chipping Ongar, however, this represents far fewer than the 35 exceedances permitted in the UK Air Quality Objectives for this pollutant. These two 15-minute SO_2 exceedances occurred on Thursday 20 April 2023. The maximum hourly SO_2 concentration of 273 μgm^{-3} recorded on this day is still below the UK Air Quality hourly mean SO_2 objective of > 350 μgm^{-3} According to the Epping Ongar Railway timetable, there were no trains operating on this day, however that doesn't rule out the possibility of operations which were not timetabled or an alternative pollution source. There were no exceedances measured in NO_2, PM_{10} or $PM_{2.5}$ at Chipping Ongar across the entirety of the monitoring period.

Across the entire monitoring period at the North Weald location, there were three exceedances of the 24-hour mean PM_{10}, which is far fewer than the 35 exceedances permitted in any one year in the UK Air Quality Objectives for this pollutant. Two of these exceedances occurred on the 14-15 February 2023 when there were no trains timetabled as running. These exceedances could be attributed to a wider regional particulate pollution

episode during this period. With a daily mean PM_{10} concentration of 51.4 μgm^{-3}, the third exceedance was recorded on the 16 December 2022. The Epping Ongar Light Fantastic was running during this period. Across the entire period, there were no exceedances of the UK Air Quality Objectives measured in NO_2, SO_2 or $PM_{2.5}$ at North Weald.

The monitoring period means for NO_2, PM_{10} and $PM_{2.5}$ are all below the annual mean UK objectives at both the North Weald and Chipping Ongar monitoring sites.

There were numerous special events on the Epping Ongar Railway during the course of the monitoring period. Given SO_2 is predominately produced from the combustion of coal, increases in this pollutant could be expected during the annual steam gala which took place between the 23-25 June 2023. The maximum measured 15-minute mean SO_2 concentration of 132 μgm^{-3} was measured at 10:00 on 23 June 2023 at North Weald. By comparison, the highest 15-minute mean SO_2 concentration during the same period at Chipping Ongar was 115 μgm^{-3} measured at 11:45 on 24 June 2023. These concentrations are well below the 15-minute mean SO_2 objective of 266 μgm^{-3}.

The annual autumn diesel gala between 22-24 September 2023 saw the highest concentrations of NO_2 in September 2023 for both locations. This would be expected as primary NO_2 emissions are particularly important from diesel combustion. The maximum hourly NO_2 concentration over this period, measured at North Weald on 22 September 2023 was 88.3 μgm^{-3}, which is well below the hourly mean NO_2 objective of 200 μgm^{-3}.

The full report shows boxplots as a direct comparison of pollutant concentrations during days at the weekend when trains were timetabled, with days when no trains are timetabled. At both locations, there is some indication median concentrations are slightly lower for $PM_{2.5}$ and SO_2 during weekends when no trains are running, and for PM_{10} at Chipping Ongar. There is also some evidence for a greater number of high concentration outliers for all pollutants on days when trains are running compared to when they are not. However, it should be noted that meteorological variations may also have some impact on the pollutant concentrations.

Polar plots detailed in the full report provide an indication of the relative strength and direction of sources of pollution on days when trains were timetabled as running. At North Weald, the directional source for all pollutants is generally to the south and west of the sensor which indicates the railway, and particularly the North Weald Station, being the likely source. Likewise, at Chipping Ongar the polar plots indicate a source to the south and east of the sensor which again points towards Ongar Station.

To conclude, this report highlights that there are measurable effects of the Epping Ongar Railway on nearby residential properties in North Weald and Chipping Ongar however despite a few individual exceedances all pollutants measured during the monitoring period, were within the UK Air Quality Objectives.

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 National Highways
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 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

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.