**Epping Forest District Council**

# 2022 Air Quality Annual Status Report (ASR)

## In fulfilment of Part IV of the Environment Act 1995

## Local Air Quality Management

Date: August 2022


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|---|---|
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# Executive Summary: Air Quality in Our Area

## Air Quality in Epping Forest District

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

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

The 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 2021 show that concentrations at many of the monitoring locations have increased a little since 2020 when they were artificially suppressed by the national lockdowns as a result of the COVID-19 pandemic. Some sites have recorded similar concentrations to last year, and a few have recorded a further decrease in concentrations. 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 Epping, Bell Common. The concentration of nitrogen dioxide measured here during 2021 was 41µg/m$^3$. This is significantly below the 60µg/m$^3$ concentration which is used to indicate that the hourly objective is likely to be exceeded, however it is marginally in excess of the 40µg/m$^3$ annual mean objective. In normal circumstances this would indicate that the Council should consider the revocation of the management area in respect of the hourly exceedance, however as it is anticipated that

[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

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

[3] Defra. Air quality appraisal: damage cost guidance, July 2021

[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

traffic volumes may increase further as more people return to pre-pandemic behaviour, we do not feel it is appropriate to consider such an action at present.

Details of the AQMA, Epping Forest District Council (No.2) can be found at: http://www.essexair.org.uk/AQInEssex/LA/EppingForest.aspx?View=aqma , alternatively a map showing its location can be found in Appendix D of this report.

In January 2021 one additional nitrogen dioxide diffusion tube monitoring location was set up on the façade of the Woodbine Public House, Honey Lane Waltham Abbey. This lane links junction 26 of the M25 to the west of the district and therefore carries a significant amount of traffic. Congestion here often leads to queuing traffic during the morning and evening rush hours. This location reported a concentration of 28.1µg/$m^3$ which is well below the annual mean objective concentration. Monitoring will continue here to ensure that the concentration does not increase significantly once travel returns to pre-pandemic levels and patterns.

Where the Councils Development Control department refer planning applications to Environmental Health, the applications are screened to determine if there is potential for the proposed development to have a negative impact on human health due to air quality. Such applications are both those that increase pollution in an area as well as those that bring 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 will result due to a development, applicants are required to undertake a quantitative assessment of the development and the associated likely changes in traffic movements. Assessments include measures to be implemented which will mitigate all negative air quality impacts resulting from the development. Measures such as 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 2021 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.

The Council continues to work with our partners including Essex County Council and the Environment Agency on environmental protection and air quality matters.

## Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[5] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

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

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 allow their engines to idle. We have produced a number of posters which continue to be rotated around various hotspots in the district to provide a visual reminder to drivers.

Due to a wave of COVID-19 infections at the start of 2021, lockdown restrictions continued until infection levels decreased. Whilst this lockdown was not as restrictive as previous ones, it nevertheless affected traffic levels and therefore is likely to have had an impact on pollution concentrations in the district. Figure 3.1.2 provides a chart illustrating traffic flows on Epping High Road and can be found on page 15 of this report.

The Council had already taken steps in 2020 to facilitate pedestrians to social distance in the high streets by widening kerbs, and in autumn 2021 this temporary measure was made permanent in Epping to make the town centre more pedestrian friendly. Also, at this time the 20mph speed limits were removed from the districts town centre locations which returned to 30mph.

[5] Defra. Clean Air Strategy, 2019

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

The Council has been taking measures to reduce its own impact on air quality by reducing the capacity at its offices and enabling staff to work from home on a permanent basis, whilst encouraging the use of a car share scheme when travel to the offices is required. The Council has installed 9 electric vehicle charge points to date across 4 sites for its fleet and staff use. This includes vehicle to grid charging.

The Council has undertaken a revised Source Apportionment Assessment and is currently rewriting its Air Quality Action Plan with a view to introducing a new range of measures focussing on reducing concentrations of nitrogen dioxide in the AQMA at Epping Bell Common, as well as across the district. We are continuing to explore the possibilities of taking steps that will directly improve the traffic flow at the Epping Bell Common AQMA. Measures will also be aimed at developing appropriate infrastructure to support the anticipated increased uptake in electric and plug-in hybrid vehicles, as well as promoting sustainable transport choices for use by both local businesses and residents. It is anticipated that this revised action plan will be produced by the end of 2022.

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 rose at many sites during 2021 in relation to those concentrations measured during 2020. As similar trends have been observed nationwide it can be assumed that the increase in concentrations is as a result of people returning to pre-lockdown travel patterns. It is likely that the pandemic will have a long-lasting impact on travel patterns for many workers although it is not yet known to what extent this will be case. The Highways authority advise that whilst traffic levels are roughly equal to those on the roads pre-pandemic, fewer cars have been using the roads during morning rush hours, which should help to reduce congestion and associated pollution.

The only location in the district to have an annual mean in excess of the objective in 2021 was ‘3.Epping Bell Vue’ in the AQMA, which recorded a concentration of 41µg/$m^3$.This site had previous recorded 48µg/$m^3$ in 2019, reducing to 32.5µg/$m^3$ in 2020. It is currently not clear as to whether the concentration at this location will increase further without lockdowns affecting travel behaviours. The concentration here has been falling steadily in recent years, likely due to the uptake of cleaner vehicles, and it may be that the result from 2021 reflects

the natural decline in concentrations that would have been recorded despite the pandemic. This will become clearer with continued monitoring in 2022 and beyond.

No exceedances were identified outside of the Air Quality Management Area where relevant receptors were present, and therefore the Council does not propose to declare any further AQMAs at this time.

No changes to declarations are proposed at this time however if concentrations remain at 2021 levels in the future, a revocation of the declaration in respect of the hourly mean concentration will be considered. Further improvement in the concentration of nitrogen dioxide will need to be demonstrated before a revocation of the annual mean objective can be considered.

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

The main priorities for EFDC in 2022 are in relation to:

- Completion of the revised Air Quality Action Plan. This will involve collaboration with colleagues in respect of sustainable transport and climate change in both the district and county council, as well as any relevant external partners.
- Continue 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, and the County Council.
- Commence real time monitoring at two receptor sites in close proximity to the Epping Ongar Heritage Railway.

The challenges that EFDC anticipate are in respect of implementing effective actions that directly target air quality in the AQMA. The approach has been to promote measures that improve air quality district wide, which may only have a limited impact on concentrations at the AQMA. During 2021 many people did not return to their previous travel habits, and the change in commuter patterns together with an increased uptake of low emissions vehicles may lead to a sufficient improvement of nitrogen dioxide concentrations in the AQMA to enable the designation to be revoked. However, it is noted that the long-term impacts of changed working patterns first implemented during the national lockdown are currently

unknown and Epping Forest District Council will not assume that the changes to travel patterns due to the pandemic will be sufficient to meet the annual mean nitrogen dioxide objective. We will continue to work on actions to bring about a long-term improvement in nitrogen dioxide concentrations, especially in the vicinity of the AQMA at Bell Common.

## 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.
- Use central heating to heat your home rather than relying on a log burner.
- 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 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 departments:

- Sustainable Transport
- Climate Change
- Development Control Team
- Local Plans Team
- GIS Team
- Essex County Council Highways

This ASR has been signed off by the Head of Wellbeing and Public Health at Essex County Council, on behalf of the Director of Public Health.

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 2021. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

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

# 2 Actions to Improve Air Quality

## Air Quality Management Areas

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

A summary of AQMAs declared by Epping Forest District Council can be found in Table 2.1. The table presents a description of the AQMA that is currently designated within Epping Forest District. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of the AQMA and 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;

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 do not propose to make any changes to the remaining AQMA at Epping Bell Common (No.2) and no other declarations are required at this time.

Whilst the annual mean concentration of nitrogen dioxide monitored at Bell Common has been below 60 µg/$m^3$ for 4 years, which would normally provide us with confidence that the hourly objective is unlikely to be exceeded, it is felt that due to the large impact of the COVID-19 pandemic on traffic levels, it would be prudent to wait until travel patterns have returned to normal before considering the revocation of the declaration in respect of the hourly objective.

…

## 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 National Highways? | Level of Exceedance: Declaration | Level of Exceedance: Current Year | 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$^3$ | 41 µg/m3 | Air Quality Action Plan 2012 | See comment 3 below |
| 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 (see comment 2 below) | Air Quality Action Plan 2012 | See comment 3 below |

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

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

1. The annual mean concentration of nitrogen dioxide was measured by passive diffusion tubes. In line with research undertaken by AEA Energy and Environment (2008) for Defra, annual mean concentrations in excess of 60µg/m3 are assumed to represent an exceedance of the 1-hourly objective. As there was no continuous analyser at this location, the number of hours exceedance was not available.
2. As the annual mean concentration of nitrogen dioxide is below 60 µg/m3, it can be assumed that the 1-hourly objective has not been exceeded in 2021.
3. At the time of writing this document we are updating our Air Quality Action Plan, having already undertaken a Source Apportionment Assessment. The Source Apportionment Assessment can be found at https://www.eppingforestdc.gov.uk/environment/local-air-quality-management/

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

Defra's appraisal of last year's ASR concluded that the report was well structured and used the relevant LAQM tools to provide the information specified in the guidance. Three points were made in the commentary:

- Consideration should be given to an automatic monitoring site in the AQMA in order to be able to report on the 1-hour mean concentrations of nitrogen dioxide.
  As the annual mean concentration of nitrogen dioxide at this location has not been in excess of 60µg/m3 (the concentration which Defra consider to be indicative of a 1-hourly exceedance) for the last 4 years, we do not consider that this is necessary at this time.

- The Council is to continue to work to revise the AQAP, with a draft submission being made to Defra alongside its consultation. Noted.

- Measures specific to the AQMA should be developed in the AQAP. Noted.

Epping Forest District Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of the measures completed, in progress or planned are set out in Table 2.2**.** Ten measures are included within Table 2.2, with the type of measure and the progress Epping Forest District Council have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

The Council is currently working on a draft Air Quality Action Plan that will provide more detail on these measures as well as introduce new ones. It is hoped that this plan will be finalised towards the end of 2022.

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

- Clean Air Day – undertake additional promotional work outside schools, focussing on known problem areas, speaking to parents in vehicles and also raising awareness with the children.

- Idling vehicles promotion campaign – Raising awareness of the impacts of idling vehicles and that idling is an offence that may lead to the issuing of an FPN. This is to include commercial vehicles.
- Targeted enforcement and use of powers to issue fixed penalty notices (FPNs) in respect of idling stationary vehicles especially where complaints are received, such as taxis and buses at train stations, and all vehicles in the vicinity of schools.
- Increasing the numbers of electric vehicle charge points to facilitate the uptake of cleaner vehicles.
- Continuation of the programme to replace the Council's own vehicle fleet with sustainable alternatives procuring replacement vehicles.
- Liaising with Epping Forest Conservators (as landowners) and Essex County Council Highways Department in relation to options to improve air quality in the Bell Common Air Quality Management Area.
- Liaising with internal departments regarding the emerging Local Plan to ensure that policies facilitate mitigation to protect human health going forward.
- Work with Development Control to update standard conditions placed on planning applications, to ensure that they address current and future issues as a result of development.

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

- Continue liaison with key partners including Essex County Council Highways Department with regards to workable options that will address air quality issues in the Epping Bell Common AQMA. Discussions will be informed by the Source Apportionment Assessment which was undertaken in November 2021 and the outputs from air quality modelling commissioned by the Council to support the emerging Local Plan. These review the potential for longer term improvements in air quality arising from interventions together with the application of policies proposed in the Plan.
- Complete the draft Air Quality Action Plan and consult on this before publishing the final document.
- Targeted enforcement of idling vehicles where complaints are received.

Epping Forest District Council worked to implement measures in partnership with the following stakeholders during 2021:

- Essex County Council
- City of London, Epping Forest Conservators
- Local Bus and Taxi companies

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

- Availability of land adjacent to the Epping Bell Common AQMA which could facilitate adjustments to the road network and therefore improve traffic flow through the area
- Effective partnership working where interests and required outcomes differ.
- Financial costs of implementing preferred options for measures to reduce pollution concentrations
- Effects of the COVID-19 pandemic. The full effects on long term transport patterns are still unknown. It has been suggested that an additional 8% of workers now work from home following the pandemic, however traffic numbers are back to pre-pandemic levels. Will this mean that the concentration of nitrogen dioxide will increase further? Or as fewer cars have been observed on the roads in the morning rush hour, will reduced congestion enable concentrations to reduce further?
- Transport for London have recently consulted on an expansion to the Ultra Low Emission Zone in London. This will bring this zone up to the southern border of Epping Forest District's border. The impact that this will have on the air quality in Epping Forest is unknown, although the modelling provided does not show a negative impact. The proposed expansion is expected in the Autumn of 2023.

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

- Local Plan: The Local Plan has yet to be adopted. At the time of writing the District Council is communicating with the Planning Inspector with regards to a number of modifications. It is unlikely that this plan will be adopted until winter 2022.
- Several of the above measures are linked to the Council's emerging Local Plan. Progress towards the Plan's adoption has been slower than anticipated. The Inspector appointed to examine the Plan has changed and there has been a need to respond to a number of queries that the new Inspector has raised. To support the delivery of development in the district the Council has separately adopted an Interim

Air Pollution Mitigation Strategy (IAPMS) for the Epping Forest SAC. This document is available at https://www.eppingforestdc.gov.uk/planning-and-building/efsac-guidance-for-applicants/ .Some measures within it have the potential to provide air quality benefits not only for the ecological health of the Forest but also on adjoining areas including in the vicinity of the AQMA in respect of human health. Any measures which have the potential to displace road traffic will be assessed in terms of their potential to negatively affect air quality as it relates to human health. The IAPMS has been underpinned by detailed modelling and analysis of air quality impacts within the Epping Forest SAC and includes the Council's proposed approach to undertaking further on-site monitoring and analysis. This will further enhance our understanding of air quality (especially in relation to ecological resources) in this part of the district.

The Source Apportionment Assessment that was undertaken on behalf of Epping Forest District Council models that (assuming no additional measures are put in place) compliance with the nitrogen dioxide annual mean objective in AQMA Epping Forest District Council No.2 (Bell Common) should be met by 2024.

Whilst the measures stated above and in Table 2.2 are anticipated to enable compliance with the objective in 2 years, Epping Forest District Council will be working to reach compliance as soon as possible. The Action Plan will explore additional measures aimed at speeding up compliance and reducing further concentrations within the district so that we are in a position to submit the revocation of AQMA Epping Forest District Council No.2 (Bell Common).

## Table 2.2 – Progress on Measures to Improve Air Quality

| Measure No. | Measure | Category | Classification | Year Measure Introduced | Estimated / Actual Completion Year | Organisations Involved | Funding Source | Defra AQ Grant Funding | Funding Status | Estimated Cost of Measure | Measure Status | Reduction in Pollutant / Emission from Measure | Key Performance Indicator | Progress to Date | Comments / Barriers to Implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Environmental Permitting Inspections | Environmental Permits | Introduction/increase of environment charges through permit systems and economic instruments | ongoing | 2032 | EFDC | N/A | NO | Not Funded | < £10k | Implementation | Applicable to the whole district not just the AQMA | 100% of inspections due completed | 0% for year ending 31.3.2021. This was due to the pandemic. | Inspections resumed during 2021, with all installations now inspected. |
| 2 | Updates to Essex Air Website | Public Information | Via the Internet | ongoing | 2032 | Essex Air | N/A | No | Not Funded | < £10k | Implementation | Applicable to the whole district not just the AQMA | None | Ongoing | Unable to upload documents to EssexAir at present. Replacement website in development. Recent documents on EFDC website. |
| 3 | Fleet Vehicle standards for CO2 | Promoting Low Emission Transport | Company Vehicle Procurement - Prioritising uptake of low emission vehicles | 2017 | 2032 | EFDC | N/A | NO | Not Funded | £1 million - £10 million | Implementation | Applicable to the whole district not just the AQMA | None | Council fleet had 15 electric vehicles (54%) by December 2021. (Also 76% small plant now electric) | Where a suitable electric alternative is available, these are being used. As technology improves further replacements will be made. |
| 4 | Promotion of anti-idling of vehicles. | Public Information | Other | 2018 | 2032 | EFDC | N/A | NO | Not Funded | < £10k | Implementation | Applicable to the whole district not just the AQMA | None | Banners erected at and rotated between a number of sensitive locations. Electronic promotional material produced | Replacement banners needed as faded over time and less noticeable |
| 5 | Enforcement of Idling Vehicles | Traffic Management | Anti-idling enforcement | 2018 | 2032 | EFDC | N/A | NO | Not Funded | < £10k | Implementation | Applicable to the whole district not just the AQMA | None | Campaigns in problem / sensitive locations to raise awareness and promote behaviour change and enforce if necessary | Law requires drivers are asked to turn off engines to avoid being issued with a Fixed Penalty Notice. All drivers have complied to date when asked. |
| 6 | Promotion of sustainable transport to schools | Promoting Travel Alternatives | Other | 2017 | 2032 | EFDC | N/A | NO | Not Funded | < £10k | Implementation | Applicable to the whole district not just the AQMA | None | Promotional Campaigns at 4 Schools to date, raising awareness of idling vehicles and sustainable transport alternatives | 2021 Campaign on Clean Air Day was undertaken by email to all schools due to the pandemic and the resulting |

| Measure No. | Measure | Category | Classification | Year Measure Introduced | Estimated / Actual Completion Year | Organisations Involved | Funding Source | Defra AQ Grant Funding | Funding Status | Estimated Cost of Measure | Measure Status | Reduction in Pollutant / Emission from Measure | Key Performance Indicator | Progress to Date | Comments / Barriers to Implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | staffing shortages. |
| 7 | Installation of Electric Vehicle Charge point infrastructure | Promoting Low Emission Transport | Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging | 2021 | 2032 | EFDC | N/A | NO | Not Funded | £10k - 50k | Implementation | Applicable to the whole district not just the AQMA | None | EVCPs installed at 4 Council properties (9 in total). | 3 x Vehicle to Grid units installed at Oakwood Hill |
| 8 | Promotion of Home working for Council staff | Promoting Travel Alternatives | Encourage / Facilitate homeworking | 2020 | 2032 | EFDC | N/A | NO | Not Funded | < £10k | Implementation | Applicable to the whole district not just the AQMA | None | Officers largely retained as home workers following lockdown during pandemic. | 87 Fixed Desks for 569 employees and 44 Car Parking Spaces |
| 9 | Reduction of Council staff vehicle usage | Alternatives to private vehicle use | Car & lift sharing schemes | 2021 | 2032 | EFDC | N/A | NO | Not Funded | < £10k | Implementation | Applicable to the whole district not just the AQMA | None | Database of staff addresses available and staff encouraged to contact those close by to arrange life sharing to offices as required | 44 Parking spaces for all staff at Civic Offices |
| 10 | Encourage pedestrians in Epping High Street | Traffic Management | Strategic highway improvements, Re-prioritisation of road space away from cars, including access management, selective vehicle priority, bus priority, high vehicle occupancy lane | 2020 | 2021 | EFDC | N/A | NO | Not Funded | £50k - £100k | Completed | Not Assessed | None | Initially a temporary measure during lockdown, this was made permanent during 2021 | Fewer traffic movements along the high street has improved the environment for pedestrians |

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

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

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

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 COVID-19 restrictions our 2020 Clean Air Day campaign was undertaken via the distribution of electronic promotional material.
- 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.
- Updating 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.
- 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. Whilst the percentages below are higher than previous years, it should be noted that the methodology for calculating this indicator has changed.

The percentages for 2020 are as follows:

| | |
|---|---|
| Epping Forest District | 6.1% |
| East of England | 5.8% |
| England | 5.6% |

No information for 2021 is available at the time of writing this report.
Further information regarding this indicator can be found at:
https://fingertips.phe.org.uk/public-health-outcomes-framework#page/4/gid/1000043/pat/6/ati/401/are/E07000072/iid/30101/age/230/sex/4/cat/-1/ctp/-1/cid/4/tbm/1/page-options/ovw-do-0

As Epping Forest District Council did not undertake monitoring of particulate matter (either $PM_{10}$ or $PM_{2.5}$) during 2021, we are reliant on Defra background maps which provide modelled $PM_{2.5}$ 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 11.49 µg/$m^3$ in 2021. 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 4 years (2018: 12.16µg/$m^3$, 2019: 11.90µg/$m^3$, 2020: 11.65µg/$m^3$; 2021: 11.49µg/$m^3$.). 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 Environment Act 2021 addresses the sale of fuels that are to be 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

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

This section sets out the monitoring undertaken within 2021 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 2017 and 2021 to allow monitoring trends to be identified and discussed.

## Summary of Monitoring Undertaken

The monitoring undertaken in 2021 was a continuation of that undertaken by Epping Forest District Council in 2020 with the following alterations:

An additional nitrogen dioxide monitoring location was set up at the start of 2021:

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

This monitoring location was chosen in response to concerns that traffic congestion was commonplace on Honey Lane, especially during the rush hour and when traffic is diverted off the M25 motorway. There are a number of residential properties along this stretch of Honey Lane and therefore there is potential for residents to be exposed to poor air quality if concentrations are found to exceed the objectives.

Monitoring was discontinued at five locations:

- Tube ID 17: 15 The Elms, Waltham Abbey. The Elms previously had 2 monitoring locations, with this location being further from the assumed source road (M25) than the other. Both locations were consistently reading well below the objective. It was considered more appropriate to monitor the other side of this mobile home site, on the façade of the Woodbine Public House Honey Lane, where the diffusion tube would be close to a road that experiences traffic congestion on a regular basis.
- Tube ID 24: Sheering Road, Sheering. this monitoring location was removed as part of the realignment of the road. As the location was recording significantly under the objective (18.3µg/$m^3$ in 2020), it was not felt necessary to find an alternative monitoring site at this time.

- Tube ID 28: 3 Bowes Drive, Ongar This location was part of a short-term project to record concentrations in the vicinity of Epping Ongar Railway. The annual mean concentrations recorded were significantly under the objective (13.4µg/$m^3$ in 2020). The Council will be undertaking real time monitoring in respect of this source in 2022.
- Tube ID 29: 21 Bowes Drive, Ongar. This location was part of a short-term project to record concentrations in the vicinity of Epping Ongar Railway. The annual mean concentrations recorded were significantly under the objective (10.8µg/$m^3$ in 2020). The Council will be undertaking real time monitoring in respect of this source in 2022
- Tube ID 30: 51 Bowes Drive, Ongar. This location was part of a short-term project to record concentrations in the vicinity of Epping Ongar Railway. The annual mean concentrations recorded were significantly under the objective (10.1µg/$m^3$ in 2020). The Council will be undertaking real time monitoring in respect of this source in 2022

### 3.1.1 Automatic Monitoring Sites

Epping Forest District Council did not undertake automatic (continuous) monitoring during 2021.

### 3.1.2 Non-Automatic Monitoring Sites

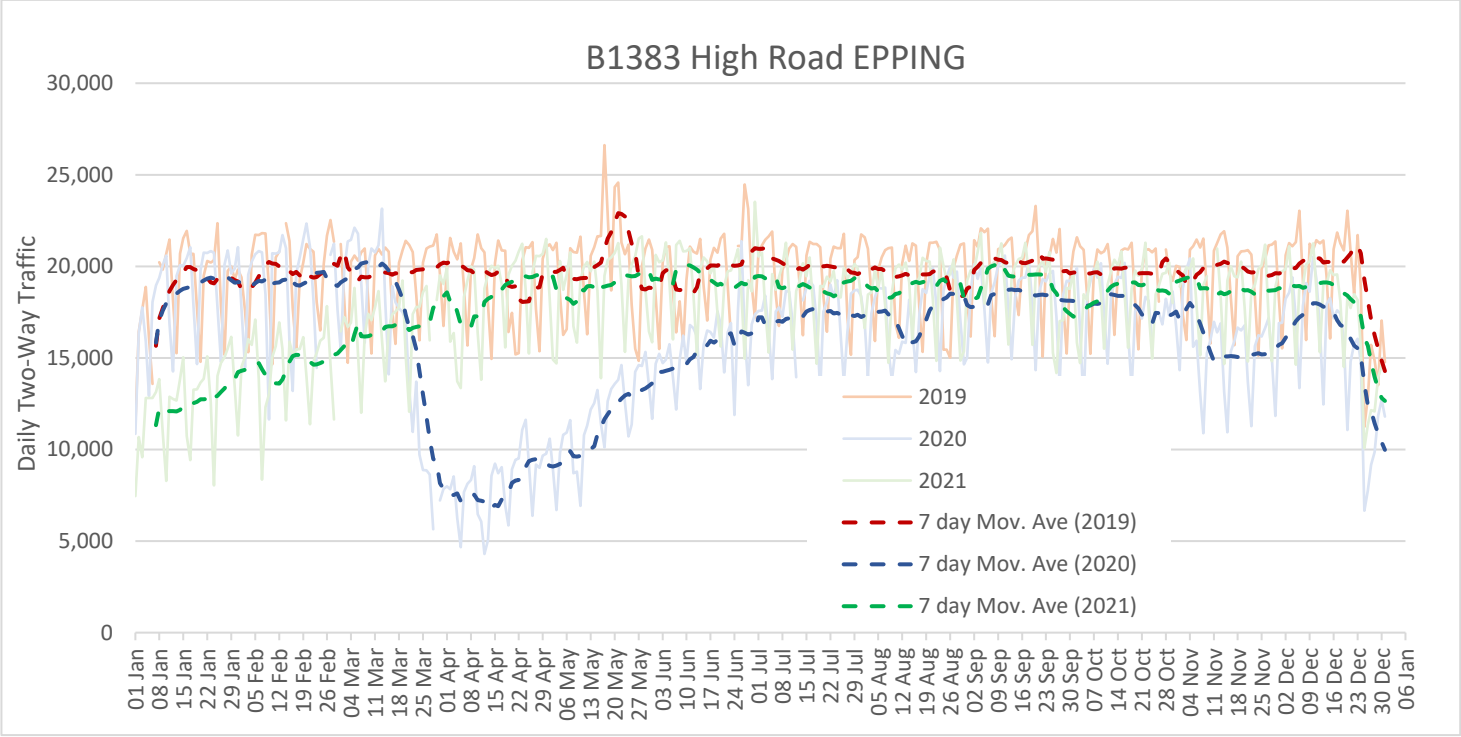
Epping Forest District Council undertook non- automatic (i.e. passive) monitoring of $NO_2$ at 41 sites during 2021. Table A.1 in Appendix A presents the details of the non-automatic sites.

Maps showing the locations 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, are included in Appendix C. Annualisation and distance correction calculations were not required on the monitoring results for 2021 in this report.

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 30 sites increased in 2021, whilst one stayed the same and a 8 continued to show a reduction from the concentrations recorded during the national lockdowns in 2020.

The 2021 annual mean concentration of nitrogen dioxide at the AQMA was higher than that recorded in 2020 (32.5µg/m$^3$), at 41µg/m$^3$ it was marginally above the objective of 40µg/m$^3$. This concentration was however significantly below that recorded prior to the pandemic in 2019 (47.6µg/m$^3$). It is not yet clear whether the 2021 concentration is due to the continued impact of the pandemic on travel behaviours, or whether it reflects a further reduction in nitrogen dioxide concentrations as part of a long-term downward trend. Whilst many people returned to normal working patterns during 2021, this return did not take place until a further spike of COVID-19 infections began to decline in late spring/early summer of 2021. 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 and 2021.

**Figure 3.1 Traffic Flows on Epping High Road**




The green line represents 2021 and shows that overall traffic numbers were increased from those in 2020 which is shown in blue. Traffic flow throughout much of 2021 was similar to 2019 before the pandemic although the slight reduction may be explained by the increase in home working that has continued as a result.

No changes to declarations are proposed at this time however if concentrations remain at 2021 levels in the future, a revocation of the declaration in respect of the hourly mean concentration will be considered. Further improvement in the concentration of nitrogen

dioxide will need to be demonstrated before a revocation of the annual mean objective can be considered.

## 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.

### 3.1.3 Nitrogen Dioxide ($NO_2$)

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 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

All results from 2021 were below the annual mean objective for nitrogen dioxide except the monitoring location in the AQMA (AQMA Epping Forest District Council No. 2) at Bell Common, Epping. The concentration at this location was 41µg/$m^3$.

As none of the other locations measured an annual mean concentration within 10% of the annual mean objective (36µg/$m^3$ or above), no distance to site correction calculations were required to be undertaken on any of the results.

The majority of sites measured an increase in concentrations from those recorded in 2020, however the concentrations were all below those recorded in 2019, prior to the pandemic. There were a number of sites that continued to record a reduction in annual mean concentrations from that recorded in 2020. There was no clear pattern as to where these sites were located.

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.

The data capture during 2021 was greater than 75% for each site, and therefore there was no requirement to undertake annualisation calculations. This approach is in line with TG16, paragraph 7.185.

As the 2021 monitoring data shows that no additional sites measured concentrations of nitrogen dioxide greater than the objective, no further designations are required at this time.

One additional monitoring location was set up at the end of 2021 in response to concerns of poor air quality from a member of the public. Five locations were removed from the 2021 monitoring programme, as detailed above. None of these locations had been recording elevated concentrations of nitrogen dioxide.

### 3.1.4 Particulate Matter ($PM_{10}$)

Particulate matter ($PM_{10}$) monitoring is not undertaken in the district.

### 3.1.5 Particulate Matter ($PM_{2.5}$)

Particulate Matter ($PM_{2.5}$) monitoring is not undertaken in the district.

### 3.1.6 Sulphur Dioxide ($SO_2$)

Sulphur dioxide ($SO_2$) monitoring is not undertaken in the district.

# 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, EFDC 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 |
| 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 |

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| 17a, 17b, 17c | 14 The Elms, Waltham Abbey | Urban Background | 541320 | 200020 | NO2 | No | 0.0 | 55.8 | No | 2.0 |
| 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 Sch, 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 (at Bottleneck) | Roadside | 555253 | 2020921 | 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 |
| 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, High Road, Bell Common, Epping | 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 |

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| 38a, 38b, 38c | 204 High Street, Ongar (Watsons) | Roadside | 555265 | 203108 | NO2 | No | 0.0 | 2.5 | No | 2.0 |
| 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 | 533015 | 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 | 2.0 |

**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 2021 (%) [2] | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1a, 1b, 1c | 544234 | 192236 | Kerbside | 100.0 | 100.0 | **45.3** | 39.2 | 38.9 | 30.0 | 29.6 |
| 2a, 2b, 2c | 545555 | 201732 | Urban Background | 100.0 | 100.0 | 27.6 | 24.5 | 23.9 | 18.1 | 17.9 |
| 3a, 3b, 3c | 544928 | 201281 | Roadside | 100.0 | 100.0 | **64.5** | **54.8** | **47.6** | 32.5 | **41.0** |
| 4a, 4b, 4c | 546196 | 202355 | Roadside | 100.0 | 100.0 | 30.8 | 28.3 | 28.2 | 21.3 | 20.0 |
| 5a, 5b, 5c | 546058 | 202193 | Roadside | 100.0 | 100.0 | 35.7 | 35.9 | 33.5 | 24.0 | 24.8 |
| 6a, 6b, 6c | 547838 | 206819 | Urban Background | 100.0 | 100.0 | 26.0 | 21.8 | 20.1 | 16.1 | 16.9 |
| 7a, 7b | 542505 | 196668 | Roadside | 100.0 | 100.0 | 27.0 | 25.4 | 22.4 | 17.4 | 17.9 |
| 8a, 8b | 542664 | 196868 | Roadside | 100.0 | 100.0 | 26.3 | 23.2 | 21.2 | 16.8 | 17.9 |
| 9a, 9b, 9c | 542339 | 196360 | Roadside | 100.0 | 100.0 | 32.8 | 32.4 | 28.0 | 21.2 | 20.4 |
| 10a, 10b | 542373 | 196478 | Roadside | 100.0 | 100.0 | 37.6 | 32.0 | 28.3 | 21.7 | 22.3 |
| 11a, 11b | 543091 | 197316 | Roadside | 100.0 | 100.0 | 38.6 | 38.8 | 34.4 | 28.0 | 28.8 |
| 12a, 12b, 12c | 549648 | 203671 | Urban Background | 100.0 | 100.0 | 18.4 | 16.0 | 15.1 | 11.5 | 12.1 |
| 13a, 13b, 13c | 540919 | 209956 | Roadside | 100.0 | 100.0 | 23.2 | 22.7 | 20.5 | 16.1 | 16.8 |
| 14a, 14b, 14c | 539711 | 208662 | Urban Background | 100.0 | 100.0 | 17.6 | 17.0 | 15.8 | 13.4 | 13.2 |
| 15a, 15b | 537727 | 196187 | Roadside | 100.0 | 100.0 | 32.7 | 30.3 | 27.2 | 22.6 | 23.2 |
| 17a, 17b, 17c | 541320 | 200020 | Urban Background | 100.0 | 82.2 | 30.3 | 27.9 | 25.7 | 17.0 | 21.4 |
| 18a, 18b | 537808 | 200644 | Roadside | 100.0 | 100.0 | 28.1 | 24.6 | 23.8 | 18.9 | 19.6 |
| 19a, 19b | 538386 | 199557 | Roadside | 100.0 | 100.0 | 25.8 | 27.1 | 26.0 | 20.4 | 22.2 |
| 20a, 20b, 20c | 538710 | 199860 | Roadside | 100.0 | 100.0 | 33.1 | 30.5 | 30.2 | 22.5 | 24.6 |
| 21a, 21b | 538954 | 199973 | Urban Background | 100.0 | 100.0 | 30.1 | 26.8 | 28.2 | 21.0 | 20.8 |
| 22a, 22b | 541719 | 193979 | Roadside | 100.0 | 100.0 | 30.9 | 28.7 | 25.2 | 19.4 | 21.5 |
| 23a, 23b, 23c | 540902 | 194240 | Roadside | 100.0 | 100.0 | 31.9 | 29.2 | 25.7 | 20.1 | 20.6 |
| 25a, 25b, 25c | 541913 | 194020 | Roadside | 100.0 | 100.0 |  | 37.3 | 33.3 | 26.1 | 27.1 |
| 26a, 26b, 26c | 555253 | 202921 | Roadside | 100.0 | 92.1 |  | 38.3 | 33.4 | 27.8 | 31.3 |
| 27a, 27b, 27c | 555125 | 203944 | Roadside | 100.0 | 100.0 |  | 26.7 | 24.2 | 18.3 | 18.7 |
| 31a, 31b, 31c | 546196 | 201563 | Other | 100.0 | 100.0 | - | - | 37.9 | 25.3 | 28.2 |
| 32a, 32b, 32c | 544709 | 201139 | Roadside | 100.0 | 100.0 | - | - | 30.9 | 23.2 | 22.2 |
| 33a, 33b, 33c | 544238 | 192212 | Roadside | 100.0 | 100.0 | - | - | 30.3 | 25.0 | 23.4 |
| 34a, 34b, 34c | 544268 | 192247 | Roadside | 100.0 | 100.0 | - | - | 21.6 | 16.9 | 17.5 |
| 35a, 35b, 35c | 544183 | 192231 | Roadside | 100.0 | 100.0 | - | - | 34.9 | 24.3 | 25.5 |
| 36a, 36b, 36c | 555231 | 202875 | Roadside | 100.0 | 100.0 | - | - | 34.1 | 24.7 | 26.1 |
| 37a, 37b, 37c | 555253 | 202964 | Roadside | 100.0 | 100.0 | - | - | 28.4 | 19.8 | 21.3 |
| 38a, 38b, 38c | 555265 | 203108 | Roadside | 100.0 | 100.0 | - | - | 30.0 | 19.5 | 21.6 |
| 39a, 39b, 39c | 546107 | 202254 | Roadside | 100.0 | 100.0 | - | - | 34.9 | 22.6 | 22.6 |
| 40a, 40b, 40c | 545991 | 202095 | Roadside | 100.0 | 100.0 | - | - | 33.0 | 24.3 | 21.7 |
| 41a, 41b, 41c | 546075 | 202253 | Roadside | 100.0 | 100.0 | - | - | 34.9 | 22.7 | 23.9 |
| 42a, 42b, 42c | 533015 | 205995 | Roadside | 100.0 | 100.0 | - | - | - | 23.0 | 22.3 |
| 43a, 43b, 43c | 539084 | 206058 | Roadside | 100.0 | 100.0 | - | - | - | 21.0 | 21.7 |
| 44a, 44b, 44c | 543989 | 196472 | Roadside | 100.0 | 100.0 | - | - | - | 16.9 | 17.0 |
| 45a, 45b, 45c | 544119 | 196133 | Roadside | 100.0 | 100.0 | - | - | - | 17.9 | 18.6 |
| 46a, 46b, 46c | 541301 | 199731 | Roadside | 100.0 | 100.0 | - | - | - | - | 28.1 |

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

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

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

**Notes:**

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

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.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

## Figure A.1 – Trends in Annual Mean $NO_2$ Concentrations

Figure A.1a

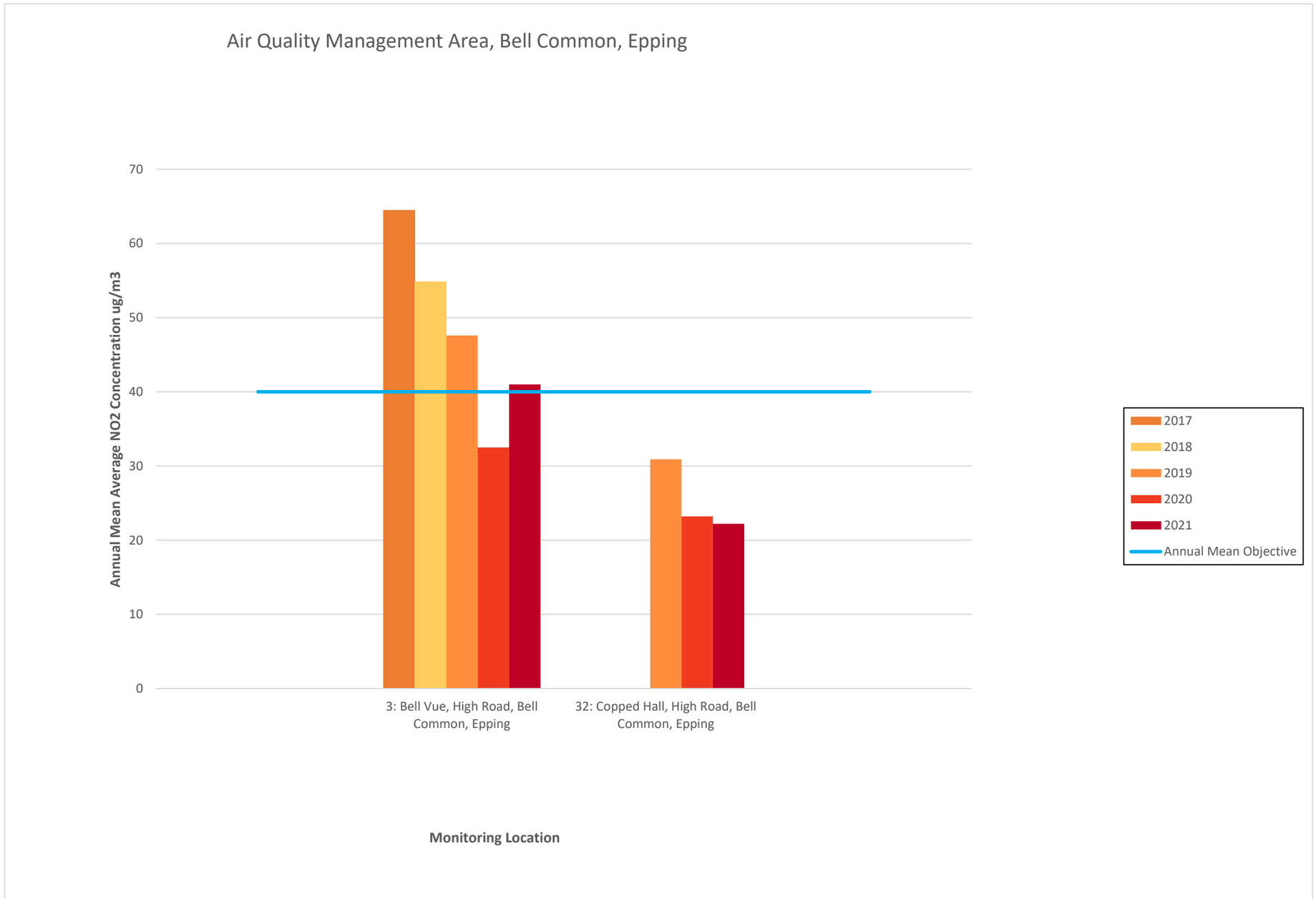


Figure A.1b

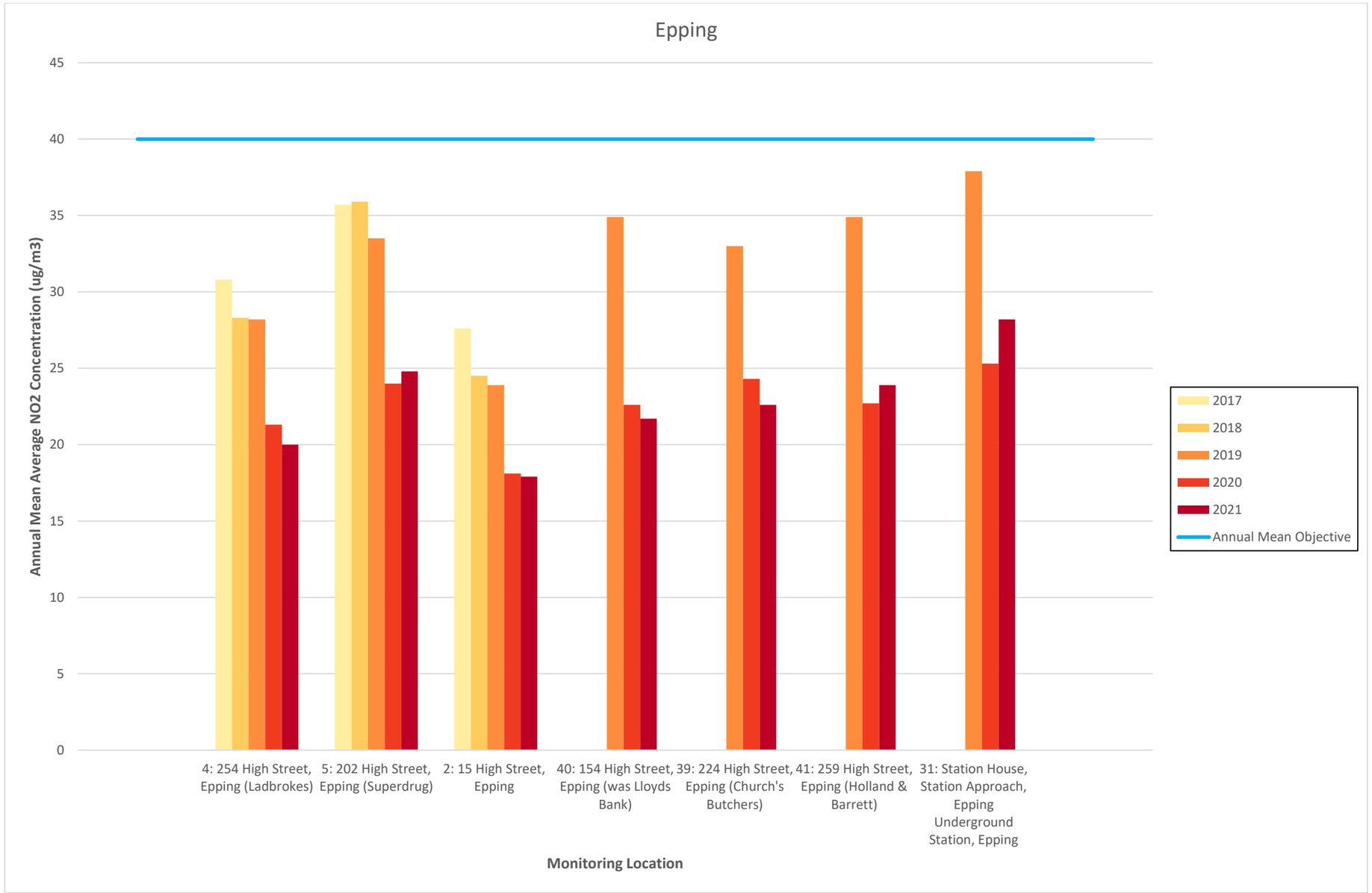

Epping
45
40
35
30
25
20
15
10
5
0
Annual Mean Average NO2 Concentration (ug/m3)
2017
2018
2019
2020
2021
Annual Mean Objective
4: 254 High Street, Epping (Ladbrokes)
5: 202 High Street, Epping (Superdrug)
2: 15 High Street, Epping
40: 154 High Street, Epping (was Lloyds Bank)
39: 224 High Street, Epping (Church's Butchers)
41: 259 High Street, Epping (Holland & Barrett)
31: Station House, Station Approach, Epping Underground Station, Epping
Monitoring Location

Figure A.1c

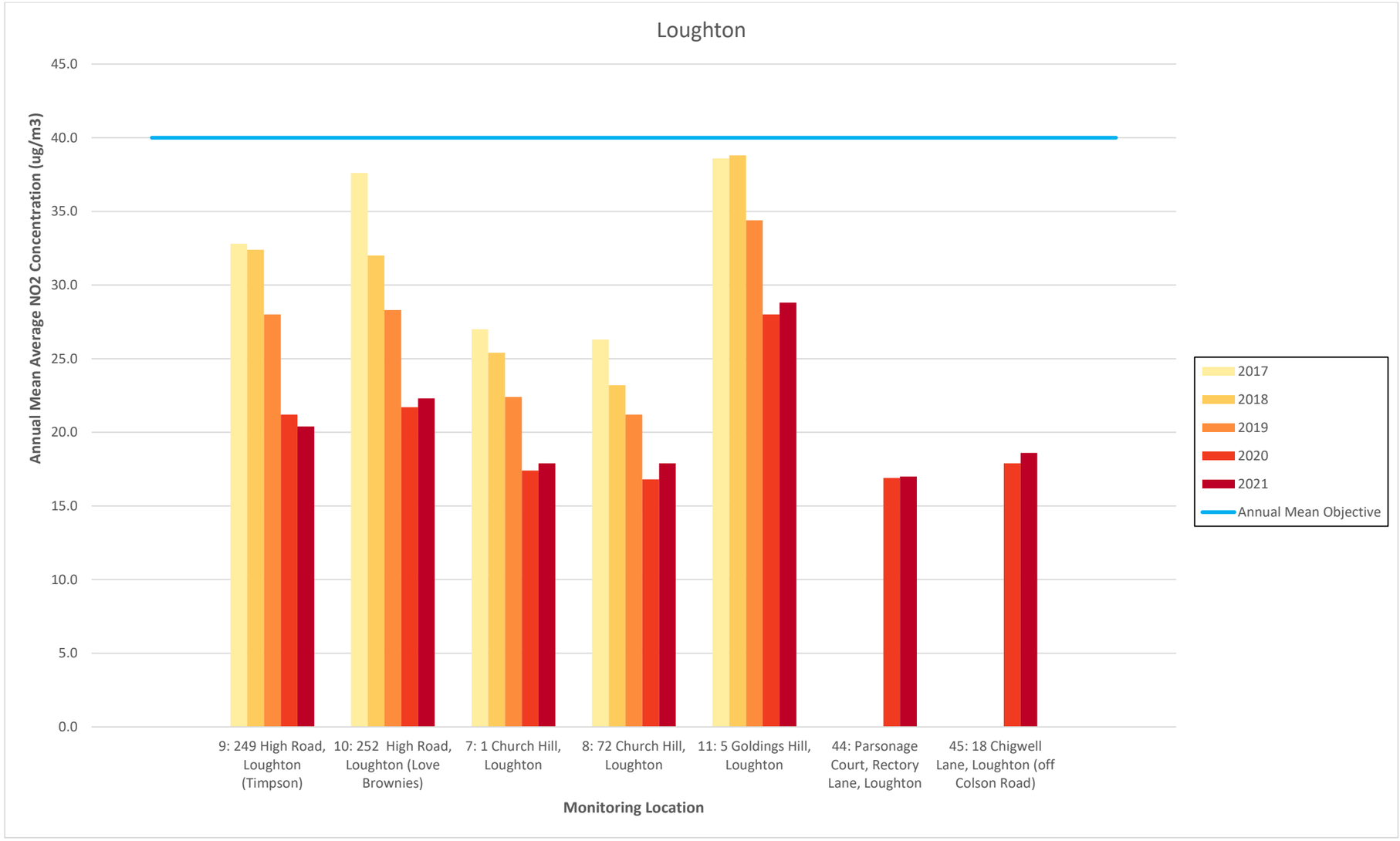

Loughton
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Annual Mean Average NO2 Concentration (ug/m3)
9: 249 High Road, Loughton (Timpson)
10: 252 High Road, Loughton (Love Brownies)
7: 1 Church Hill, Loughton
8: 72 Church Hill, Loughton
11: 5 Goldings Hill, Loughton
44: Parsonage Court, Rectory Lane, Loughton
45: 18 Chigwell Lane, Loughton (off Colson Road)
Monitoring Location
2017
2018
2019
2020
2021
Annual Mean Objective

Figure A.1d

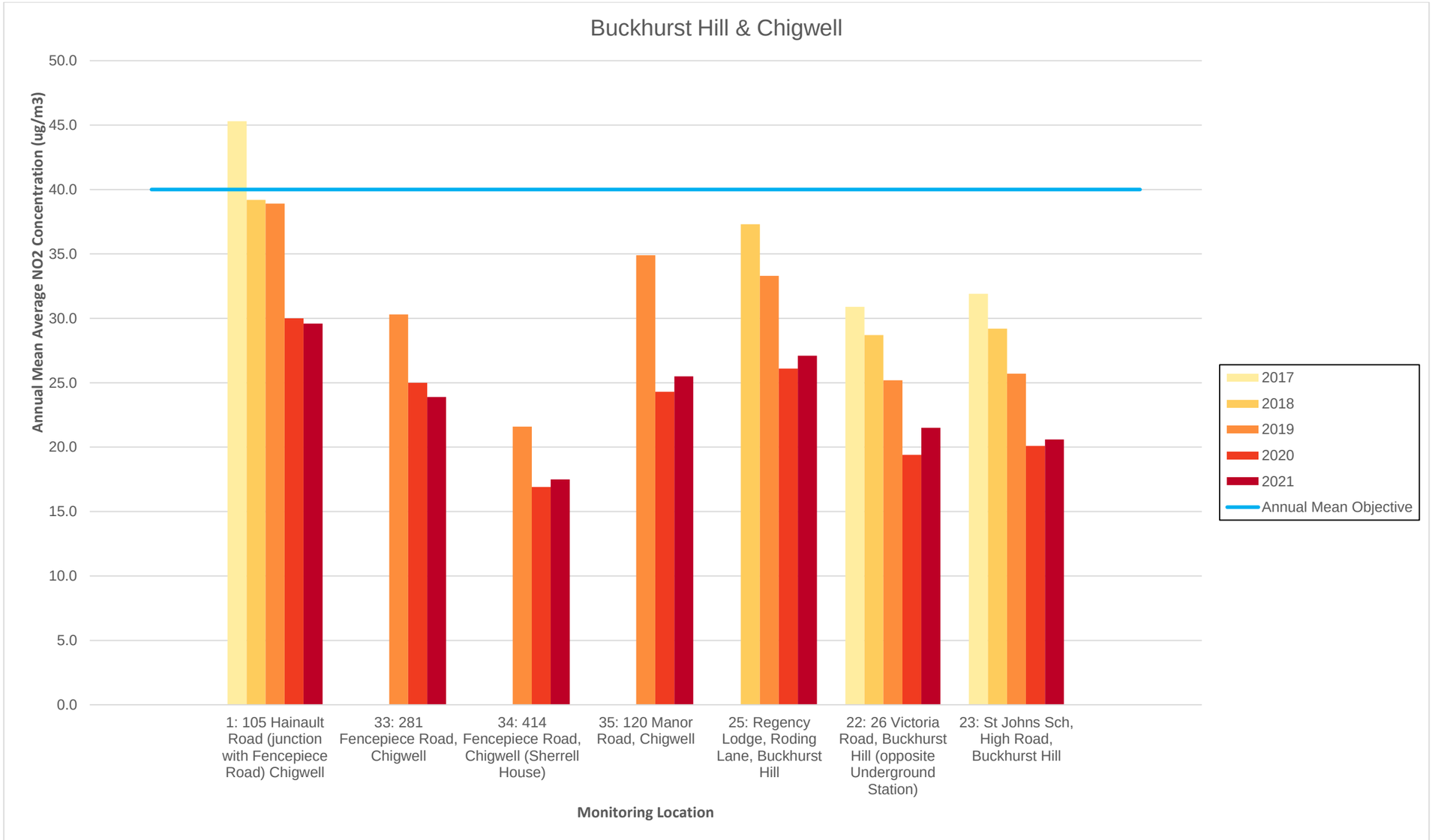

Buckhurst Hill & Chigwell
Annual Mean Average NO2 Concentration (ug/m3)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1: 105 Hainault Road (junction with Fencepiece Road) Chigwell
33: 281 Fencepiece Road, Chigwell
34: 414 Fencepiece Road, Chigwell (Sherrell House)
35: 120 Manor Road, Chigwell
25: Regency Lodge, Roding Lane, Buckhurst Hill
22: 26 Victoria Road, Buckhurst Hill (opposite Underground Station)
23: St Johns Sch, High Road, Buckhurst Hill
Monitoring Location
2017
2018
2019
2020
2021
Annual Mean Objective

Figure A.1e


Waltham Abbey & Sewardstone
Annual Mean Average NO2 Concentration (ug/m3)
45
40
35
30
25
20
15
10
5
0
18: 4 Leaview, Waltham Abbey (Abbey View)
19: 34 Hayden Road, Waltham Abbey
20: 2 Lodge Lane, Waltham Abbey
21: 110 Roundhills, Waltham Abbey
16: 14 The Elms, Waltham Abbey
15: Albion Terrace, Sewardstone Road, Sewardstone
Monitoring Location
2017
2018
2019
2020
2021
Annual Mean Objective 40.0

Figure A.1f

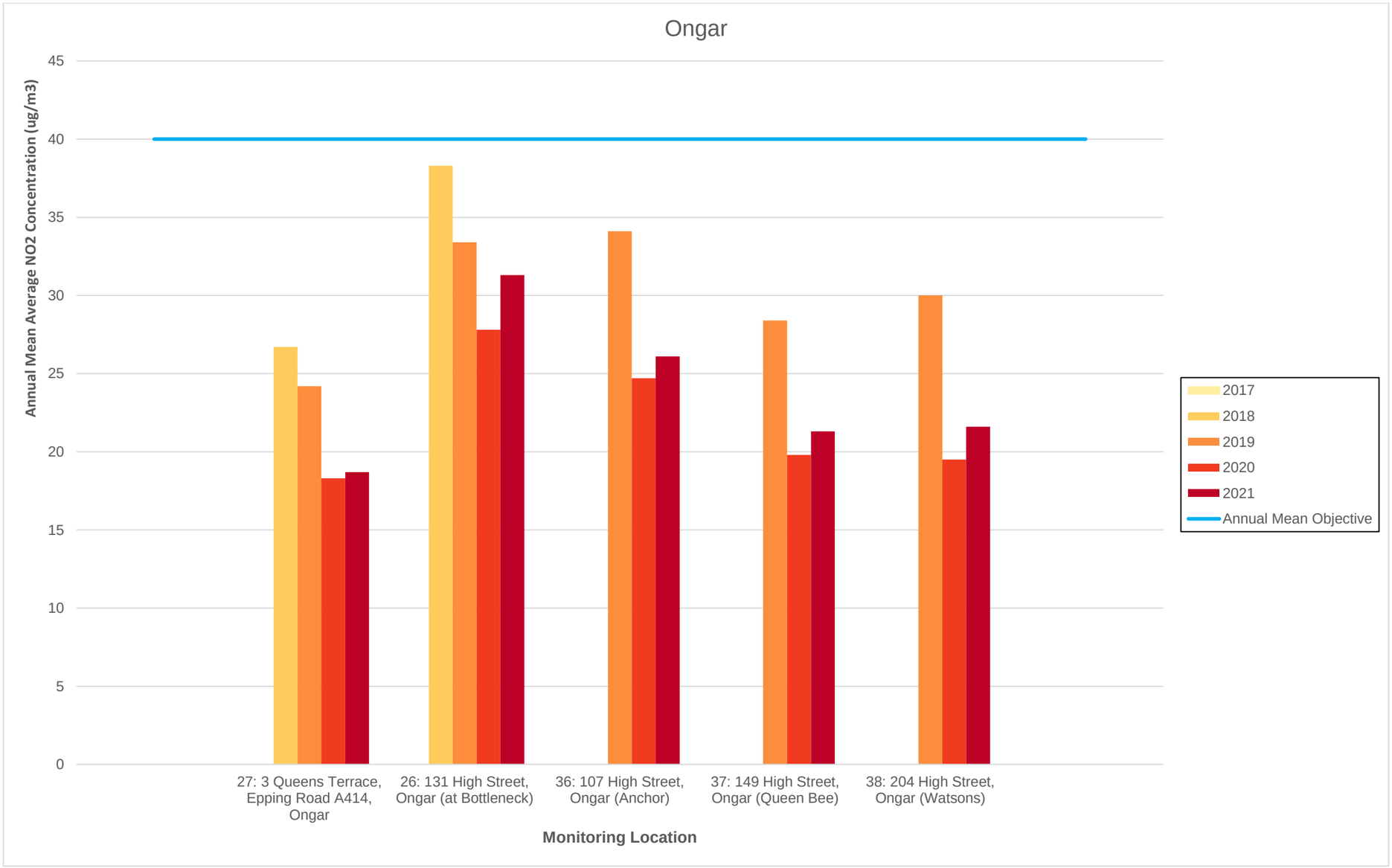

Ongar
Annual Mean Average NO2 Concentration (ug/m3)
45
40
35
30
25
20
15
10
5
0
27: 3 Queens Terrace, Epping Road A414, Ongar
26: 131 High Street, Ongar (at Bottleneck)
36: 107 High Street, Ongar (Anchor)
37: 149 High Street, Ongar (Queen Bee)
38: 204 High Street, Ongar (Watsons)
Monitoring Location
2017
2018
2019
2020
2021
Annual Mean Objective

Figure A.1g

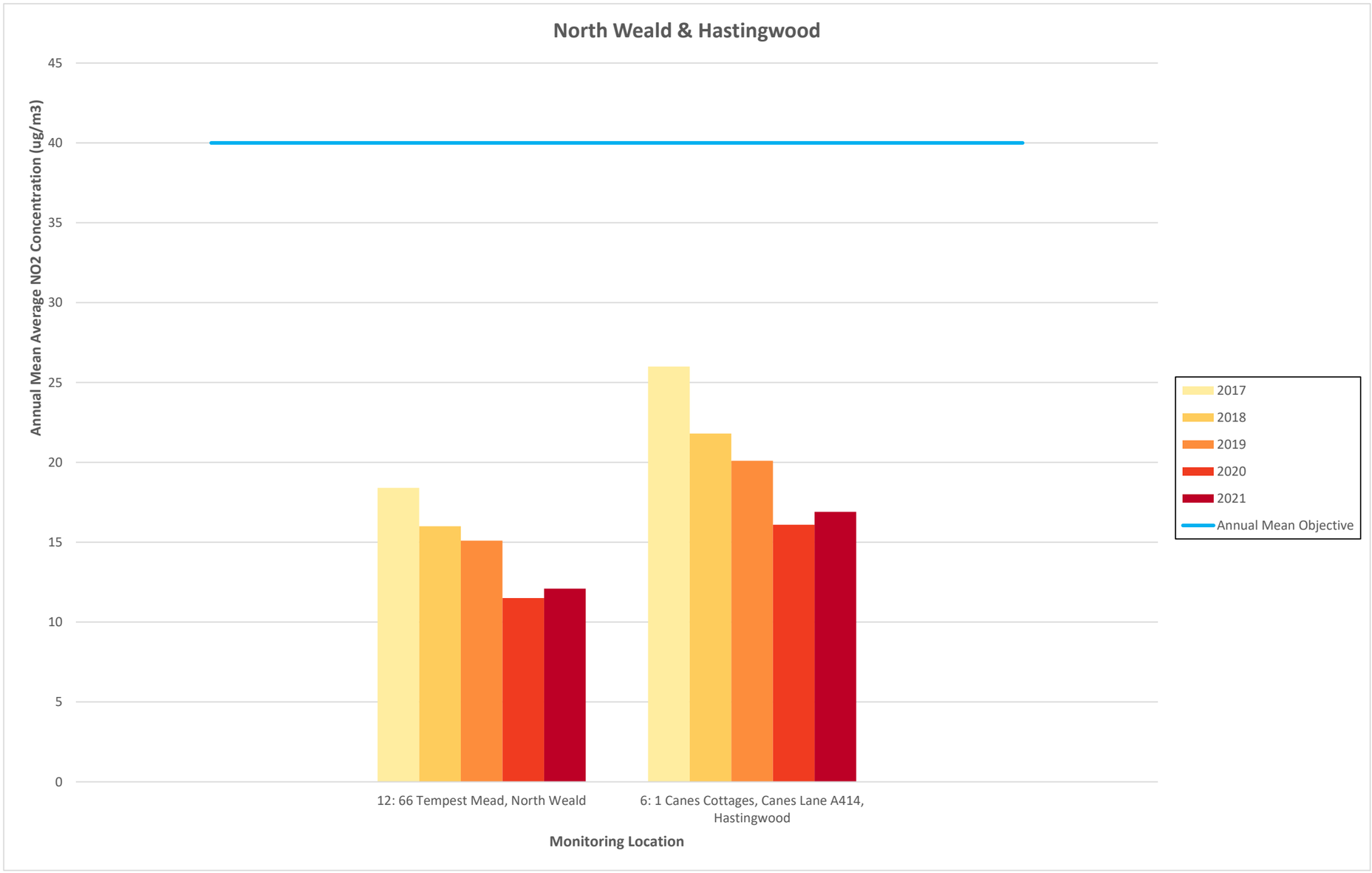
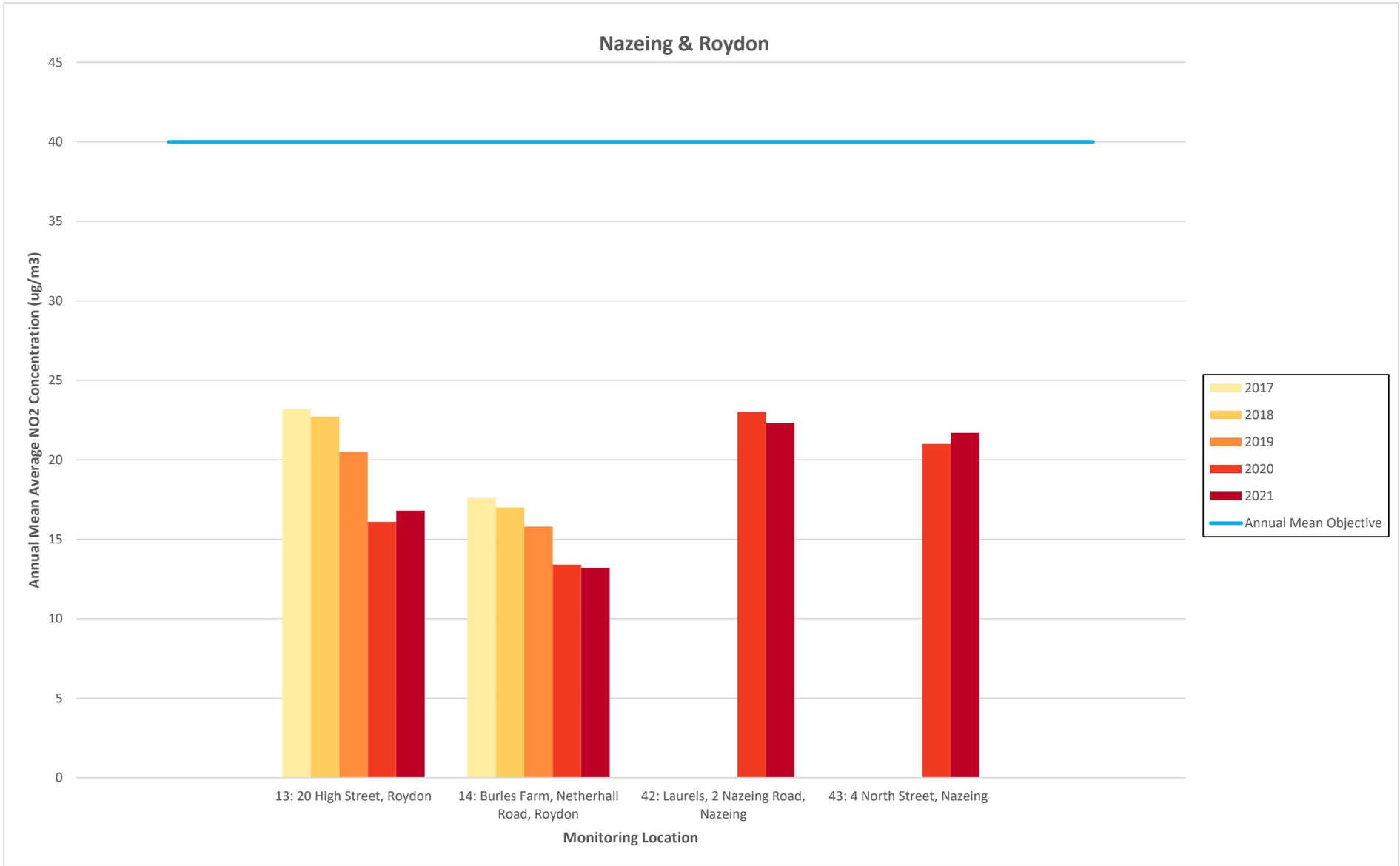

North Weald & Hastingwood
Annual Mean Average NO2 Concentration (ug/m3)
45
40
35
30
25
20
15
10
5
0
12: 66 Tempest Mead, North Weald
6: 1 Canes Cottages, Canes Lane A414, Hastingwood
Monitoring Location
2017
2018
2019
2020
2021
Annual Mean Objective

Figure A.1h


Nazeing & Roydon
45
40
35
30
25
20
15
10
5
0
Annual Mean Average NO2 Concentration (ug/m3)
13: 20 High Street, Roydon
14: Burles Farm, Netherhall Road, Roydon
42: Laurels, 2 Nazeing Road, Nazeing
43: 4 North Street, Nazeing
Monitoring Location
2017
2018
2019
2020
2021
Annual Mean Objective

# Appendix B: Full Monthly Diffusion Tube Results for 2021

## Table B.1 – $NO_2$ 2021 Diffusion Tube Results ($\mu g/m^3$)

| DT ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Easting) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean: Raw Data | Annual Mean: Annualised and Bias Adjusted (0.78) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1a | 544234 | 192236 | **48.5** | 31.7 | 38.4 | 32.8 | 35.9 | 29.7 | 31.7 | 24.9 | 41.8 | 38.1 | 46.1 | 44.9 | - | - | - | Triplicate Site with 1a, 1b and 1c - Annual data provided for 1c only |
| 1b | 544234 | 192236 | **45.6** | 39.1 | 41.6 | 38.6 | 33.9 | 30.5 | | 30.6 | 42.5 | 40.2 | 42.2 | 39.6 | - | - | - | Triplicate Site with 1a, 1b and 1c - Annual data provided for 1c only |
| 1c | 544234 | 192236 | **50.8** | 37.6 | 41.2 | 35.2 | 35.7 | 34.0 | 31.1 | 31.2 | 43.3 | 40.2 | 43.7 | 41.3 | 37.9 | 29.6 | - | Triplicate Site with 1a, 1b and 1c - Annual data provided for 1c only |
| 2a | 545555 | 201732 | 31.0 | 25.9 | 24.0 | 19.6 | 20.3 | 15.5 | 19.4 | 15.4 | 22.9 | 25.8 | 28.0 | 30.0 | - | - | - | Triplicate Site with 2a, 2b and 2c - Annual data provided for 2c only |
| 2b | 545555 | 201732 | 30.6 | 28.7 | 17.3 | 18.5 | 20.6 | 14.4 | 16.1 | 15.6 | 26.6 | 29.5 | 28.8 | 29.1 | - | - | - | Triplicate Site with 2a, 2b and 2c - Annual data provided for 2c only |
| 2c | 545555 | 201732 | 23.4 | 26.6 | 21.0 | 19.2 | 18.1 | 15.1 | 17.5 | 16.0 | 24.8 | 28.0 | 27.9 | 33.0 | 22.9 | 17.9 | - | Triplicate Site with 2a, 2b and 2c - Annual data provided for 2c only |
| 3a | 544928 | 201281 | **52.0** | **49.1** | **52.0** | **51.9** | **50.2** | **51.6** | **46.0** | **45.1** | **56.8** | **60.4** | **60.8** | **54.3** | - | - | - | Triplicate Site with 3a, 3b and 3c - Annual data provided for 3c only |
| 3b | 544928 | 201281 | **55.9** | **57.2** | **55.9** | **46.5** | | **49.0** | **49.1** | **43.8** | **61.0** | **63.3** | **54.9** | **55.6** | - | - | - | Triplicate Site with 3a, 3b and 3c - Annual data provided for 3c only |
| 3c | 544928 | 201281 | **58.0** | **48.9** | **51.3** | **46.2** | **50.8** | **49.3** | **47.3** | **35.7** | **58.6** | **59.8** | **61.3** | **54.5** | 52.6 | **41.0** | - | Triplicate Site with 3a, 3b and 3c - Annual data provided for 3c only |
| 4a | 546196 | 202355 | 30.0 | 29.6 | 28.5 | 19.8 | 22.9 | | 21.8 | 21.1 | 27.0 | 30.9 | 29.6 | 32.7 | - | - | - | Triplicate Site with 4a, 4b and 4c - Annual data provided for 4c only |
| 4b | 546196 | 202355 | 30.4 | 28.6 | 26.0 | 18.9 | 22.6 | 18.5 | | 19.6 | 29.0 | | 30.3 | 31.6 | - | - | - | Triplicate Site with 4a, 4b and 4c - Annual data provided for 4c only |
| 4c | 546196 | 202355 | 25.0 | 29.3 | 26.3 | 19.3 | 22.4 | | 21.0 | 19.6 | 26.4 | | 30.8 | 32.2 | 25.6 | 20.0 | - | Triplicate Site with 4a, 4b and 4c - Annual data provided for 4c only |
| 5a | 546058 | 202193 | 35.2 | 37.4 | 27.6 | 28.4 | 32.2 | 26.4 | 31.1 | 22.5 | 38.1 | 37.5 | 30.5 | 35.2 | - | - | - | Triplicate Site with 5a, 5b and 5c - Annual data provided for 5c only |
| 5b | 546058 | 202193 | 33.7 | 35.7 | 28.6 | 29.5 | 32.2 | 23.4 | 30.6 | 23.3 | 40.0 | 37.5 | 31.1 | 35.8 | - | - | - | Triplicate Site with 5a, 5b and 5c - Annual data provided for 5c only |
| 5c | 546058 | 202193 | 35.2 | 36.3 | 21.4 | 30.9 | 35.0 | 24.9 | 31.5 | 22.0 | 39.7 | 43.0 | 29.6 | 31.6 | 31.8 | 24.8 | - | Triplicate Site with 5a, 5b and 5c - Annual data provided for 5c only |
| 6a | 547838 | 206819 | 29.8 | 20.7 | 22.9 | 20.8 | 19.1 | 17.1 | 15.3 | 16.0 | 21.7 | 24.3 | 29.9 | 27.0 | - | - | - | Triplicate Site with 6a, 6b and 6c - Annual data provided for 6c only |
| 6b | 547838 | 206819 | 29.4 | 20.5 | 23.8 | 19.0 | 15.2 | 17.8 | 16.1 | 16.1 | 21.4 | 21.6 | 30.2 | 27.1 | - | - | - | Triplicate Site with 6a, 6b and 6c - Annual data provided for 6c only |
| 6c | 547838 | 206819 | 28.9 | 22.8 | 23.3 | 19.3 | 19.6 | 17.6 | 15.1 | 15.1 | 21.1 | 24.8 | 24.0 | 26.5 | 21.7 | 16.9 | - | Triplicate Site with 6a, 6b and 6c - Annual data provided for 6c only |
| 7a | 542505 | 196668 | 32.9 | 24.3 | 20.2 | 21.7 | 18.7 | 20.5 | 15.3 | 16.4 | 21.8 | 24.5 | 29.2 | 27.6 | - | - | - | Duplicate Site with 7a and 7b - Annual data provided for 7b only |
| 7b | 542505 | 196668 | 31.1 | 24.4 | 20.2 | 22.7 | 17.5 | 19.8 | 16.2 | 17.4 | 21.8 | 27.1 | 28.7 | 31.8 | 23.0 | 17.9 | - | Duplicate Site with 7a and 7b - Annual data provided for 7b only |
| 8a | 542664 | 196868 | 31.7 | 24.3 | 24.5 | 21.9 | 18.5 | 17.9 | 15.8 | 14.3 | 21.3 | 24.6 | 29.5 | 29.5 | - | - | - | Duplicate Site with 8a and 8b - Annual data provided for 8b only |
| 8b | 542664 | 196868 | 34.1 | 23.6 | 24.5 | 23.0 | 18.3 | 17.3 | 14.8 | 13.6 | 23.6 | 24.8 | 29.8 | 28.4 | 22.9 | 17.9 | - | Duplicate Site with 8a and 8b - Annual data provided for 8b only |
| 9a | 542339 | 196360 | 32.6 | 30.0 | 24.6 | 24.8 | 23.3 | 22.0 | 21.6 | 19.7 | 29.1 | 27.2 | 28.6 | 31.0 | - | - | - | Triplicate Site with 9a, 9b and 9c - Annual data provided for 9c only |
| 9b | 542339 | 196360 | 34.5 | 31.9 | 23.4 | 25.6 | 21.3 | 21.2 | 21.9 | 18.4 | 28.6 | 26.4 | 30.6 | 28.0 | - | - | - | Triplicate Site with 9a, 9b and 9c - Annual data provided for 9c only |
| 9c | 542339 | 196360 | 35.1 | 33.5 | 21.4 | 23.9 | 25.1 | 21.2 | 24.1 | 19.2 | 29.5 | 23.7 | 28.8 | 31.1 | 26.2 | 20.4 | - | Triplicate Site with 9a, 9b and 9c - Annual data provided for 9c only |

| DT ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Easting) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean: Raw Data | Annual Mean: Annualised and Bias Adjusted (0.78) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10a | 542373 | 196478 | 34.6 | 28.0 | 28.2 | | 25.7 | 25.5 | 18.1 | 23.5 | 28.1 | 31.0 | 37.1 | 33.3 | - | - | - | Duplicate Site with 10a and 10b - Annual data provided for 10b only |
| 10b | 542373 | 196478 | 36.1 | 28.9 | | 26.8 | 25.7 | 26.0 | 23.2 | 23.7 | 29.3 | 32.2 | 34.7 | 32.5 | 28.6 | 22.3 | - | Duplicate Site with 10a and 10b - Annual data provided for 10b only |
| 11a | 543091 | 197316 | **45.3** | **41.0** | 35.8 | 34.5 | | 30.5 | 30.5 | 27.2 | **43.7** | 37.5 | **40.7** | **43.7** | - | - | - | Duplicate Site with 11a and 11b - Annual data provided for 11b only |
| 11b | 543091 | 197316 | **43.4** | **42.4** | 33.1 | **41.8** | 30.9 | 33.5 | 34.8 | 26.2 | **44.6** | 36.7 | 39.3 | 39.6 | 37.0 | 28.8 | - | Duplicate Site with 11a and 11b - Annual data provided for 11b only |
| 12a | 549648 | 203671 | 22.5 | 16.0 | 12.5 | 11.5 | 11.6 | 9.0 | 9.9 | 10.4 | 17.6 | 19.5 | 23.0 | 22.9 | - | - | - | Triplicate Site with 12a, 12b and 12c - Annual data provided for 12c only |
| 12b | 549648 | 203671 | 16.1 | 15.1 | 15.7 | 10.0 | 11.9 | 8.3 | 10.7 | 11.3 | 16.7 | 18.7 | 22.2 | 23.9 | - | - | - | Triplicate Site with 12a, 12b and 12c - Annual data provided for 12c only |
| 12c | 549648 | 203671 | 24.3 | 16.9 | 16.7 | 10.6 | 12.6 | 9.5 | 9.8 | 9.9 | 17.2 | 19.0 | 20.2 | 23.6 | 15.5 | 12.1 | - | Triplicate Site with 12a, 12b and 12c - Annual data provided for 12c only |
| 13a | 540919 | 209956 | 32.1 | 25.4 | 22.8 | 19.5 | 19.5 | 16.1 | 15.4 | 14.1 | 22.2 | 23.3 | 28.6 | 27.1 | - | - | - | Triplicate Site with 13a, 13b and 13c - Annual data provided for 13c only |
| 13b | 540919 | 209956 | 29.8 | 25.7 | 17.3 | 18.9 | 16.2 | 15.9 | 15.2 | 13.8 | 23.3 | 24.6 | 27.9 | 28.8 | - | - | - | Triplicate Site with 13a, 13b and 13c - Annual data provided for 13c only |
| 13c | 540919 | 209956 | 26.6 | 26.2 | 21.9 | 18.7 | 16.4 | 13.3 | 14.1 | 13.5 | 23.7 | 21.3 | 27.1 | 28.2 | 21.5 | 16.8 | - | Triplicate Site with 13a, 13b and 13c - Annual data provided for 13c only |
| 14a | 539711 | 208662 | 27.2 | 19.7 | 16.4 | 13.1 | 15.4 | 12.6 | 12.2 | 11.6 | 16.3 | 18.8 | 22.6 | 21.5 | - | - | - | Triplicate Site with 14a, 14b and 14c - Annual data provided for 14c only |
| 14b | 539711 | 208662 | 17.1 | 19.0 | 18.2 | 14.1 | 13.1 | 11.8 | 11.9 | 13.1 | 16.6 | 19.5 | 23.7 | 22.8 | - | - | - | Triplicate Site with 14a, 14b and 14c - Annual data provided for 14c only |
| 14c | 539711 | 208662 | 22.0 | 19.5 | 19.2 | 12.8 | 14.2 | 12.2 | 11.3 | 11.4 | 16.7 | 20.0 | 20.6 | 21.1 | 16.9 | 13.2 | - | Triplicate Site with 14a, 14b and 14c - Annual data provided for 14c only |
| 15a | 537727 | 196187 | 25.7 | 33.5 | 28.9 | 28.5 | 27.1 | 24.2 | 26.4 | 22.8 | 34.7 | 34.7 | 37.5 | 36.3 | - | - | - | Duplicate Site with 15a and 15b - Annual data provided for 15b only |
| 15b | 537727 | 196187 | 42.0 | 25.0 | 29.9 | 25.3 | 28.2 | 24.0 | 24.8 | 22.7 | 30.7 | 32.2 | 33.5 | 34.0 | 29.7 | 23.2 | - | Duplicate Site with 15a and 15b - Annual data provided for 15b only |
| 17a | 541320 | 200020 | 35.2 | 23.7 | | | 20.7 | 25.6 | 17.8 | 26.0 | 24.9 | 27.7 | 43.2 | 29.5 | - | - | - | Triplicate Site with 17a, 17b and 17c - Annual data provided for 17c only |
| 17b | 541320 | 200020 | 34.7 | 26.3 | | | 20.9 | 26.2 | 19.4 | 24.9 | 24.5 | 27.5 | 43.3 | 30.6 | - | - | - | Triplicate Site with 17a, 17b and 17c - Annual data provided for 17c only |
| 17c | 541320 | 200020 | 32.6 | 24.5 | | | 21.4 | 23.0 | 19.0 | 25.1 | 25.1 | 26.3 | 42.2 | 30.9 | 27.4 | 21.4 | - | Triplicate Site with 17a, 17b and 17c - Annual data provided for 17c only |
| 18a | 537808 | 200644 | 33.2 | 31.2 | 24.0 | 20.7 | 23.9 | 17.5 | 18.9 | 18.6 | 26.8 | 29.9 | 31.9 | 32.3 | - | - | - | Duplicate Site with 18a and 18b - Annual data provided for 18b only |
| 18b | 537808 | 200644 | 34.3 | 27.8 | 22.8 | 17.5 | 17.9 | 16.4 | 18.5 | 16.8 | 27.2 | 28.2 | 30.8 | 36.8 | 25.2 | 19.6 | - | Duplicate Site with 18a and 18b - Annual data provided for 18b only |
| 19a | 538386 | 199557 | 35.0 | 26.7 | 28.2 | 29.4 | 23.6 | 27.7 | 21.6 | 25.8 | 29.4 | 28.6 | 32.5 | 32.7 | - | - | - | Duplicate Site with 19a and 19b - Annual data provided for 19b only |
| 19b | 538386 | 199557 | 36.5 | 26.9 | 28.8 | 28.4 | 23.3 | 28.2 | 23.1 | 21.0 | 31.1 | 27.8 | 34.0 | 32.2 | 28.4 | 22.2 | - | Duplicate Site with 19a and 19b - Annual data provided for 19b only |
| 20a | 538710 | 199860 | **40.4** | 32.0 | 33.0 | 27.5 | 26.9 | 24.1 | 23.8 | 24.0 | 31.4 | 32.6 | **42.5** | 36.8 | - | - | - | Triplicate Site with 20a, 20b and 20c - Annual data provided for 20c only |
| 20b | 538710 | 199860 | **41.7** | 29.4 | 31.6 | 31.0 | 26.1 | 26.8 | 23.4 | 27.1 | 33.3 | 31.8 | **41.7** | 36.2 | - | - | - | Triplicate Site with 20a, 20b and 20c - Annual data provided for 20c only |
| 20c | 538710 | 199860 | 37.8 | 30.0 | 35.2 | 29.5 | 25.6 | 27.5 | 23.2 | 25.8 | 32.4 | 30.7 | **41.2** | 39.3 | 31.5 | 24.6 | - | Triplicate Site with 20a, 20b and 20c - Annual data provided for 20c only |
| 21a | 538954 | 199973 | 37.6 | 30.4 | 27.7 | 18.0 | 21.9 | 17.3 | 18.8 | 19.9 | 29.2 | 32.6 | 31.5 | 36.2 | - | - | - | Duplicate Site with 21a and 21b - Annual data provided for 21b only |
| 21b | 538954 | 199973 | 32.0 | 30.4 | 27.7 | 20.6 | 25.4 | 16.9 | 19.4 | 17.1 | 27.5 | 34.5 | 30.0 | 36.7 | 26.6 | 20.8 | - | Duplicate Site with 21a and 21b - Annual data provided for 21b only |
| 22a | 541719 | 193979 | | 25.4 | 28.0 | 28.2 | 22.8 | 23.4 | 20.3 | 17.7 | 31.7 | 29.9 | 34.1 | 30.1 | - | - | - | Duplicate Site with 22a and 22b - Annual data provided for 22b only |

| DT ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Easting) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean: Raw Data | Annual Mean: Annualised and Bias Adjusted (0.78) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22b | 541719 | 193979 | 36.0 | 30.7 | 27.6 | 27.0 | 24.1 | 24.3 | 20.3 | 17.9 | 29.5 | 30.0 | 33.0 | 32.8 | 27.5 | 21.5 | - | Duplicate Site with 22a and 22b - Annual data provided for 22b only |
| 23a | 540902 | 194240 | **42.1** | 30.4 | 25.6 | 21.7 | 22.4 | 17.9 | 16.8 | 17.4 | 26.8 | 31.8 | 30.7 | 32.4 | - | - | - | Triplicate Site with 23a, 23b and 23c - Annual data provided for 23c only |
| 23b | 540902 | 194240 | **40.5** | 30.8 | 25.7 | 22.7 | 20.6 | 19.7 | 19.2 | 16.6 | 28.5 | 29.8 | 29.5 | 33.7 | - | - | - | Triplicate Site with 23a, 23b and 23c - Annual data provided for 23c only |
| 23c | 540902 | 194240 | **40.8** | 28.7 | 25.1 | 21.9 | 24.6 | 17.9 | 21.2 | 16.5 | 29.3 | 28.7 | 30.0 | 32.6 | 26.4 | 20.6 | - | Triplicate Site with 23a, 23b and 23c - Annual data provided for 23c only |
| 25a | 541913 | 194020 | 29.8 | 38.1 | 37.7 | 32.0 |  | 31.1 | 30.1 | 27.0 | **40.4** | **41.5** | **47.4** | 38.8 | - | - | - | Triplicate Site with 25a, 25b and 25c - Annual data provided for 25c only |
| 25b | 541913 | 194020 | 33.8 | 35.2 | 35.3 | 26.5 | 35.4 | 27.5 | 28.3 | 25.2 | 31.9 | 35.0 | **43.1** | **43.5** | - | - | - | Triplicate Site with 25a, 25b and 25c - Annual data provided for 25c only |
| 25c | 541913 | 194020 | 35.0 | 33.2 | 37.8 | 29.4 | 34.2 | 31.3 | 28.0 | 23.9 | 38.7 | **43.5** | **44.4** | **41.1** | 34.7 | 27.1 | - | Triplicate Site with 25a, 25b and 25c - Annual data provided for 25c only |
| 26a | 555253 | 202921 | **41.9** | 36.3 | **45.6** | **43.9** |  | **42.3** | 32.9 | 36.5 | **41.6** | **42.0** | **49.2** | **34.2** | - | - | - | Triplicate Site with 26a, 26b and 26c - Annual data provided for 26c only |
| 26b | 555253 | 202921 | 38.8 | 36.0 | 35.1 | **43.7** |  | 37.0 | 29.4 | 37.6 | **41.5** | **41.5** | **48.3** | **40.7** | - | - | - | Triplicate Site with 26a, 26b and 26c - Annual data provided for 26c only |
| 26c | 555253 | 202921 | **41.4** | 36.6 | **44.6** | **43.3** |  | **44.1** | 30.7 | 35.3 | **41.0** | **42.3** | **48.2** | **41.3** | 40.1 | 31.3 | - | Triplicate Site with 26a, 26b and 26c - Annual data provided for 26c only |
| 27a | 555125 | 203944 | 26.8 | 27.5 | 17.5 | 22.4 | 23.0 | 19.6 | 21.5 | 14.1 | 29.9 | 27.8 | 28.5 | 27.8 | - | - | - | Triplicate Site with 27a, 27b and 27c - Annual data provided for 27c only |
| 27b | 555125 | 203944 | 27.6 | 24.7 | 23.2 | 24.3 | 22.5 | 19.9 | 19.7 | 18.9 | 28.9 | 27.4 | 26.5 | 30.1 | - | - | - | Triplicate Site with 27a, 27b and 27c - Annual data provided for 27c only |
| 27c | 555125 | 203944 | 26.6 | 24.5 | 18.5 | 23.3 | 22.2 | 19.8 | 20.2 | 17.9 | 29.1 | 29.7 | 27.3 | 25.4 | 24.0 | 18.7 | - | Triplicate Site with 27a, 27b and 27c - Annual data provided for 27c only |
| 31a | 546196 | 201563 | 35.2 | 37.0 | 25.9 | 33.0 | 37.3 | 37.0 | **41.3** | 29.8 | **42.1** | **42.1** | 38.3 | 37.9 | - | - | - | Triplicate Site with 31a, 31b and 31c - Annual data provided for 31c only |
| 31b | 546196 | 201563 | 34.4 | 38.2 | 26.6 | 27.0 | **42.4** | **40.6** | 35.0 | 31.9 | **40.0** | 38.5 | 37.1 | 36.2 | - | - | - | Triplicate Site with 31a, 31b and 31c - Annual data provided for 31c only |
| 31c | 546196 | 201563 | 34.6 | **40.5** | 26.1 | 30.6 | 37.5 | 37.6 | **42.1** | 31.9 | **44.1** | 39.9 | 33.7 | 38.0 | 36.2 | 28.2 | - | Triplicate Site with 31a, 31b and 31c - Annual data provided for 31c only |
| 32a | 544709 | 201139 | 38.4 | 33.5 | 28.4 | 24.6 | 24.2 | 21.4 | 19.8 | 16.7 | 33.3 | 33.7 | 32.2 | 33.3 | - | - | - | Triplicate Site with 32a, 32b and 32c - Annual data provided for 32c only |
| 32b | 544709 | 201139 | 35.4 | 33.0 | 27.3 | 24.0 | 26.0 | 20.7 | 23.9 | 21.3 | 26.3 | 35.1 | 34.6 | 35.6 | - | - | - | Triplicate Site with 32a, 32b and 32c - Annual data provided for 32c only |
| 32c | 544709 | 201139 | 38.0 | 28.2 | 28.8 | 25.7 | 28.0 | 20.6 | 24.6 | 20.6 | 27.4 | 33.1 | 34.7 | 32.4 | 28.5 | 22.2 | - | Triplicate Site with 32a, 32b and 32c - Annual data provided for 32c only |
| 33a | 544238 | 192212 | 35.2 | 28.6 | 35.4 | 27.0 | 22.9 | 22.6 | 23.8 | 19.9 | 29.1 | 32.6 | 35.0 | 34.5 | - | - | - | Triplicate Site with 33a, 33b and 33c - Annual data provided for 33c only |
| 33b | 544238 | 192212 | 39.3 | 31.3 | 34.8 | 28.2 | 26.2 | 25.7 | 24.6 |  | 31.8 | 32.3 | 38.7 | 34.7 | - | - | - | Triplicate Site with 33a, 33b and 33c - Annual data provided for 33c only |
| 33c | 544238 | 192212 | **40.0** | 29.1 | 34.2 | 27.0 | 22.8 | 26.1 |  | 23.3 | 32.5 | 35.7 | 39.0 | 31.3 | 30.0 | 23.4 | - | Triplicate Site with 33a, 33b and 33c - Annual data provided for 33c only |
| 34a | 544268 | 192247 | 28.9 | 24.0 | 22.9 | 20.1 | 19.5 | 13.8 | 14.5 | 14.2 | 26.5 | 26.5 | 30.1 | 26.6 | - | - | - | Triplicate Site with 34a, 34b and 34c - Annual data provided for 34c only |
| 34b | 544268 | 192247 | 30.5 | 23.6 | 22.8 | 19.1 | 19.7 | 16.9 | 16.7 | 14.4 | 23.9 | 27.8 | 25.6 | 27.4 | - | - | - | Triplicate Site with 34a, 34b and 34c - Annual data provided for 34c only |
| 34c | 544268 | 192247 | 31.3 | 25.8 | 27.5 | 19.7 | 15.7 | 15.8 | 16.7 | 14.0 | 22.2 | 27.7 | 29.6 | 25.9 | 22.4 | 17.5 | - | Triplicate Site with 34a, 34b and 34c - Annual data provided for 34c only |
| 35a | 544183 | 192231 | **48.1** | 32.5 | 36.2 |  | 28.0 |  | 26.5 | 21.4 | 36.5 | 37.6 | **44.2** | 37.6 | - | - | - | Triplicate Site with 35a, 35b and 35c - Annual data provided for 35c only |
| 35b | 544183 | 192231 | **40.4** | 30.3 | 36.8 |  | 28.9 | 22.8 | 23.8 | 23.6 | 38.0 | 38.8 | **43.4** | 35.4 | - | - | - | Triplicate Site with 35a, 35b and 35c - Annual data provided for 35c only |
| 35c | 544183 | 192231 | **40.2** | 31.9 | 37.0 | 28.2 | 30.7 | 26.5 | 23.5 | 22.5 | 30.0 | 36.8 | **43.3** | 36.4 | 32.7 | 25.5 | - | Triplicate Site with 35a, 35b and 35c - Annual data provided for 35c only |

| DT ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Easting) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean: Raw Data | Annual Mean: Annualised and Bias Adjusted (0.78) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36a | 555231 | 202875 | 39.3 | 31.5 | 38.6 | 34.3 | 22.3 | 32.5 | 27.7 | 29.0 | 35.7 | 34.2 | **41.1** | 38.8 | - | - | - | Triplicate Site with 36a, 36b and 36c - Annual data provided for 36c only |
| 36b | 555231 | 202875 | 39.2 | 32.7 | 34.7 | 31.7 | 29.2 | 32.4 | 26.5 | 27.3 | 31.6 | 38.9 | **40.7** | **40.3** | - | - | - | Triplicate Site with 36a, 36b and 36c - Annual data provided for 36c only |
| 36c | 555231 | 202875 | 39.2 | 33.8 | 37.2 | 31.0 | 32.1 | 30.6 | 22.1 | 16.6 | 34.4 | 35.4 | **40.3** | 39.9 | 33.4 | 26.1 | - | Triplicate Site with 36a, 36b and 36c - Annual data provided for 36c only |
| 37a | 555253 | 202964 | 31.7 | 23.9 | 31.2 | 25.3 | 27.4 | 27.8 | 19.9 | 23.7 | 27.5 | 30.5 | 35.7 | 31.7 | - | - | - | Triplicate Site with 37a, 37b and 37c - Annual data provided for 37c only |
| 37b | 555253 | 202964 | 22.4 | 26.2 | 30.9 | 28.8 | 25.6 | 25.6 | 22.6 | 21.6 | 25.9 | 28.4 | 36.8 | 27.7 | - | - | - | Triplicate Site with 37a, 37b and 37c - Annual data provided for 37c only |
| 37c | 555253 | 202964 | 35.2 | 24.8 | 28.3 | 22.7 | 16.4 | 27.2 | 22.6 | 23.0 | 28.1 | 30.3 | 36.0 | 31.3 | 27.4 | 21.3 | - | Triplicate Site with 37a, 37b and 37c - Annual data provided for 37c only |
| 38a | 555265 | 203108 | 33.1 | 29.3 | 31.2 | 25.9 | 24.5 | 23.2 | 21.5 | 20.4 | 26.9 | 33.4 | 33.7 | 31.0 | - | - | - | Triplicate Site with 38a, 38b and 38c - Annual data provided for 38c only |
| 38b | 555265 | 203108 | 33.6 | 31.5 | 29.4 | 23.5 | 27.0 | 19.0 | 21.2 | 20.5 | 29.5 | 31.6 | 33.8 | 33.0 | - | - | - | Triplicate Site with 38a, 38b and 38c - Annual data provided for 38c only |
| 38c | 555265 | 203108 | 31.5 | 33.5 | 27.3 | 26.4 | 25.1 | 22.1 | 20.7 | 20.6 | 28.3 | 26.8 | 32.9 | 34.9 | 27.7 | 21.6 | - | Triplicate Site with 38a, 38b and 38c - Annual data provided for 38c only |
| 39a | 546107 | 202254 | 27.3 | 32.6 | 26.7 | 26.0 | 27.2 | 24.0 | 27.9 | 25.1 | 35.0 | 35.5 | 31.9 | 34.9 | - | - | - | Triplicate Site with 39a, 39b and 39c - Annual data provided for 39c only |
| 39b | 546107 | 202254 |  | 29.6 | 26.7 | 21.4 | 24.6 | 24.3 | 27.5 | 26.2 | 25.1 | 35.1 | 32.1 | 33.3 | - | - | - | Triplicate Site with 39a, 39b and 39c - Annual data provided for 39c only |
| 39c | 546107 | 202254 | 27.2 | 33.0 | 26.2 | 26.2 | 26.8 | 25.5 | 28.4 | 24.3 | 36.3 | 34.2 | 31.4 | 34.9 | 28.9 | 22.6 | - | Triplicate Site with 39a, 39b and 39c - Annual data provided for 39c only |
| 40a | 545991 | 202095 | 29.0 | 32.2 | 24.4 | 25.3 | 24.8 | 24.3 | 27.8 | 19.6 | 30.4 | 32.4 | 29.1 | 29.7 | - | - | - | Triplicate Site with 40a, 40b and 40c - Annual data provided for 40c only |
| 40b | 545991 | 202095 | 29.1 | 31.8 | 25.2 | 25.9 | 24.3 | 24.7 | 26.7 | 21.0 | 35.3 | 31.7 | 29.8 | 30.8 | - | - | - | Triplicate Site with 40a, 40b and 40c - Annual data provided for 40c only |
| 40c | 545991 | 202095 | 30.7 | 28.7 | 25.8 | 26.1 | 29.1 | 23.6 | 25.9 | 19.4 | 34.4 | 30.1 | 29.0 | 32.0 | 27.8 | 21.7 | - | Triplicate Site with 40a, 40b and 40c - Annual data provided for 40c only |
| 41a | 546075 | 202253 | 31.6 | 32.7 | 29.1 | 27.5 | 26.9 | 27.4 | 24.1 | 25.9 | 30.4 | 35.4 | 37.8 | 35.8 | - | - | - | Triplicate Site with 41a, 41b and 41c - Annual data provided for 41c only |
| 41b | 546075 | 202253 | 34.7 | 29.6 | 24.5 | 28.4 | 26.5 | 27.9 | 24.9 | 25.2 | 29.5 | 36.0 | 38.9 | 37.9 | - | - | - | Triplicate Site with 41a, 41b and 41c - Annual data provided for 41c only |
| 41c | 546075 | 202253 | 36.4 | 31.5 | 32.1 | 27.7 | 26.6 | 26.6 | 25.0 | 26.6 | 32.2 | 35.2 | 38.5 | 33.9 | 30.6 | 23.9 | - | Triplicate Site with 41a, 41b and 41c - Annual data provided for 41c only |
| 42a | 533015 | 205995 | 34.6 | 33.6 | 32.9 | 25.6 | 20.4 | 24.1 | 23.4 | 20.1 | 30.0 | 29.6 | 36.8 | 38.3 | - | - | - | Triplicate Site with 42a, 42b and 42c - Annual data provided for 42c only |
| 42b | 533015 | 205995 |  | 33.0 | 28.8 | 28.1 | 18.8 | 24.3 | 22.8 | 20.5 | 30.9 | 32.5 | 39.5 | 28.8 | - | - | - | Triplicate Site with 42a, 42b and 42c - Annual data provided for 42c only |
| 42c | 533015 | 205995 | 36.5 | 29.4 | 27.7 | 28.4 | 11.4 | 25.0 | 22.3 | 23.9 | 26.2 | 32.0 | 39.0 | 34.9 | 28.6 | 22.3 | - | Triplicate Site with 42a, 42b and 42c - Annual data provided for 42c only |
| 43a | 539084 | 206058 | 37.9 | 32.7 | 30.9 | 24.6 | 21.2 | 21.6 | 22.5 | 20.5 | 30.6 | 34.9 | 32.7 | 29.9 | - | - | - | Triplicate Site with 43a, 43b and 43c - Annual data provided for 43c only |
| 43b | 539084 | 206058 | 35.7 | 29.3 | 26.9 | 23.6 | 26.6 | 22.3 | 21.8 | 19.8 | 29.6 | 29.5 | 33.2 | 31.8 | - | - | - | Triplicate Site with 43a, 43b and 43c - Annual data provided for 43c only |
| 43c | 539084 | 206058 | 34.9 | 32.9 | 31.1 | 26.2 | 12.9 | 23.6 | 22.5 | 21.2 | 31.0 | 29.2 | 36.1 | 29.9 | 27.8 | 21.7 | - | Triplicate Site with 43a, 43b and 43c - Annual data provided for 43c only |
| 44a | 543989 | 196472 | 30.3 | 23.6 | 20.8 | 19.5 | 17.5 | 14.6 | 15.7 | 11.5 | 24.2 | 27.5 | 28.6 | 27.5 | - | - | - | Triplicate Site with 44a, 44b and 44c - Annual data provided for 44c only |
| 44b | 543989 | 196472 | 30.9 | 25.2 | 20.0 | 16.8 | 12.8 | 15.0 | 16.1 | 12.5 | 23.4 | 28.3 | 30.2 | 29.2 | - | - | - | Triplicate Site with 44a, 44b and 44c - Annual data provided for 44c only |
| 44c | 543989 | 196472 | 28.4 | 24.0 | 21.8 | 19.4 |  | 15.1 | 15.7 | 13.8 | 25.9 | 28.9 | 29.4 | 26.5 | 21.8 | 17.0 | - | Triplicate Site with 44a, 44b and 44c - Annual data provided for 44c only |
| 45a | 544119 | 196133 | 30.2 | 29.2 | 22.1 | 20.9 | 20.1 | 22.4 | 17.4 | 15.8 | 22.8 | 26.5 | 29.2 | 31.5 | - | - | - | Triplicate Site with 45a, 45b and 45c - Annual data provided for 45c only |

| DT ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Easting) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean: Raw Data | Annual Mean: Annualised and Bias Adjusted (0.78) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45b | 544119 | 196133 | 28.2 | 27.3 | | 25.2 | 20.1 | 19.6 | 16.6 | 16.6 | 23.9 | 26.1 | 30.7 | 29.6 | - | - | - | Triplicate Site with 45a, 45b and 45c - Annual data provided for 45c only |
| 45c | 544119 | 196133 | 32.1 | 27.9 | 22.0 | 24.5 | 11.7 | 20.7 | 17.8 | 16.3 | 25.2 | 25.1 | 29.4 | 33.1 | 23.9 | 18.6 | - | Triplicate Site with 45a, 45b and 45c - Annual data provided for 45c only |
| 46a | 541301 | 199731 | 44.7 | 32.1 | 34.4 | | 35.3 | 34.3 | 30.4 | 30.5 | 39.1 | 38.8 | 38.2 | 37.3 | - | - | - | Triplicate Site with 46a, 46b and 46c - Annual data provided for 46c only |
| 46b | 541301 | 199731 | 43.6 | 33.6 | 38.1 | 39.3 | 27.2 | 33.8 | 26.9 | 33.9 | **42.0** | 37.8 | 31.6 | 39.0 | - | - | - | Triplicate Site with 46a, 46b and 46c - Annual data provided for 46c only |
| 46c | 541301 | 199731 | 40.3 | 37.2 | 38.0 | | 33.3 | 34.5 | 31.4 | 31.7 | **44.4** | 34.2 | 33.6 | 38.4 | 36.0 | 28.1 | - | Triplicate Site with 46a, 46b and 46c - Annual data provided for 46c 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.TG16.**

☒ **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 2021 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 2021

Epping Forest District Council has not identified any new sources relating to air quality within the reporting year of 2021.

## Additional Air Quality Works Undertaken by Epping Forest District Council During 2021

### Source Apportionment Assessment

Epping Forest District Council has undertaken a Source Apportionment Assessment in respect of the AQMA Epping Forest District Council No.2 (Bell Common) during 2021. Below is a summary of the main finding of this report, which can also be found at https://www.eppingforestdc.gov.uk/environment/local-air-quality-management/ .

The report concluded that with no additional actions, the AQMA was modelled to meet the objective for the annual mean nitrogen dioxide concentration by 2024, and to be below 10% of the objective by 2026. The sources of pollution were assessed to be:

- 46.6% of all vehicles on Epping High Road were petrol cars
- The fleet make up was older than the fleet assumption
- The M25 Motorway accounted for half of the background NOx in the vicinity
- Diesel cars and Diesel Light Goods Vehicles (LGV) are the primary contributors of local road NOx within the AQMA
- Total NOx contributions are roughly equally split between total cars, LGVs and heavy goods vehicles (HGV).
- Congestion and queuing traffic accounts for 81.9% of NOx at the AQMA.
- Particulates at the AQMA are largely made up from background sources, The greatest local contributor was Diesel Cars followed by Petrol Cars then Diesel LGVs

### Climate Change Action Plan

Epping Forest Council approved its Climate Change Action Plan in April 2022. This plan incorporates air quality as one of the district wide actions to improve out climate. The document is published on the Councils website https://www.eppingforestdc.gov.uk/environment/climate-change-action-plan-consultation/ .

### Interim Air Pollution Mitigation Strategy

Air quality in the forest is of concern as pollution is having a negative impact on the ecological resources in the Special Area of Conservation (SAC). This document was produced in December 2020 as part of the evidence to support the revised local Plan. It sets out the Councils strategy for the protection of ecological resources whilst enabling development in the district.

The document is published on the Councils website https://www.eppingforestdc.gov.uk/planning-and-building/efsac-guidance-for-applicants/ .

### Monitoring of Air Quality associated with Heritage Railway

Following complaints of air pollution from residents in the vicinity of the Epping Ongar Heritage Railway, the Council have committed to a project to monitor at 2 real time analysers for a period of one year. This project will enable the Council to determine if air quality objectives are being met, and therefore whether any actions to improve air quality are required.

## QA/QC of Diffusion Tube Monitoring

The supplier used for diffusion tubes was SOCOTEC and the method of preparation was 50% TEA in acetone.

SOCOTEC participates in the AIR NO2 PT laboratory performance scheme. Rounds AR042, AR043, AR045, and AR046 cover the 2021 monitoring period contained in this Air Quality Status Report. SOCOTEC prescribe 2 sets of tests (2 x 4 test samples on each round). The results for AR042, AR043 and AR046 were good, with 100% performance. Round AR045 achieved 87.5 performance.

The monitoring has been completed in adherence with the 2021 Diffusion Tube Monitoring Calendar.

### Diffusion Tube Annualisation

All diffusion tube monitoring locations within Epping Forest District recorded data capture of 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

### Diffusion Tube Bias Adjustment Factors

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

Epping Forest District Council have applied a national bias adjustment factor of 0.78 to the 2021 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.

Epping Forest District Council uses the national bias adjustment factor as they do not have a continuous analyser and therefore cannot undertake a local co-location study.

### Table C.1 – Bias Adjustment Factor

| Monitoring Year | Local or National | If National, Version of National Spreadsheet | Adjustment Factor |
|---|---|---|---|
| **2021** | National | 6/22 | 0.78 |
| **2020** | National | 09/21 | 0.76 |
| **2019** | National | 09/20 | 0.75 |
| **2018** | National | 03/19 | 0.76 |

| | | | |
|---|---|---|---|
| **2017** | National | 03/18 | 0.77 |

## $NO_2$ Fall-off with Distance from the Road

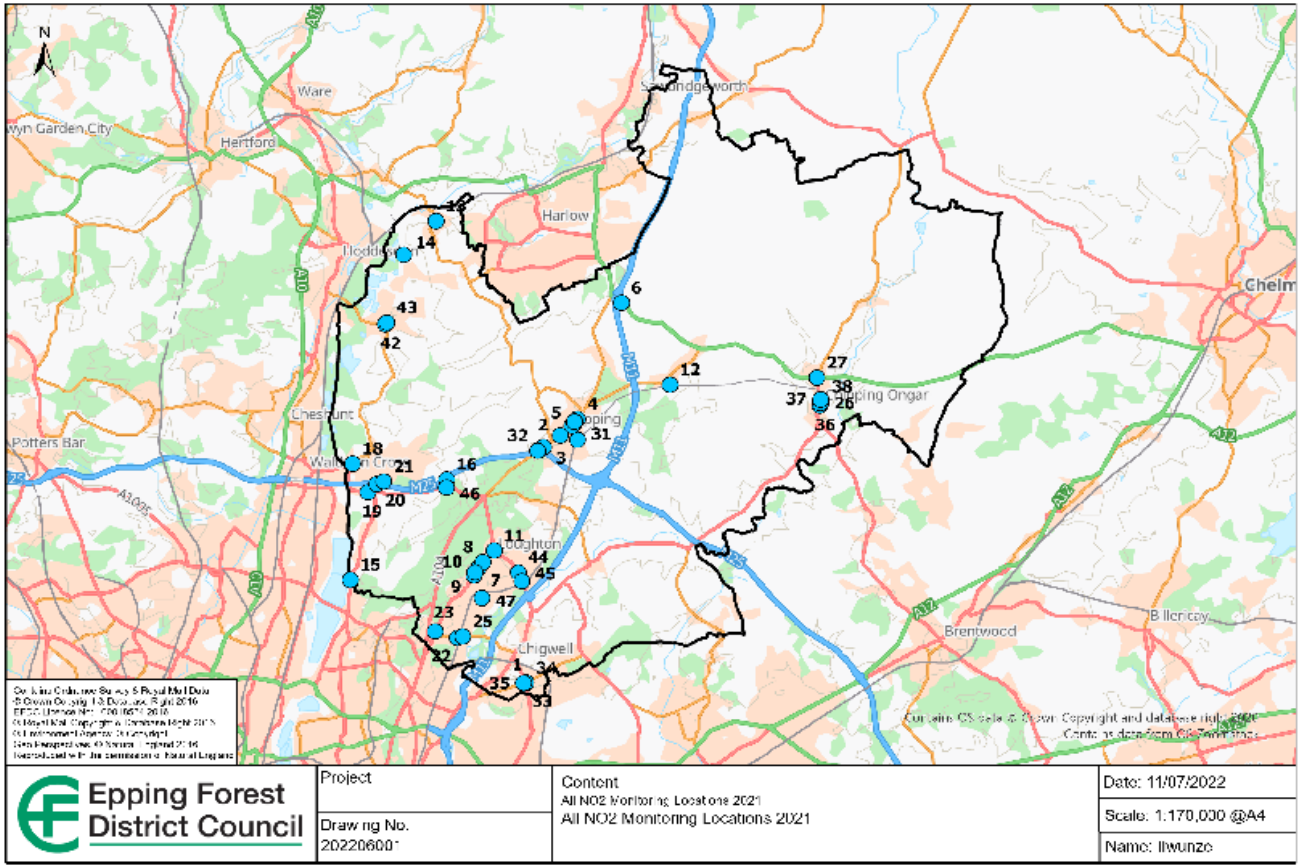
Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the $NO_2$ concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/$NO_2$ fall-off with distance calculator available on the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

No diffusion tube $NO_2$ monitoring locations within Epping Forest District required distance correction during 2021.

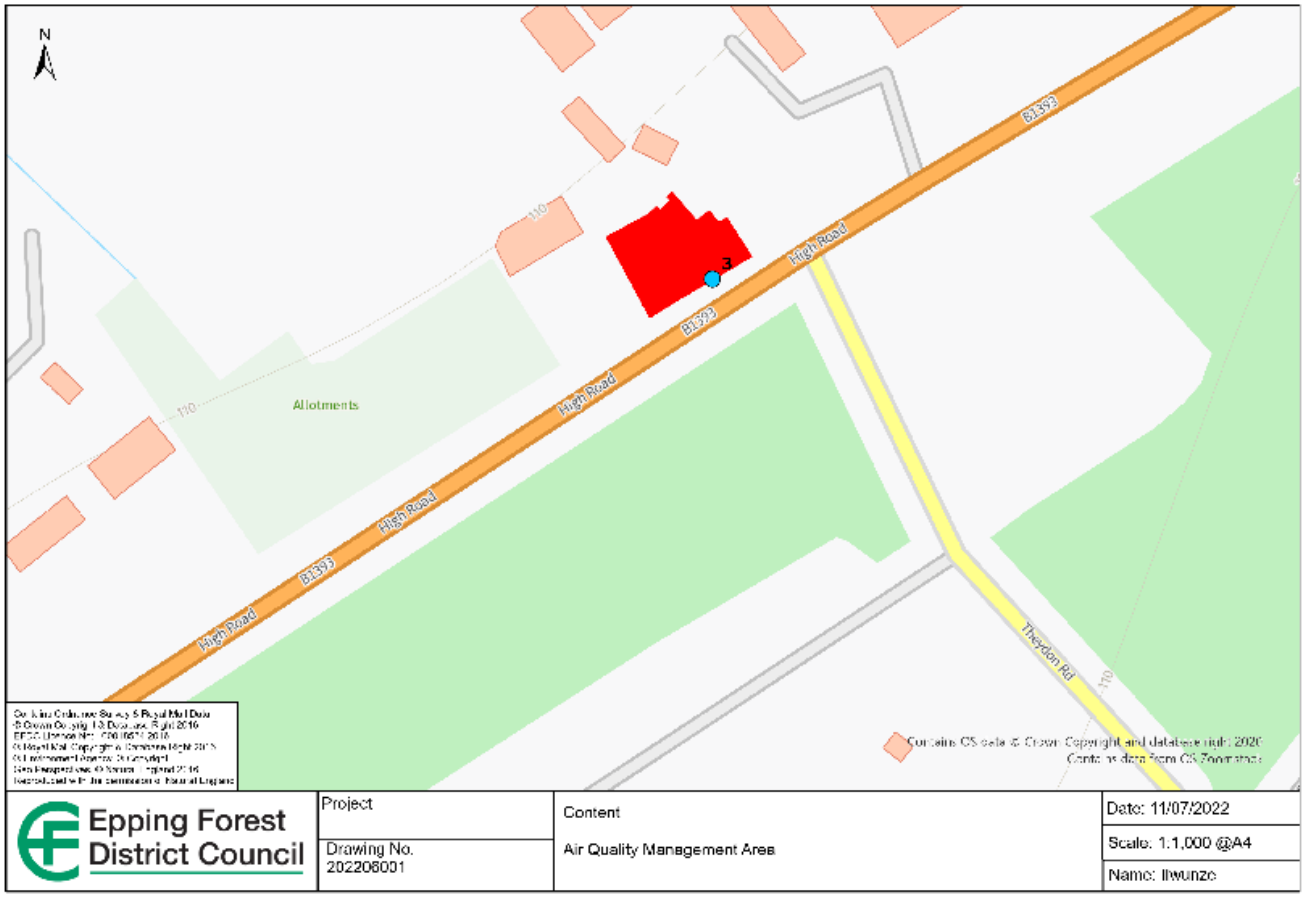
# Appendix D: Map(s) of Monitoring Locations and AQMAs

## Figure D.1 – Map of Non-Automatic Monitoring Site

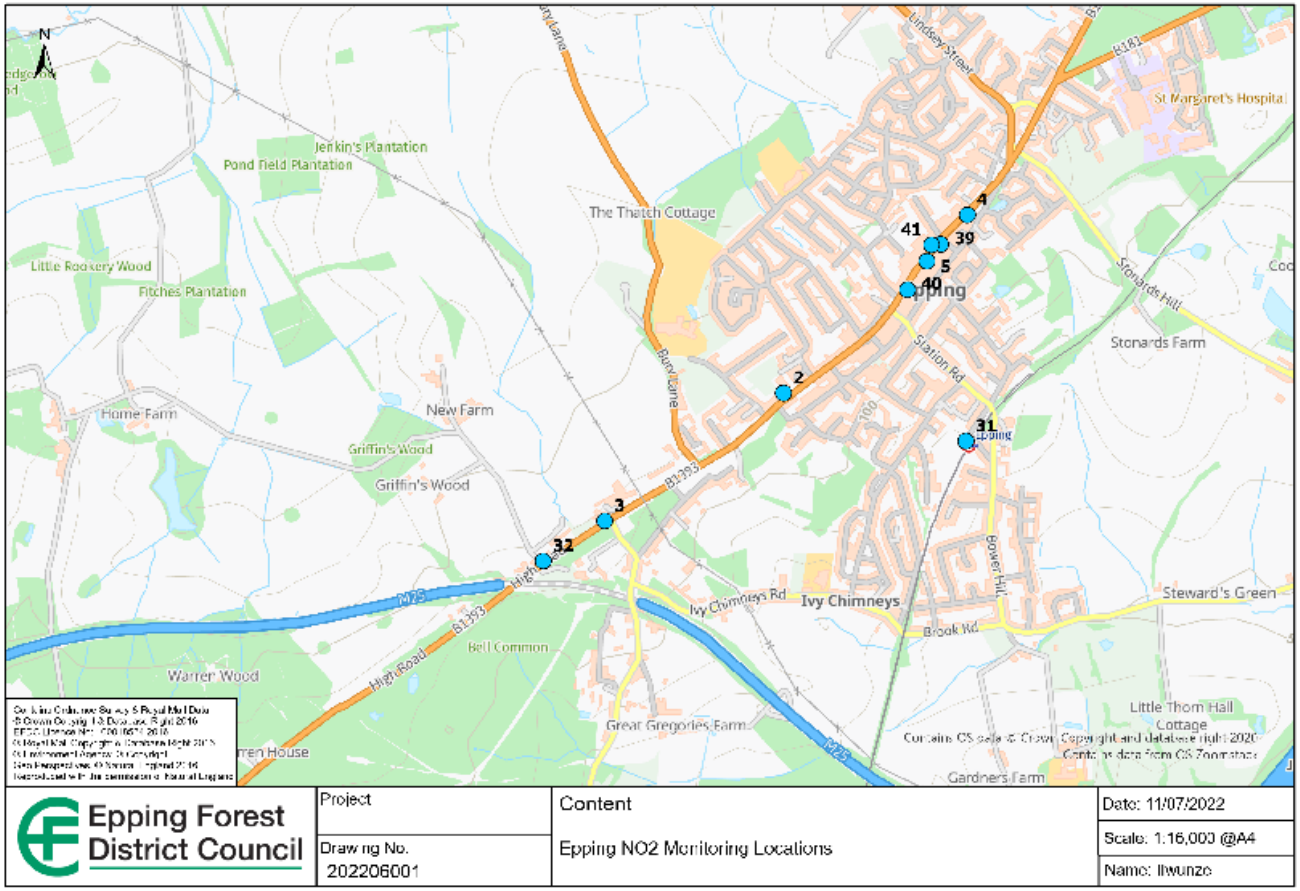
District Wide – All locations



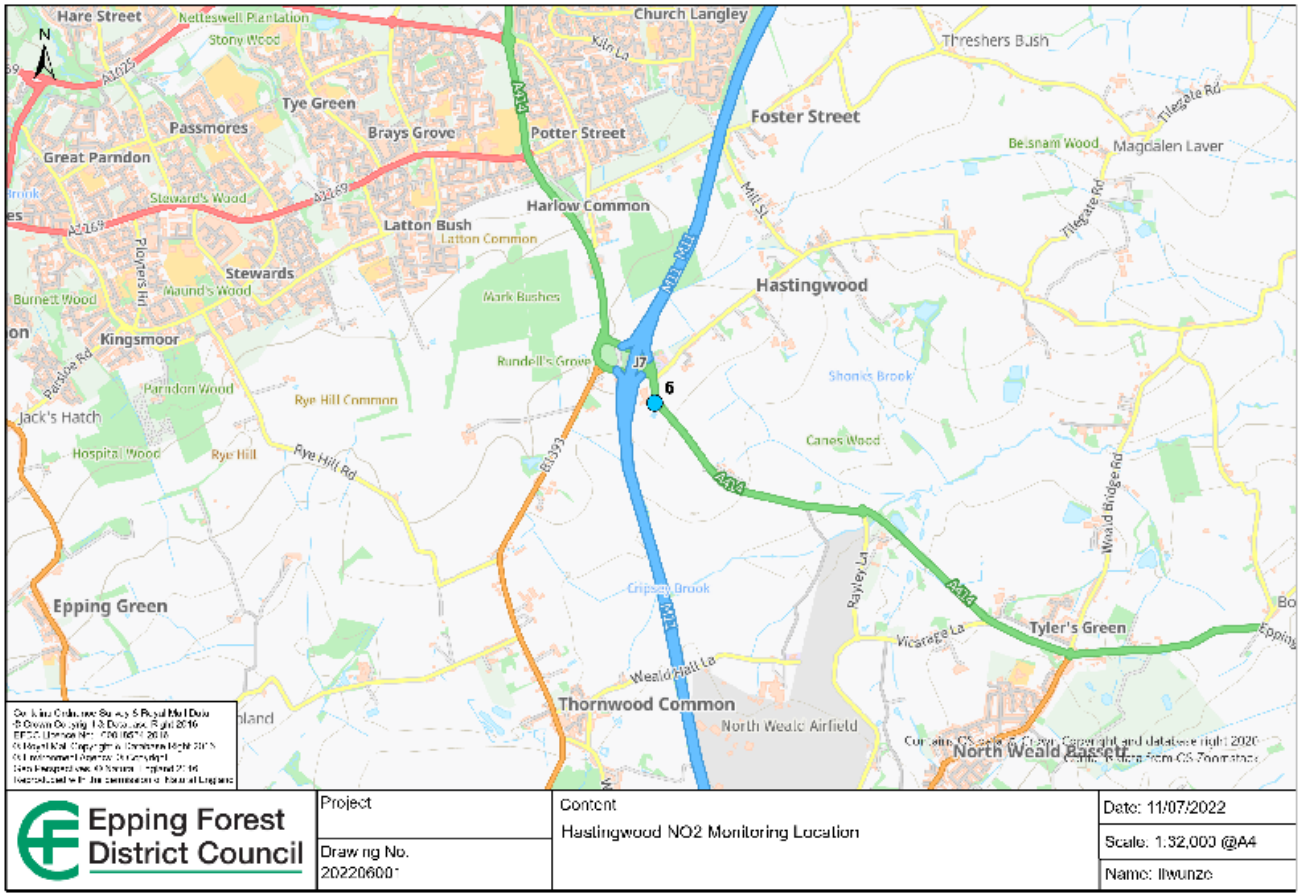
AQMA Epping Forest No2. Bell Common



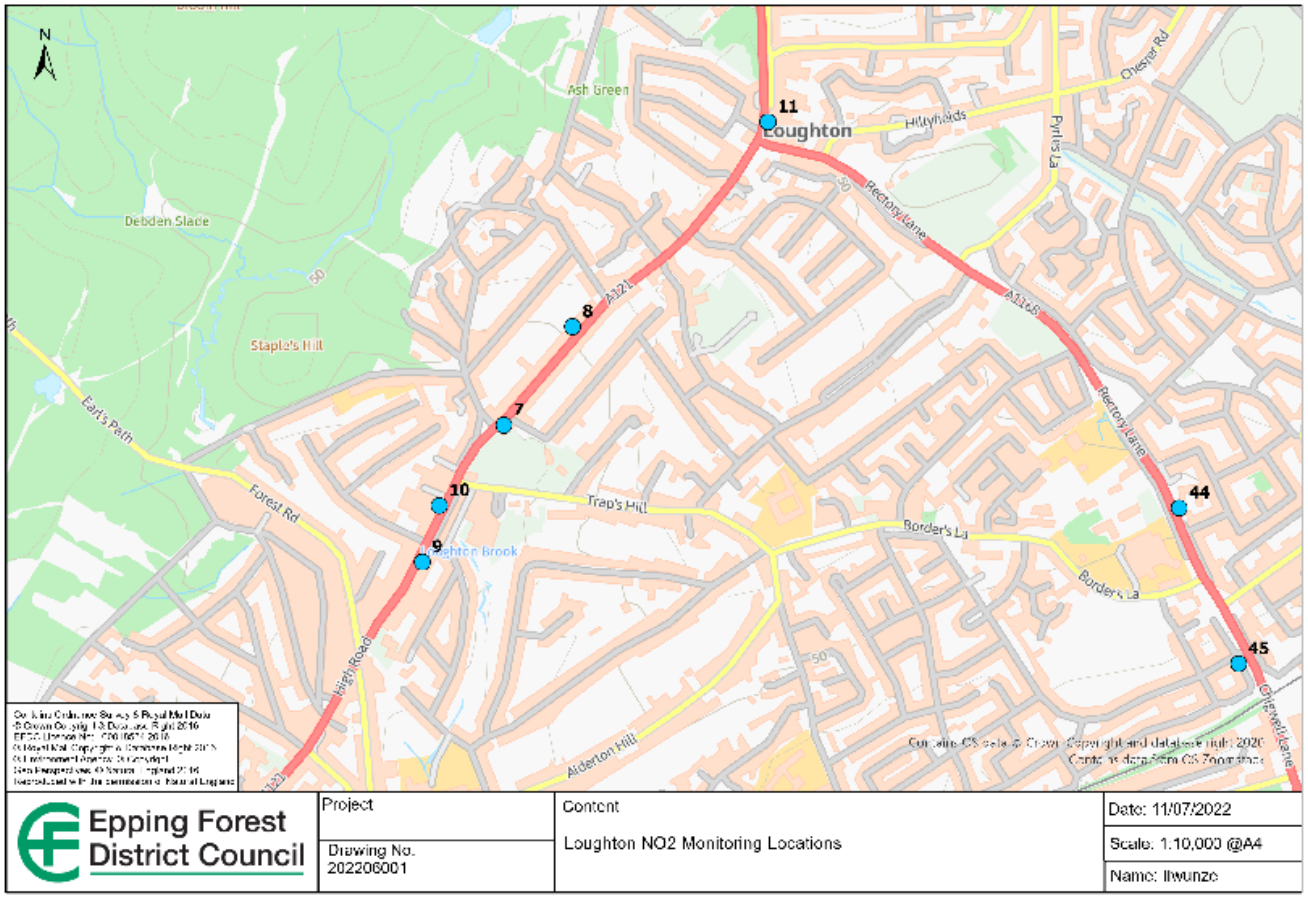
Epping


N
Jenkin's Plantation
Pond Field Plantation
The Thatch Cottage
Little Rookery Wood
Fitches Plantation
Home Farm
New Farm
Griffin's Wood
Griffin's Wood
Warren Wood
Bell Common
Great Gregories Farm
Ivy Chimneys
Ivy Chimneys Rd
Brook Rd
Steward's Green
Little Thorn Hall Cottage
Gardners Farm
Stonards Farm
Stonards Hill
Bower Hill
Station Rd
Bend Lane
Lindsey Street
St Margaret's Hospital
B1393
M25
41
39
4
5
40
2
31
3
32
Epping Forest District Council
Project
Drawing No.
202206001
Content
Epping NO2 Monitoring Locations
Date: 11/07/2022
Scale: 1:16,000 @A4
Name: Ilwunze

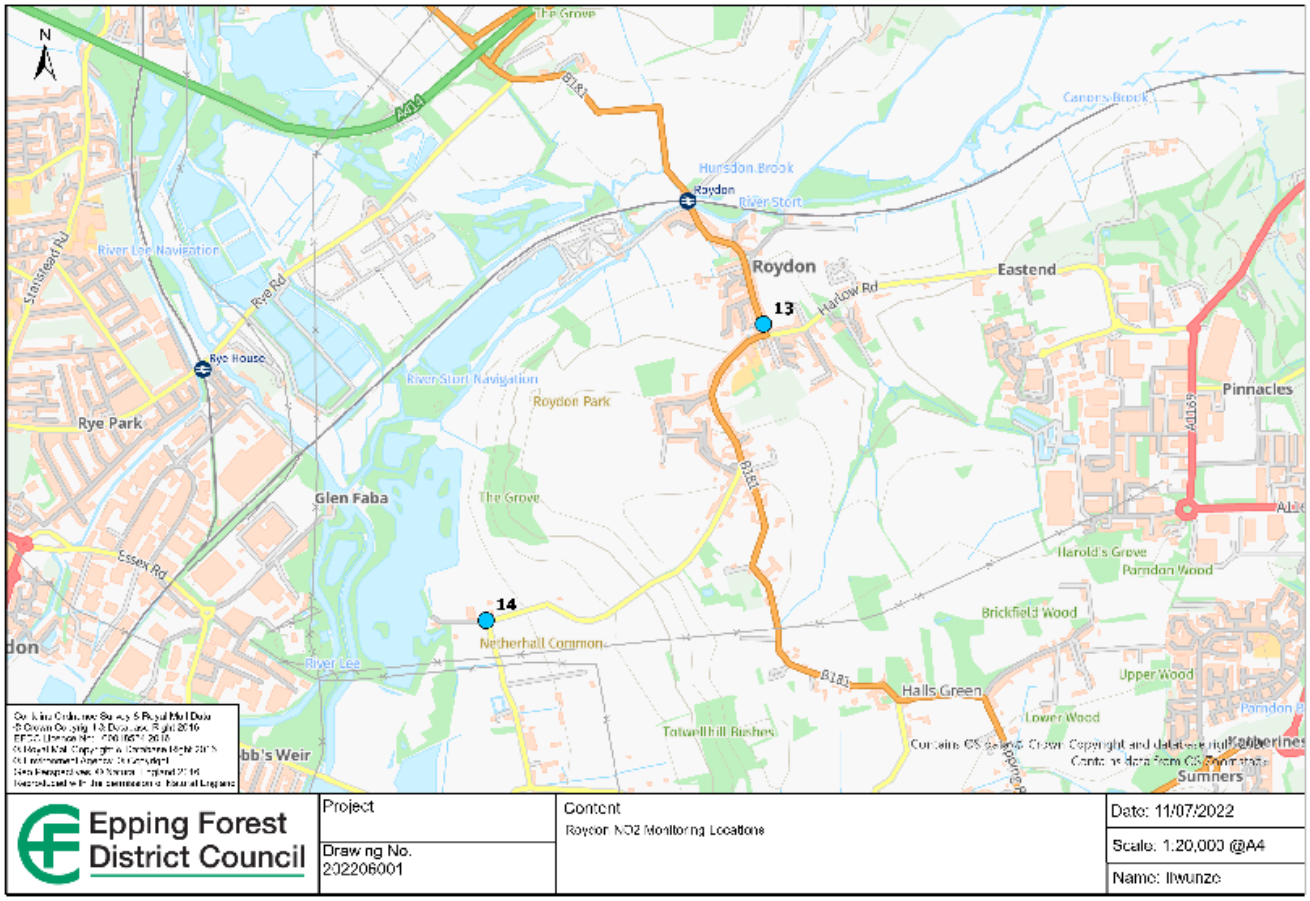
Hastingwood



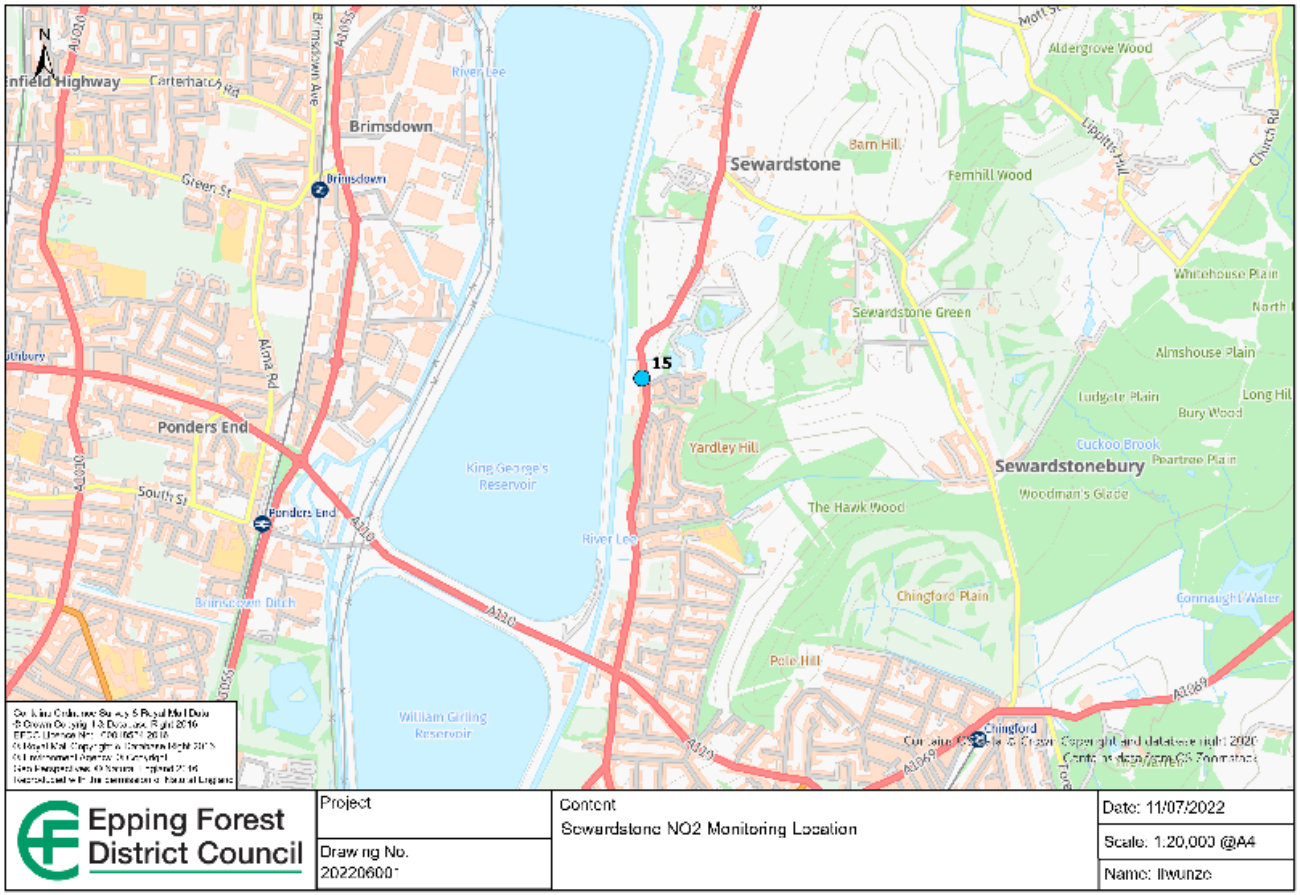
Loughton


N
Ash Green
Debden Slade
Staple's Hill
Earl's Path
Forest Rd
High Road
Alderton Hill
Traps Hill
Border's La
Rectory Lane
Chigwell Rd
Pyrles La
Hillyfields
A121
A1168
11
Loughton
8
7
10
9
44
45
Epping Forest District Council
Project
Drawing No.
202206001
Content
Loughton NO2 Monitoring Locations
Date: 11/07/2022
Scale: 1:10,000 @A4
Name: lhwunze

Roydon


N
A414
B181
The Grove
Hunsdon Brook
Roydon
River Stort
Canons Brook
River Lee Navigation
Stanstead Rd
Rye Rd
Rye House
Rye Park
River Stort Navigation
Roydon Park
Glen Faba
The Grove
Essex Rd
Netherhall Common
River Lee
Totwellhill Bushes
Roydon
13
Harlow Rd
Eastend
Pinnacles
A1169
Harold's Grove
Parndon Wood
Brickfield Wood
Upper Wood
Lower Wood
Halls Green
Sumners
14
Project
Drawing No.
202206001
Content
Roydon NO2 Monitoring Locations
Date: 11/07/2022
Scale: 1:20,000 @A4
Name: Ilwunze
Epping Forest District Council

Sewardstone



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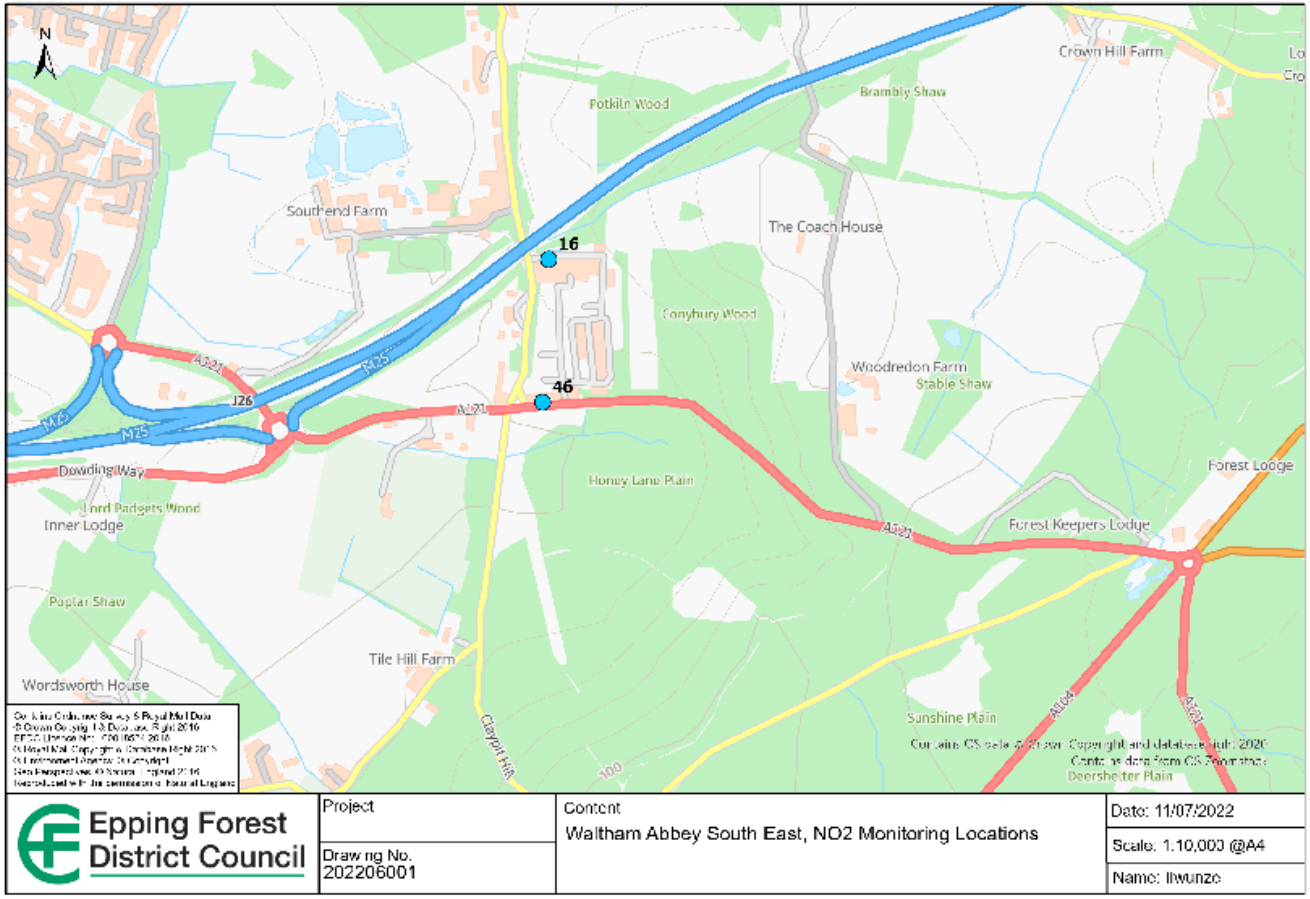

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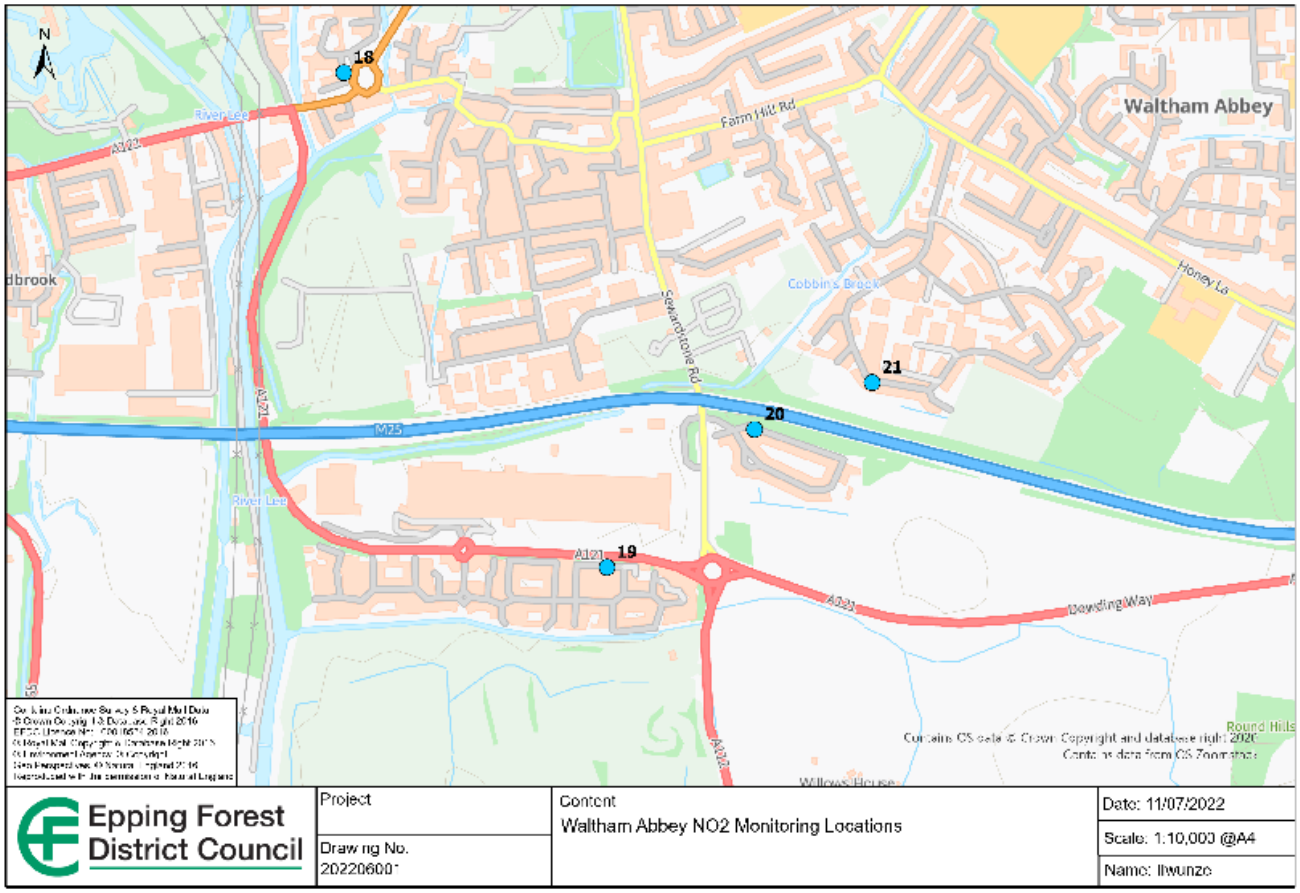

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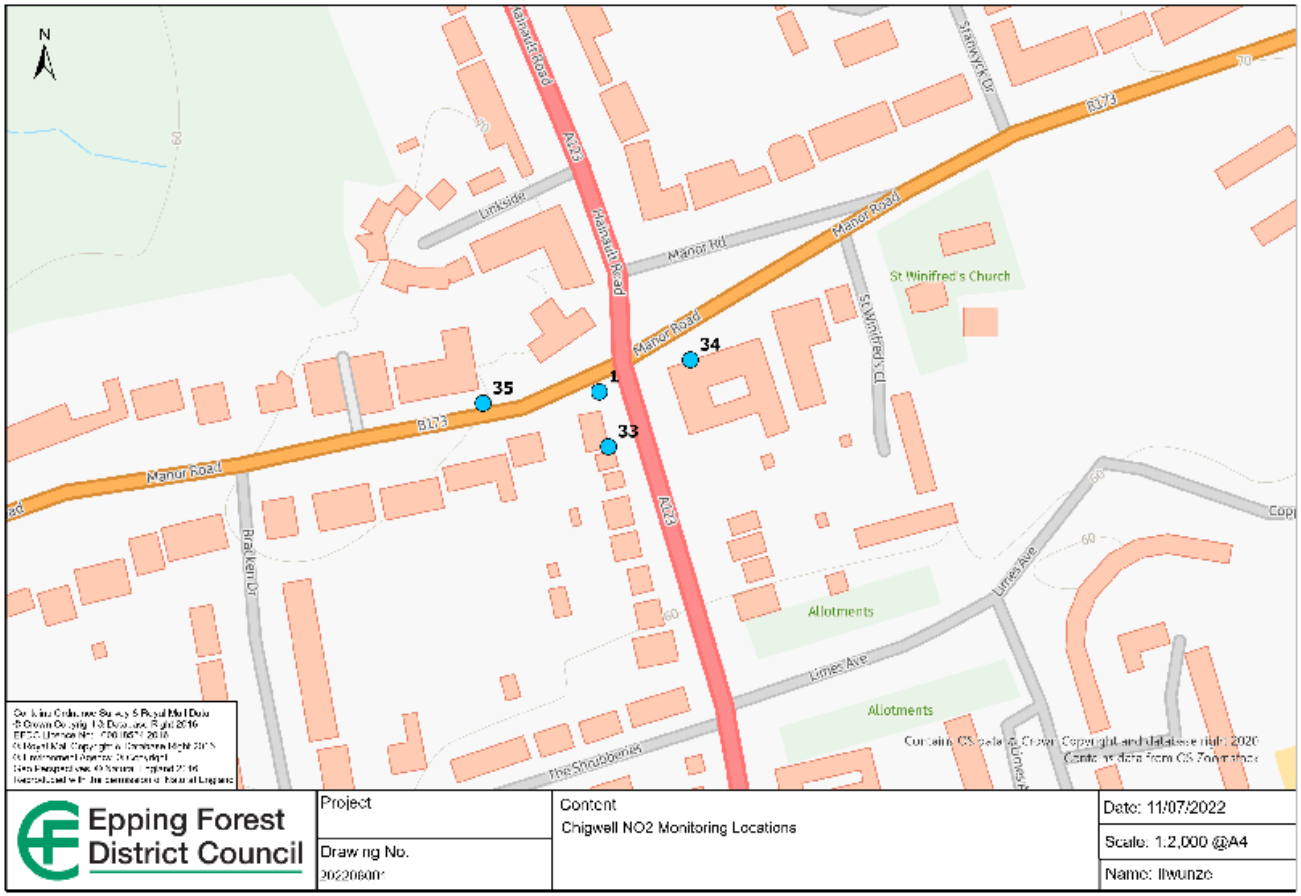
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Bracken Dr
Allotments
Limes Ave
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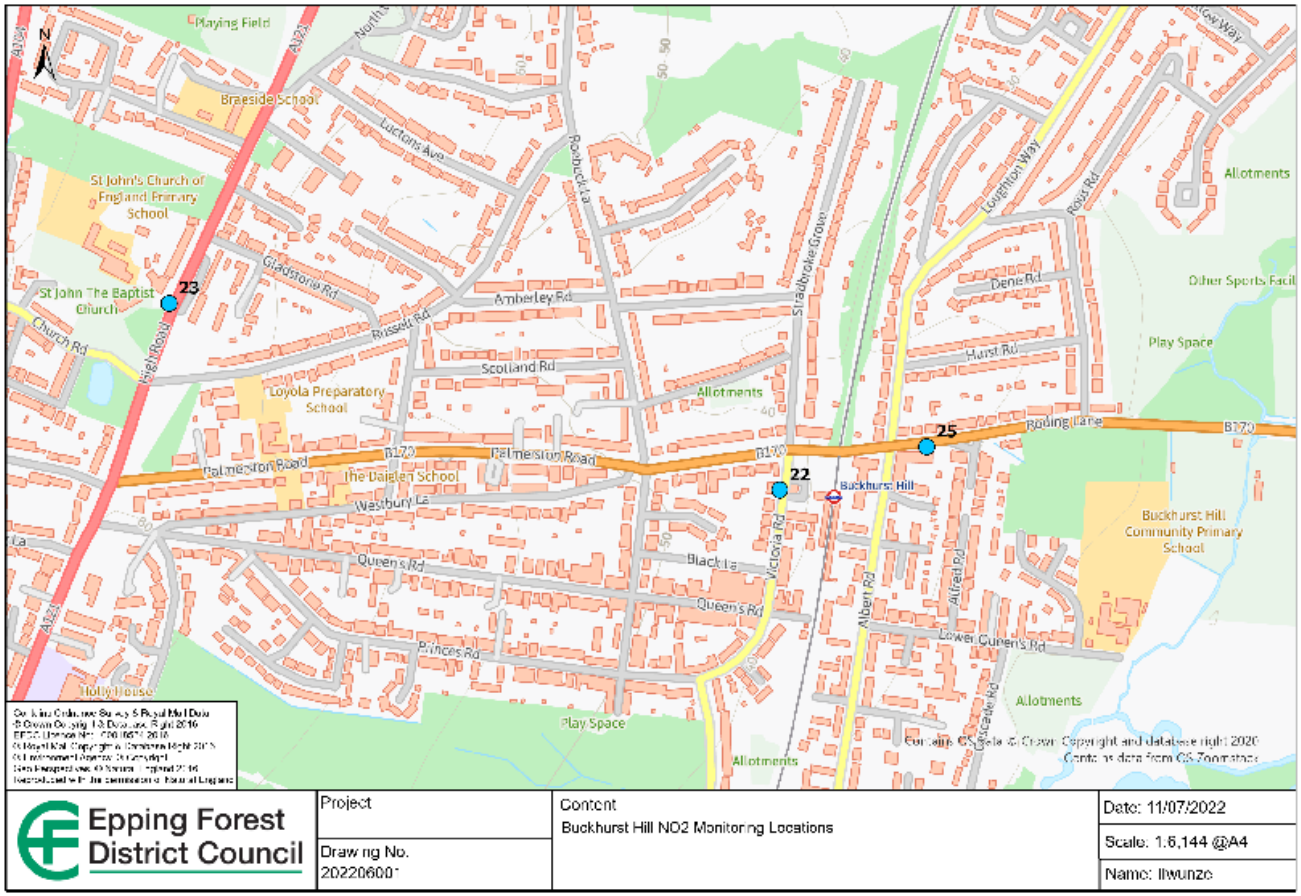

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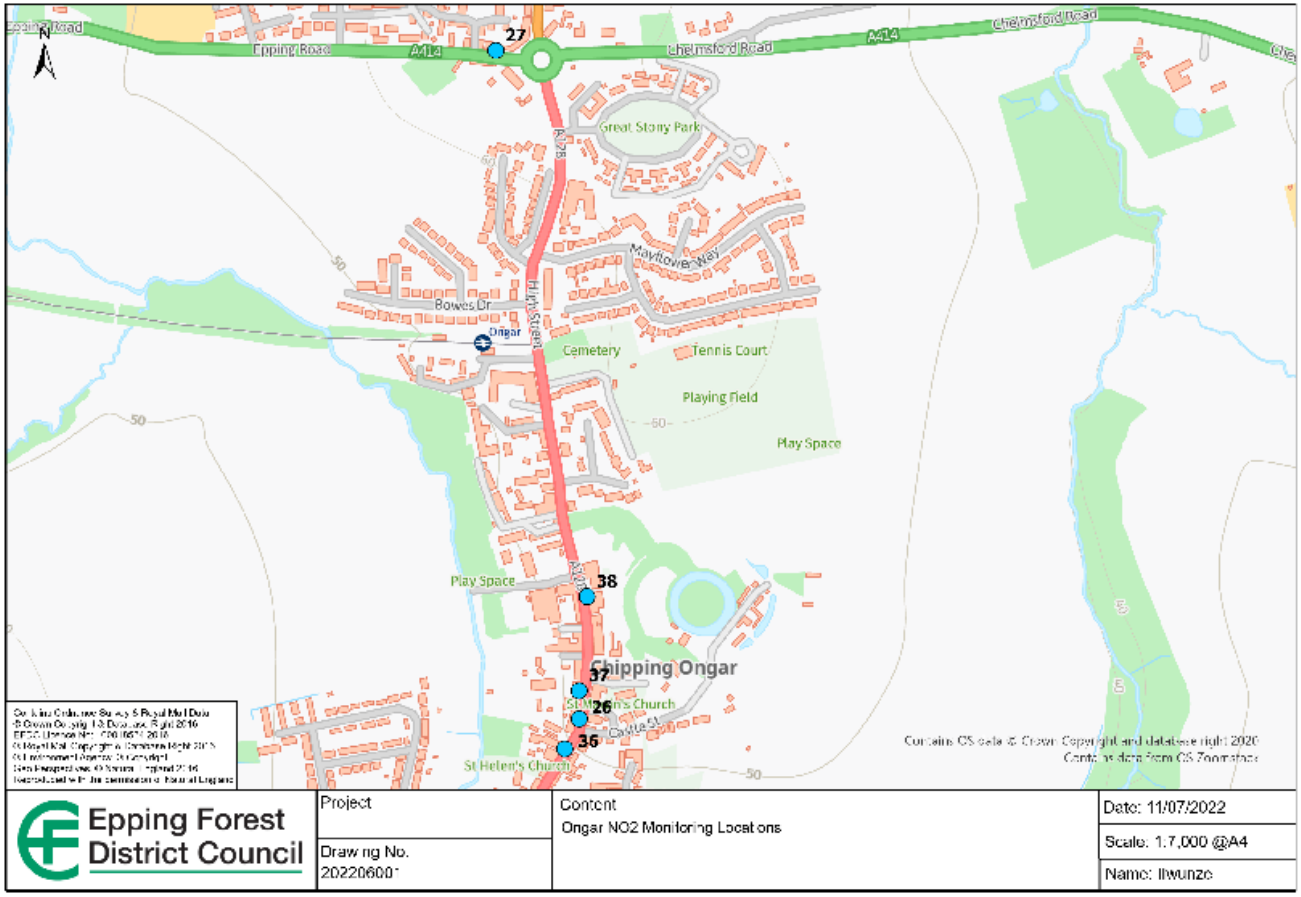
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Cemetery
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Playing Field
Play Space
Play Space
38
Chipping Ongar
37
26
36
St Helen's Church
Castle St
Contains OS data © Crown Copyright and database right 2020
Epping Forest District Council
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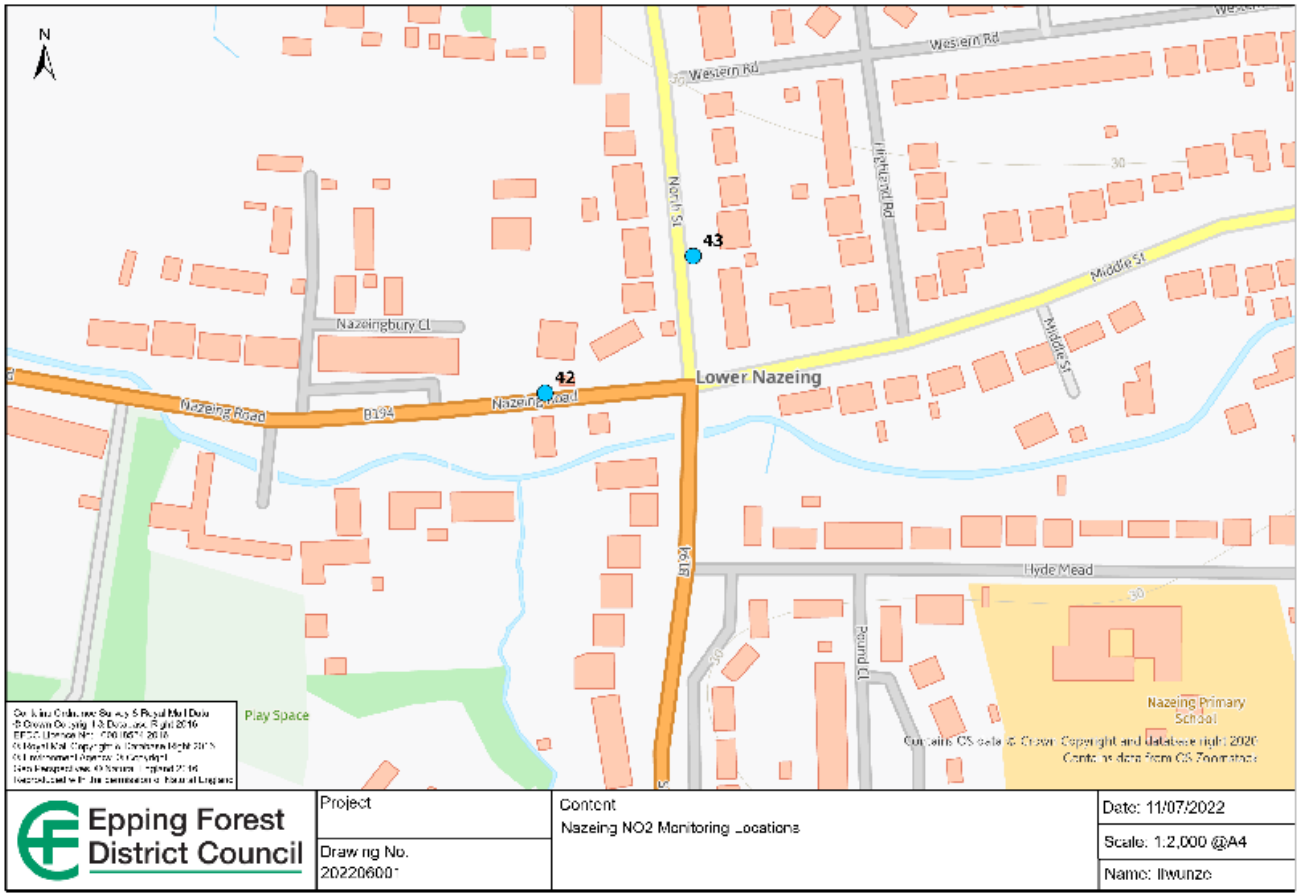
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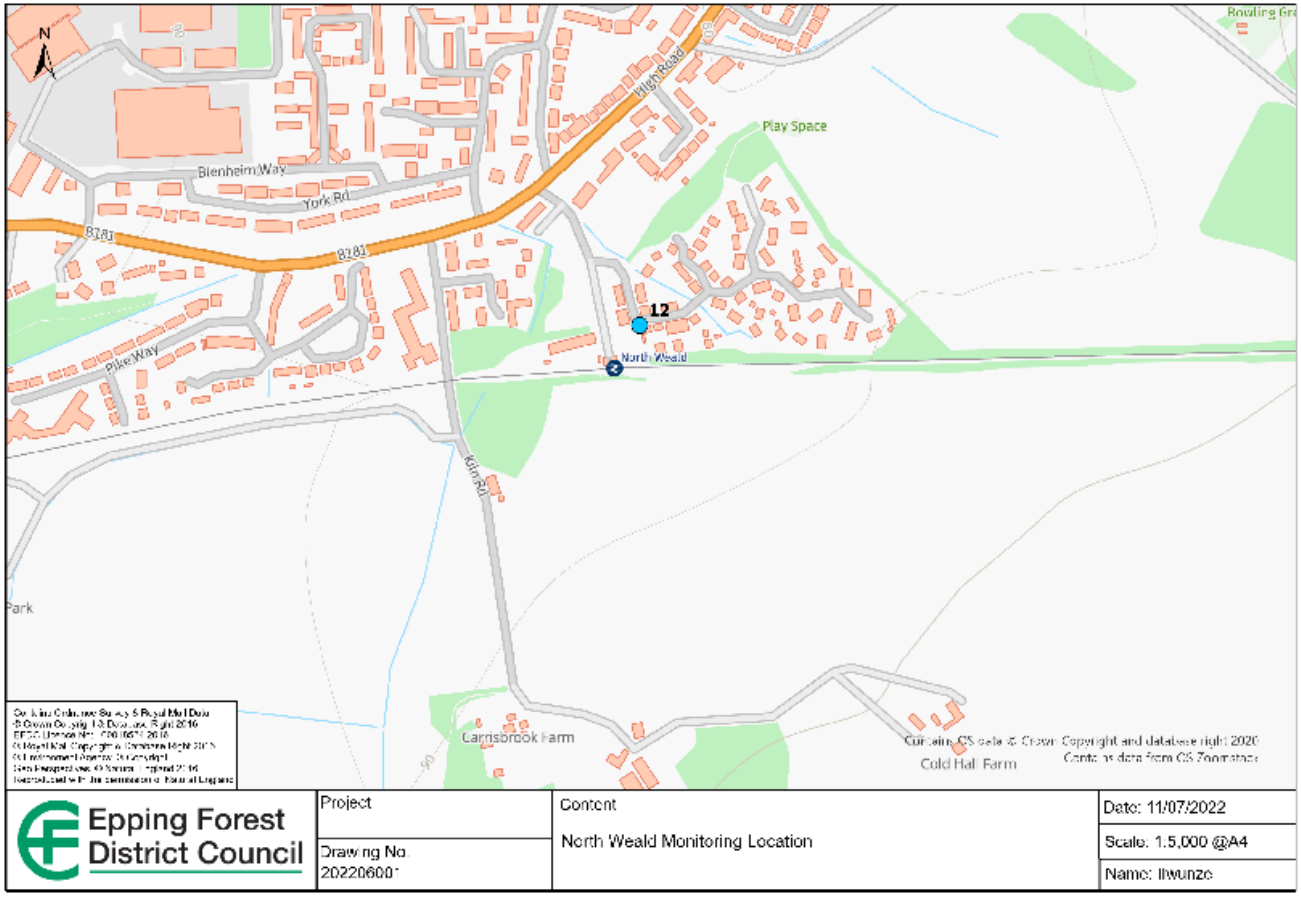
North Weald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# Appendix E: Summary of Air Quality Objectives in England

### 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/$m^3$).

# 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 |
| SAC | Special Area of Conservation |
| $SO_2$ | Sulphur Dioxide |

# References


- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- AEA Energy and Environment (2008). Analysis of the relationship between annual mean nitrogen dioxide concentration exceedances of the 1-hour mean AQS Objective - https://ukair.defra.gov.uk/assets/documents/reports/cat18/0806261511_TG_NO2relationship_report_draft1.pdfNitrogen dioxide measured by diffusion tube. As 68µg/m3