2019 Air Quality Annual Status Report (ASR)

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

April 2019

Local Authority Officer	Sonya Hildebrandt
Department	Environmental Health
Address	Civic Offices London Road Basingstoke RG21 4AH
Telephone	01256 845625
E-mail	Sonya.hildebrandt@basingstoke.gov.uk
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Executive Summary: Air Quality in Our Area

Air Quality in Basingstoke and Deane Borough

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2]. The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

Air quality has been monitored in Basingstoke and Deane Borough Council as part of the local authority review and assessment process since the mid-1990s. The 2014 Progress Report identified an area around Winton Square in Basingstoke where there were exceedances of the NO_2 annual mean objective at locations relevant for human exposure. The 2015 Updating and Screening Report also reported exceedances of the annual mean objective but advised that a detailed assessment was underway to determine if exceedances were occurring at areas of relevant exposure.

A detailed modelling assessment of air quality in Winton Square and Winchester Street was carried out in the latter part of 2015 using the most recent traffic, monitoring and meteorology data. It showed an exceedance may be occurring but recognised the uncertainty in modelled concentrations and recommended further monitoring at residential properties located on the first floor on the south side of Winchester Street. The recommended monitoring began at 39 Winchester Street in late April 2016. This involved the introduction of three diffusion tubes (Sites 34, 35 and 36). Annualisation of the measurement data showed that the annual mean objective concentration was not exceeded in 2016.

During 2017 there were three monitoring sites (31-33) which exceeded the annual mean objective of 40μg/m^{3}, these tubes have since ceased monitoring as they were not representative of relevant public exposure. Due to changes to the building frontage there was not a free flow of air around the tubes and subsequently they were over-

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

reading NO$_2$ concentrations. Sites 37-44 have also ceased monitoring as previous results demonstrate compliance. Twelve sites (45-56) commenced monitoring in 2017 due to public concern about air quality in the area. The monitoring results for these sites were not presented in the 2018 ASR due to their installation in late 2017, however, the full 2018 dataset is presented in this report.
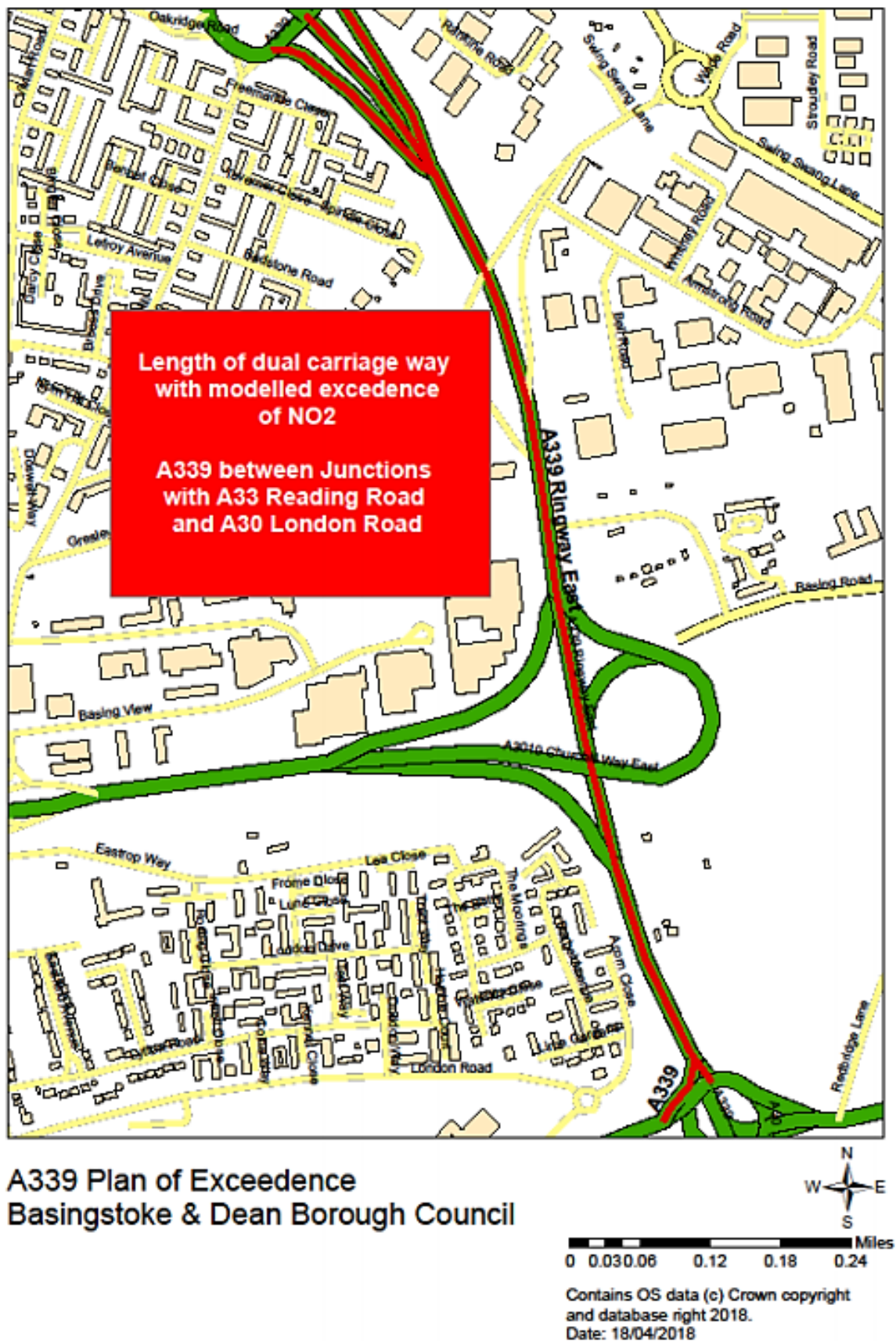
On the 23rd of March 2018, Basingstoke and Deane Borough Council received a Ministerial Direction to undertake a feasibility study into nitrogen dioxide compliance. This is the 'third wave' of Local Authorities charged with undertaking this study. The study identified a length of road, the A339 (Ringway East) located between the A339/A33 Roundabout and the A339/A30 Black Dam Roundabout (Figure 1) exceeded the annual mean NO$_2$ Air Quality Directive Limit value. The road link is a key part of the ring road around the centre of Basingstoke that links onto the M3 motorway at junction 6 and is expected to be compliant for 2020. Basingstoke and Deane Borough Council installed two new diffusion tubes (Sites 57 and 58) to monitor this link in 2018, the results of which are published in this ASR.

The feasibility study concluded that levels of nitrogen dioxide were significantly below the standard set by the EU along the public footpath. However, the modelling indicated that levels on the carriageway marginally exceed the EU standard until 2021. Despite levels being significantly lower than was predicted and compliant along the footpath, DEFRA required further work to explore ways of reducing emissions from vehicles along this stretch of road. This further work indicated that reducing the speed from 70mph to 50mph along a short section of this road, may achieve the desired reduction in nitrogen dioxide concentrations prior to 2021.

In October 2018, the Government served a further Ministerial Direction on the council, based on the findings of the Targeted Feasibility Study. However this time it was also served on Hampshire County Council, as the Highway Authority who are responsible for the A339. The Ministerial Direction requires that the option of reducing the speed limit along a short section of the A339, be explored in greater detail.

At the request of Transport Planning colleagues at Hampshire County Council (HCC), we have commissioned some further detailed modelling work to assess the impact that this speed reduction would have. If the outcome of the modelling confirms the existing findings, further work will be required by HCC to design and implement the scheme.

Figure 1 Non-compliant link in Basingstoke and Deane Borough[4]

A339 Plan of Exceedence
Basingstoke & Dean Borough Council

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Date: 18/04/2018

Actions to Improve Air Quality

Although there is currently no Air Quality Action Plan or Air Quality Strategy in place within the council area, Basingstoke and Deane Borough Council has taken forward several initiatives during the current reporting year of 2018 in pursuit of improving local air quality.

The Emerging Transport Strategy, again in partnership with Hampshire County Council, has been under consultation between November 2018 and January 2019. The responses are being reviewed and the final strategy is expected to be adopted over Summer 2019.

Council fleet improvements

A new fleet of waste collection vehicles took to the roads on 1 October 2018 as a result of the new waste contract with Serco. All these vehicles were required to meet Euro 6 emission standards and therefore produce less pollution.

Similarly, the council is investing a further £2m in replacement vehicles for the Street Cleansing and Grounds Maintenance teams. A total of 11 new vehicles were purchased in 2018 and a further six are currently on order, all which will meet the Euro 6 emissions standards.

Public transport

The council recognises the importance of good public transport services in the borough. In 2018/19 we provided £568,505 of funding towards local transport. This compares to an average of £26,458 in other districts in Hampshire.

Public transport was further funded by £226,976 from revenue, Bus Service Operators Grant (BSOG), and S106 contributions.

School travel

We are working in partnership with Hampshire County Council's School Travel Planning Team, who are currently working with 22 Basingstoke and Deane schools to promote active and sustainable travel through the nationally accredited school travel planning 'STARS' (Sustainable Travel Accreditation and Recognition for Schools) scheme. The scheme recognises schools that have demonstrated excellence in supporting cycling, walking and other forms of sustainable travel.

Currently 16 schools in the borough have STARS accreditation: eight at bronze level, one at silver and seven at gold – that's 21% of Basingstoke schools, the third highest level of engagement across the county districts.

Hampshire County Council also works in partnership with the walking charity Living Streets who are actively engaged with 14 schools participating in their WOW – The year-round walk to school challenge in Basingstoke.[5]

The council have worked closely with the county council's School Travel Planning Team to fund air pollution monitoring at two schools: Oakridge Junior School and Hatch Warren Junior School. This has been a developing area for the Travel Plan Team, and all Basingstoke schools have access to our Air Quality toolkit as well as a large number of other resources through the My Journey Hampshire website: https://myjourneyhampshire.com/education.

Both Hatch Warren and Oakridge schools were experiencing problems with congestion on the nearby roads at school drop-off and pick-up. The monitoring was seen to be a positive way to engage with staff, children and parents to encourage a shift towards walking and cycling rather than car journeys. The children took an active role in undertaking the monitoring and analysing the results. The results found emission levels to be low, and the findings were presented at special assemblies.

We are currently working in partnership with Hampshire County Councils School Travel team to monitor nitrogen dioxide at Chiltern Primary School, Basingstoke College of Technology and St Marks C of E Primary.

Civic Offices Electric Vehicle charge points

Six new electric vehicle fast chargers have been installed at the Civic offices: one in Eastlands forecourt, two in the visitors' car park at Upper Parklands and three staff chargers in Lower Parklands. The units at Upper Parklands are available to the general public and Councillors at all times. The Eastlands charge point is available to the general public at weekends. Fast chargers are capable of charging a standard electric car in 3-5 hours.

In December 2018, an Electric Vehicle survey on the council website was active for seven weeks. We asked details about what residents and businesses currently have in place and what their future aspirations were for electric vehicles. The survey was

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[5] www.livingstreets.org.uk/what-we-do/projects/wow

well received, and we had 283 residential and over 40 business responses. A detailed report of the results will be published on our website in the coming months.

We are expecting to install a charging hub in the centre of Basingstoke by the end of 2019. This will have both rapid and fast infrastructure for residents and visitors to enjoy whilst they shop in Basingstoke.

Taxi Licensing

The council has recently introduced a new maximum age limit for taxis and has waived licencing fees for ultra-low emission vehicles, to encourage licenced drivers to switch to these ultra-low emission vehicles. We currently have one electric taxi operating in our district.

Clean Air Basingstoke and Deane

In January 2019 we launched our Clean Air Basingstoke and Deane campaign to raise public awareness of air pollution and dispel some of the myths around the subject.[6] A main focus of the event has been anti-idling and we have worked with Hampshire County Council School Travel Team and local environmental groups to spread the anti-idling message.

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[6] http- s://www.basingstoke.gov.uk/clean-air

Conclusions and Priorities

Monitoring at locations relevant for public exposure has shown that the annual objective of 40µg/m^3 for nitrogen dioxide concentrations has not been exceeded within Basingstoke and Deane Borough Council area, hence an Air Quality Management Area is not required.

Following the Ministerial Direction to undertake a feasibility study into nitrogen dioxide compliance, Basingstoke and Deane Borough Council installed two new diffusion tube sites to monitor air quality adjacent to the A339. Sites 57 and 58 provided bias adjusted, annualised measurements of 30.0µg/m^3 and 36.3µg/m^3 respectively.

We will continue to review our monitoring locations on an annual basis to identify new locations where there is relevant public exposure.

Local Engagement and How to get Involved

Road vehicles are a major source of many pollutants in urban areas. They produce over 50% of the emissions of nitrogen oxides in the UK.

Before using your car, ask yourself:

- Do I really need to make this journey?

- Could I walk or cycle instead of taking the car?

- Could I take a bus or train?

- Are the levels of air pollution already too high today?[7]

If you must drive:

- Drive smoothly. You will save fuel, and your engine will also pollute less;

- Don't rev your engine unnecessarily;

- Maintain your car. Keep the engine properly tuned and the tyres at the right pressure; and

- Turn off the engine when your car is stationary.[8]

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[7] https://uk-air.defra.gov.uk/forecasting/index?day=4
[8] https://www.basingstoke.gov.uk/myth-busters

<u>At home</u>

• Buy water-based or low-solvent paints, varnishes, glues and wood preservatives.

• Avoid burning solid fuels if possible. If you live in a smoke control area, burn only authorised smokeless fuels (your local authority can advise you).

• Avoid lighting bonfires, but if you must, don't light them when pollution levels are high or while the weather is still and cold. Only burn dry material and never burn household waste, especially plastic, rubber, foam or paint. Levels of pollution can be quite high on bonfire night and other events/festivals with bonfires, and sensitive people, including people with respiratory conditions, may notice some effects. However, exposure can be considerably reduced by remaining indoors and keeping windows closed. For further information, please see: https://www.basingstoke.gov.uk/air-quality

• Wood-burning stoves are increasing in popularity, but burning wood produces a lot of air pollutants. To minimise your contribution to air pollution, buy a Defra approved stove, use authorised fuel, and only light it when you really have to. Further information can be found here: https://www.basingstoke.gov.uk/domestic-biomass

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1 Local Air Quality Management

This report provides an overview of air quality in Basingstoke and Deane Borough Council during 2018. 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 Basingstoke and Deane Borough to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

After a detailed assessment of air quality within Winton Square in 2015, Basingstoke and Deane Borough Council agreed with Defra within its 2016 ASR to undertake monitoring for a full year at residential properties located at a first-floor height at Winchester Street (within Winton Square) to represent relevant public exposure. Monitoring at the first-floor location began in late April 2016 and showed that the annual objective concentration of $40\mu g/m^3$ was not exceeded. Continued compliance with the annual NO_2 objective has ensured no need to declare an AQMA in Basingstoke and Deane Borough.

For reference, a map of Basingstoke and Deane Borough Council's monitoring locations is available in Appendix D.

2.2 Progress and Impact of Measures to address Air Quality in Basingstoke and Deane Borough

Comments from Defra's appraisal in January 2018 were addressed in the 2018 ASR. No recommendations were made following submission of last year's ASR and so no further comments are provided.

Basingstoke and Deane Borough Council has taken forward a number of direct measures during the current reporting year of 2018 in pursuit of improving local air quality.[9] Details of all measures completed, in progress or planned are set out in Table 1.

A key measure going forward will be development of the Basingstoke Transport Strategy, in partnership with Hampshire County Council. Consultation on the draft Transport Strategy ran from Wednesday 28 November 2018 and until 28 January 2019; a copy of the draft document is available to view online at https://www.hants.gov.uk/aboutthecouncil/haveyoursay/consultations/basingstoketransportstrategy. The Councils are considering the 250 responses received and intend to adopt the strategy in Summer 2019. A focus of the strategy is meeting the air quality objectives to ensure a good quality of life for people who live in, work in and visit Basingstoke.

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[9] https://www.basingstoke.gov.uk/air-quality

Table 1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Council Fleet Improvements	Vehicle Fleet Efficiency	N/A	Basingstoke & Deane Borough Council, Serco	Live	Live	No. of vehicles on the road that meet Euro 6 emissions standards.	Reduced vehicle emissions.	Live	Live	Continued funding, continued work with Serco.
2	Public Transport	Alternatives to private vehicle use	Other	Basingstoke & Deane Borough Council	Live	Live	Reduction in private vehicle usage.	Reduced vehicle emissions.	Live	Live	Continued funding.
3	School Travel	Public Information	Via other mechanisms	Basingstoke & Deane Borough Council, Hampshire County Council	Live	Live	Reduction in private vehicle usage. Increase in awareness.	Reduced vehicle emissions, especially near schools.	Live	Live	Effects limited, public information only.
4	Civic Offices EV Charge Points	Promoting Low Emission Transport	Priority parking for LEV's	Basingstoke & Deane Borough Council	Live	Live	Increase in EV ownership/use.	Reduced vehicle emissions.	Six new EV chargers in Civic offices. Expected charging hub in centre of Basingstoke by the end of 2019.	Live, further results by end of 2019.	Funding. Response by the public.
5	Taxi Licensing	Promoting Low Emission Transport	Taxi Licensing conditions	Basingstoke & Deane Borough Council	Live	Live	Improvement in taxi fleet.	Reduced vehicle emissions.	Implementation on-going	Live	Uptake of low emission taxis.
6	Clean Air Basingstoke and Deane	Public Information	Via the Internet	Basingstoke & Deane Borough Council, Hampshire County Council, local environmental groups	Live	Live	Reduction in idling (a key focus of the campaign). Increase in public awareness of air quality.	Reduced vehicle emissions.	Implementation on-going	Live	Effects limited, public information only.

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
7	Climate Change Strategy	Public Information	Via the Internet	Basingstoke & Deane Borough Council	Live	Live	Reduction in carbon emissions.	The council aims to measure its own emissions and collect data which will contribute to national targets in the Climate Change Act 2008: 34% reduction in carbon emissions by 2020 (from 1990 levels) 80% reduction in carbon emissions by 2050 (from 1990 levels) 15% of energy demand generated by renewable sources by 2020	Live	Live	Effects limited, public information only.
8	Cycling Strategy	Transport Planning and Infrastructure	Cycle network	Basingstoke & Deane Borough Council, Hampshire County Council	Live	Live	Decrease in vehicle usage, increase in cycle usage.	Reduced vehicle emissions	Live	Live	Funding for upkeep.
9	Transport Strategy	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Basingstoke & Deane Borough Council, Hampshire County Council; DfT	Present	Summer 2019	Measured concentration at NO_2 diffusion tubes in Winton Square.	Reduced vehicle emissions	Implementation on-going	Summer 2019	Funding; reliance on Hampshire County Council and DfT.
10	Climate Change Strategy and Carbon management	Public Information	Via the Internet	Basingstoke & Deane Borough Council	Live	Live	Reduction in carbon emissions.	The council aims to measure its own emissions and collect data which will contribute to national targets in the Climate Change Act 2008:	Live	Live	Effects limited, public information only.

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
								34% reduction in carbon emissions by 2020 (from 1990 levels) 80% reduction in carbon emissions by 2050 (from 1990 levels) 15% of energy demand generated by renewable sources by 2020			
11	Design and Sustainability Supplementary Planning Document	Policy Guidance and Development Control	Sustainable Procurement Guidance	Basingstoke & Deane Borough Council	Live	Live	N/A	N/A	Live	Live	Supporting the Local Plan 2011-2029, funding may be an issue.

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

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

Basingstoke and Deane Borough Council is taking a number of measures to address PM$_{2.5}$, and measures to reduce other pollutants will also reduce PM$_{2.5}$. The Public Health Outcomes Framework (PHOF) is a Department of Health data tool for England, intended to focus public health action on increasing healthy life expectancy and reducing differences in life expectancy between communities. The PHOF includes an indicator, based on the effect of particulate matter (PM$_{2.5}$) on mortality. The approach used in partnership with Public Health colleagues, includes the encouragement of active travel, such as the Basingstoke and Deane Cycling Strategy,[10] which also has wider public health benefits captured in other indicators such as increased physical activity (indicator 2.13) and reducing excess weight at various ages (indicators 2.6 & 2.12).

The Local Transport Plan (Hampshire County Council, 2014)[11] for Hampshire sets out the transport strategy for the County for the period 2011-2031. Road traffic is one of the main sources of PM$_{2.5}$; improving transport within the borough is therefore of key importance. The Local Transport Plan proposes strategies to improve transport within the County including measures to reduce the need to travel, widen travel choice and reduce dependence on the private car, alongside investment in low-carbon vehicle technologies and increasing active travel. The Local Transport Plan has considered the health impacts of policies and measures, such as the health benefits of physical activity and changes to air quality, noise and traffic accident numbers considering the Department of Health guidance on Transport and Health Resource (Department for Transport, 2011).

Planning policy is also a particularly important mechanism for controlling PM$_{2.5}$ emissions and Basingstoke and Deane Borough Council is focused through its

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[10] https://www.basingstoke.gov.uk/cyclestrategy
[11] http://documents.hants.gov.uk/transport/HampshireLTPPartALongTermStrategy2011-2031RevisedApril2013.pdf

planning policy on preventing particulate matter concentrations being inadvertently increased. Policy CN9 within our Local Plan (2011-2029)[12] states that the council will work in partnership to promote a safe, efficient and convenient transport system which will:

- Build on the borough's strategic location, through improvements to strategic road and rail connections to the wider area;

- Promote transport choice, through improvements to public transport services and supporting infrastructure, and providing coherent and direct cycling and walking networks to provide a genuine alternative to the car and facilitate a modal shift;

- Improve access to Basingstoke town centre and rail station by all modes of transport and ensure good integration between transport modes;

- Manage congestion and provide for consistent journey times; and

- Promote and improve safety, security and healthy lifestyles.

Development should seek to minimise the need to travel, promote opportunities for sustainable transport modes, improve accessibility to service and support the transition to a low carbon future. Development proposals will be permitted that:

- Integrate into existing movement networks;

- Provide safe, suitable and convenient access for all potential users;

- Provide an on-site movement layout compatible for all potential users with appropriate parking and servicing provision; and

- Do not result in inappropriate traffic generation or compromise highway safety.

Development proposals that generate significant amounts of movement must be supported by a Transport Statement or Transport Assessment and will normally be required to provide a Travel Plan.

Development should be of high quality, sustainable in design, construction and layout, offering maximum flexibility in the choice of travel modes, including walking and cycling, and with accessibility for all potential users. Development will be permitted where it:

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[12] https://www.basingstoke.gov.uk/planningpolicy

- Does not have a severe impact on the operation, safety or accessibility to the local or strategic highway networks;

- Mitigates impacts on the local or strategic highway networks, arising from the development itself or the cumulative effects of development, through the provision of, or contributions towards, necessary and relevant transport improvements, including those secured by legal agreements or through the Community Infrastructure Levy;

- Protects and where possible enhance access to public rights of way;

- Provides appropriate parking provision, in terms of amount, design and layout, in accordance with the adopted Parking Standards;

- Provides appropriate waste and recycling storage areas and accessible collection points for refuse vehicles, in accordance with the Design and Sustainability Supplementary Planning Document;[13] and

- Ensures that all development proposals provide a co-ordinated and comprehensive scheme that does not prejudice the future development or design of suitable adjoining sites.

The provision of a safe, convenient and efficient transport network in the borough is key to supporting residents, employees and visitors to the borough, as well as assisting the wider economy, given the role of the borough in the Enterprise M3 LEP area. To facilitate this, future transport planning of the borough will support the approach of policy CN9 through the preparation of a Transport Strategy for the Borough; in partnership with Hampshire County Council, transport operators, Network Rail, local interest groups and local residents and business. This will provide a framework to ensure that there are opportunities to access key services, facilities and employment locations by a range of modes of transport, including accessibility from new developments. This will be supplemented by the Borough Cycling Strategy which provides further detail on the council's ambitions in terms of cycling, including the provision of a Strategic Cycling Network.

The Transport Strategy will sit within the framework of the Hampshire Local Transport Plan. The LTP provides the long-term framework for transport policies within the borough. The Plan seeks to improve accessibility through the three initiatives of

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[13] https://www.basingstoke.gov.uk/design-and-sustainability-spd

reduce, manage and invest. To assist in meeting the objective of creating sustainable communities, the council will, working in partnership with Hampshire County Council and others, aim to:

- Improve accessibility to services;

- Reduce the need to travel;

- Manage congestion; and

- Achieve more sustainable travel behaviour through the policies and proposals within the Local Plan.

Hampshire County Council published a Transport Statement to set out the transport objectives and delivery priorities for the borough. The Transport Statement builds upon exiting transport related documents covering the borough, to provide:

- A local transport policy framework for the borough;

- A framework to assist with the prioritisation of transport investment;

- A basis for land use planning and development planning; and

- Assistance to the council with infrastructure planning in support of the Local Plan.

In relation to Basingstoke Town Centre, consultation has recently closed on the emerging Basingstoke Transport Strategy, which includes a wider transport masterplan for Basingstoke town centre.[14] The consultation produced 250 responses which are currently being reviewed by the Councils. The plan is expected to be adopted over Summer 2019 and will cover the Winchester Street and Winton Square areas.

There are two electric vehicle charging points in Basingstoke town centre. These have been installed in Central Car Park and Churchill Way Car Park; please see the Town Centre Car Parks Map[15] for their locations. The charging point in Central Car Park is a 'rapid' charge point and will charge a car from zero to 80% in approximately 30 minutes. Two spaces have been allocated for electric vehicles and users will be able to park their cars free of charge for up to a maximum of one hour, after which time the vehicle must be moved out of the charging bay and into a standard pay and display space. A pay and display ticket must be displayed in your car on arrival.

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[14] http://documents.hants.gov.uk/consultation/btsframework.pdf
[15] https://www.basingstoke.gov.uk/content/doclib/2118.pdf

The charging point in Churchill Way Car Park is a fast charger, with Type 2 connectors, and will charge your car in around three to four hours. Normal parking charges apply to park in the electric vehicle charging point spaces. The charging point has been installed by Hampshire County Council and is managed by ChargePoint.[16]

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[16] https://www.chargepointservices.co.uk/

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

Basingstoke and Deane Borough Council did not undertake automatic (continuous) monitoring at any sites during 2018. As noted in TG(16) local authorities do not have to report annually on the following pollutants: 1,3-butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem.

3.1.2 Non-Automatic Monitoring Sites

Basingstoke and Deane Borough Council undertook non-automatic (passive) monitoring of NO_2 at 29 sites during 2018. Table A.1 in Appendix A shows the details of the sites.

As discussed in last year's ASR, twelve sites (45-56) commenced their monitoring in November 2017. Due to the data capture being so low, the results from these sites were not analysed in 2018 but are discussed in detail in this report. Two sites (57 and 58) commenced their monitoring at the end of January 2018 and so this is also the first report containing discussion of those results.

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

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, "annualisation" and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO$_2$)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO$_2$ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B. Figures A.1 to A.4 in Appendix A present these data in a graphical format for the roadside, kerbside, urban background and special monitoring locations, including the sites that are new for 2018. Roadside monitoring sites 1–26 show a general decrease in NO$_2$ concentrations over the past 5 years; these sites are consistently below the NO$_2$ annual mean objective. Sites 31–33 showed an increase in NO$_2$ concentrations during the years of operation (2014–2017), however, these sites ceased monitoring as it was determined that changes in the building frontage did not allow a free flow of air around the diffusion tubes and subsequently they were over-reading. Sites 37–44 were present for one year before being removed due to continued compliance. Roadside sites 45–54 were installed for 2018 and the results show compliance at these locations thus far. There has been a decrease in NO$_2$ concentrations measured at kerbside monitoring locations over the past 5 years, with the lowest concentrations measured in 2018. The urban background monitoring site locations in Basingstoke and Deane Borough have changed over the past 5 years, however, all sites remain below the annual mean objective for NO$_2$.

Figure A.5 to Figure A.7 in Appendix A present the data from 2010 to present. Roadside monitoring sites 1, 2, 9, 10, 13, 16, 18 and 22 have been operating since 2010 (or prior) and all show significant decreases in annual mean NO$_2$ concentrations. For example, measured NO$_2$ concentrations at Site 2 have decreased by 30% and concentrations at Site 22 have decreased by approximately 27% since 2010. Kerbside monitoring sites 12, 17, 19 and 20 have also been operating since 2010 and show decreases between 15–20%.

No sites exceeded the annual mean objective NO$_2$ concentration in 2018, although site 58 measured 36.3µg/m^3 after bias adjustment and annualisation. Site 20 was also close to exceedance, measuring 37.5µg/m^3, however this has decreased from 38.6µg/m^3 in 2017.

3.2.2 Particulate Matter (PM$_{10}$)

Particulate matter is not a pollutant of concern in Basingstoke and Deane Borough as far as exceedances of the air quality objectives for PM$_{10}$ are concerned.

The First and Second Stage Reviews and Assessments (1999) carried out for Basingstoke and Deane Borough Council identified a risk of exceeding the air quality objectives for NO$_2$ and PM$_{10}$. As a result of this, the Air Quality Review and Assessment – Stage Three[17] investigated the air quality at several specific areas close to the M3, as well as other areas close to heavily trafficked roads previously identified as at risk of exceeding the air quality objectives. The areas assessed were:

- The M3 corridor;

- The A30 Winchester Rd between Winchester Rd roundabout & Brighton Hill roundabout;

- Ringway East; and

- The area around the Black Dam roundabout.

The modelled results indicated it was likely that the air quality objectives for PM$_{10}$ would be met at all locations of relevant exposure near motorways and major roads in Basingstoke and Deane Borough by the 2005 deadline. It was recommended that no Air Quality Management Area be declared for PM$_{10}$.

PM$_{10}$ was continuously monitored for a number of years in the early-to-mid 2000s. The continuous monitoring site was located at Eastrop Way, Basingstoke (464292, 152283) and is shown in Figure 2. The site was classed as urban background and employed an R & P Tapered Element Oscillating Microbalance (TEOM) for monitoring.

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[17] Air Quality Review and Assessment – Stage 3 for Basingstoke and Deane, June 2000

Figure 2 Location of the former Continuous Monitoring Site at Eastrop Way

Contains OS data © Crown Copyright and database right 2019
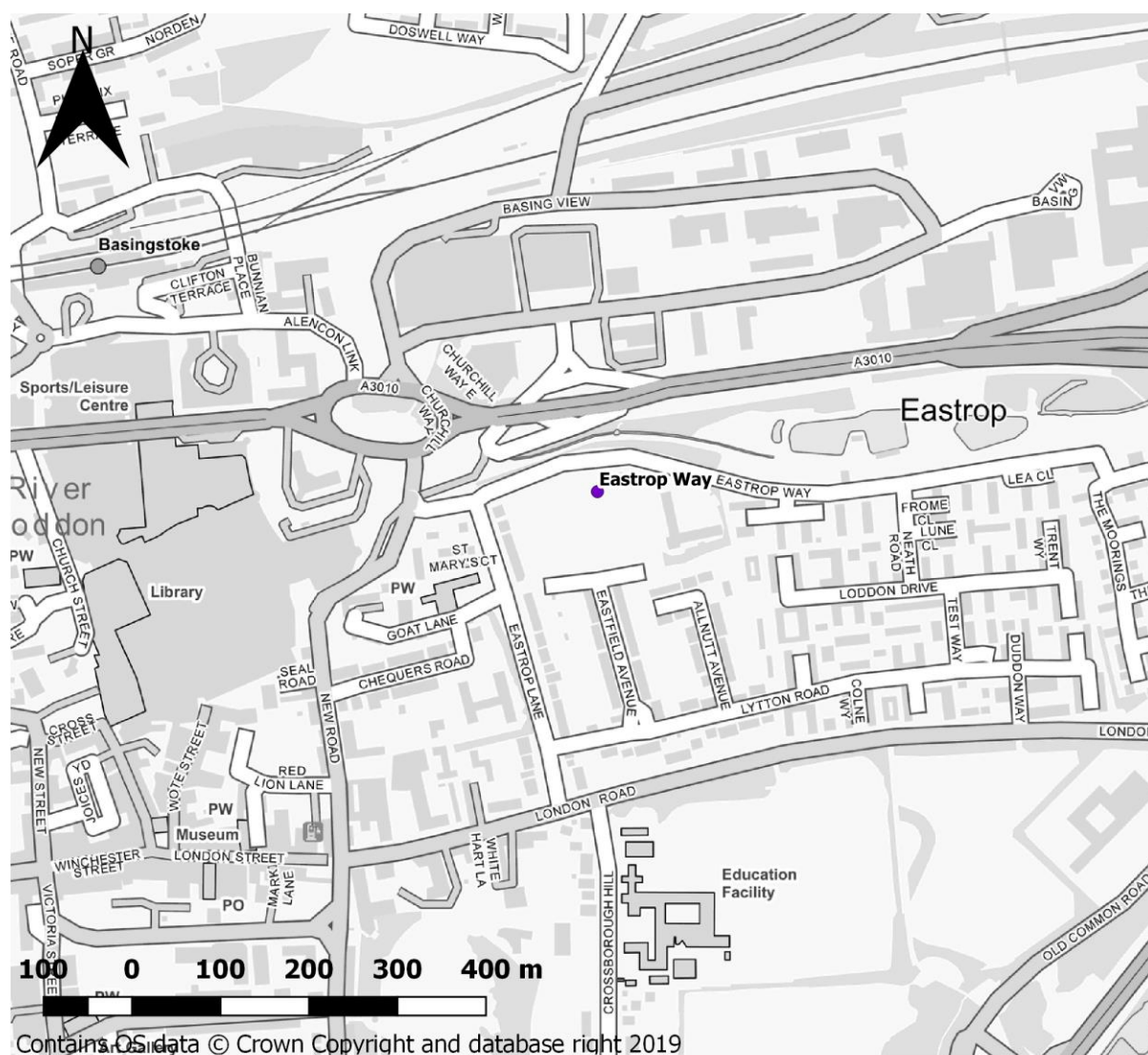
The Updated Screening Assessments and Air Quality Progress Reports in 2003,[18] 2004,[19] 2006,[20] and 2007,[21] used monitoring data from the Eastrop Way site to predict PM_{10} concentrations in future years and assess them against the air quality objectives. In all assessments, the monitoring data as well as results from the Design Model for Roads and Bridges (DMRB) identified no exceedances of PM_{10} against the 2004 air quality objectives. In each report, the following year was considered as well as a future year (2010).

Housing developments (such as the Kempshott Park housing development), busy junctions, industrial sources (such as the petroleum and combustion processes in Basingstoke and Deane Borough) and fugitive sources (such as quarries, landfill sites

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[18] Air Quality Updating and Screening Assessment for Basingstoke and Deane, August 2003
[19] Air Quality Review and Assessment Progress Report for Basingstoke and Deane, May 2004
[20] Air Quality Updating and Screening Assessment for Basingstoke and Deane, June 2006
[21] Air Quality Review and Assessment Progress Report 2007, July 2007

and domestic solid fuel burning) were considered via screening assessments in each report.

Continuous monitoring of PM$_{10}$ ceased at the end of June 2006, following no exceedances for a number of years. For the final six-month period of monitoring, the average PM$_{10}$ concentration was 20µg/m^3, well within the annual air quality objective of 40µg/m^3. The 90th percentile of daily mean PM$_{10}$ concentrations was 30µg/m^3, well within the 24-hour air quality objective of 50µg/m^3. No exceedances were predicted up to the year 2010. Following these results, Basingstoke and Deane Borough Council took the decision at the end of June 2006 to close the continuous monitoring site and resources were retargeted.

Particulate matter is always a consideration for Basingstoke and Deane Borough Council, despite the closure of the Eastrop Way continuous monitoring site. The DMRB has been used to assess the likelihood of the exceedance of the air quality objectives for PM$_{10}$, for example in an air quality assessment regarding a biomass combustion plant at the former SCA Building and Yard in Basingstoke, which was granted planning permission in 2010.[22] The DMRB continues to be used to assess the impact of fugitive sources of PM$_{10}$, such as the quarry at Mortimer which was granted planning permission to extend in 2011.

Although PM$_{10}$ is not a pollutant of concern for the Borough, in terms of exceedances of the air quality objectives, air quality assessments will continue to analyse PM$_{10}$ emissions where relevant.

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[22] 2012 Air Quality Updating and Screening Assessment for Basingstoke and Deane Borough Council, May 2012

Appendix A: Monitoring Results

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
Site 1	Winton Sq, Basingstoke	Roadside	463637	151855	NO_2	NO	1.0	1.3	No	3.7
Site 2	Front façade, 279 Winchester Rd, Basingstoke	Roadside	463636	151847	NO_2	NO	0.0	1.8	No	3.7
Site 9	Traffic lights at Winton Sq.	Roadside	463636	151847	NO_2	NO	4.0	1.8	No	3.7
Site 10	Corner of New St./Winton Square jnctn.	Roadside	463636	151847	NO_2	NO	5.0	1.8	No	3.7
Site 12	4 Winton Square	Kerbside	462440	153994	NO_2	NO	6.0	32.0	No	3.2
Site 13	Adjacent 52 New Road, B'Stoke	Roadside	461834	155601	NO_2	NO	0.0	2.7	No	2.5
Site 16	Junct. Winton Square/Winchester R'd.	Roadside	465559	159459	NO_2	NO	5.0	3.3	No	3.0
Site 17	37 Winchester St.	Kerbside	460962	153186	NO_2	NO	1.0	1.4	No	3.0
Site 18	Adjacent 37 Winchester St.	Roadside	460643	152286	NO_2	NO	1.0	2.0	No	3.0
Site 19	Adjacent Copenhagen Hse, New St.	Kerbside	460275	151853	NO_2	NO	0.0	1.8	No	3.0
Site 20	45 Winchester Street.	Kerbside	460681	151795	NO_2	NO	1.0	2.3	No	3.0

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
Site 22	Façade of Agra Balti, 34 Winchester Rd	Roadside	459692	148395	NO_2	NO	0.0	2.2	No	3.2
Site 34	39 Winchester Street	Roadside	459725	148322	NO_2	NO	0.0	24.0	No	3.0
Site 35	39 Winchester Street	Roadside	462969	152324	NO_2	NO	0.0	3.4*	No	3.2
Site 36	39 Winchester Street	Roadside	463983	152394	NO_2	NO	0.0	1.0	No	3.1
Site 45	Wadham Gardens	Urban background	464127	152302	NO_2	NO	8.7	58.0	No	3.0
Site 46	A340, West End	Roadside	464860	153143	NO_2	NO	6.5	21.0	No	2.9
Site 47	Bramley	Roadside	464820	153237	NO_2	NO	16.6	6.0	No	3.2
Site 48	North End of Roman Road	Roadside	463637	151855	NO_2	NO	11.0	1.3	No	3.7
Site 49	Middle of Roman Road	Roadside	463636	151847	NO_2	NO	7.3	1.8	No	3.7
Site 50	Bottom of Roman Road	Roadside	463636	151847	NO_2	NO	40.2	1.8	No	3.7
Site 51	Worting Road	Roadside	463636	151847	NO_2	NO	6.5	1.8	No	3.7
Site 52	Winchester Road. A30	Urban background	462440	153994	NO_2	NO	41.0	32.0	No	3.2
Site 53	Winchester Road, A30	Roadside	461834	155601	NO_2	NO	4.1	2.7	No	2.5
Site 54	Sinclair Drive	Roadside	465559	159459	NO_2	NO	4.4	3.3	No	3.0
Site 55	Skyline Plaza	Kerbside	460962	153186	NO_2	NO	2.0	1.4	No	3.0
Site 56	Eastrop	Urban background	460643	152286	NO_2	NO	32.0	2.0	No	3.0

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
Site 57	A339 nr Taverner Close	Urban Background	460275	151853	NO$_2$	NO	45.0	1.8	No	3.0
Site 58	A339 nr Taverner Close	Kerbside	460681	151795	NO$_2$	NO	49.0	2.3	No	3.0

Notes:

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

(2) N/A if not applicable.

*18m to ringway and 3.4m to road into the housing development.

Table A.2 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	NO₂ Annual Mean Concentration (µg/m³) [3]				
					2014	2015	2016	2017	2018
Site 1	Roadside	Diffusion Tube	100	100	28.1	25.6	26.8	25.3	25.5
Site 2	Roadside	Diffusion Tube	100	100	29.9	27.9	30.7	25.3	26.1
Site 9	Roadside	Diffusion Tube	100	100	36.9	35.2	30.1	35.3	34.2
Site 10	Roadside	Diffusion Tube	100	100	37.4	34.8	29.0	33.6	31.7
Site 12	Kerbside	Diffusion Tube	100	100	36.9	34.3	27.2	33.8	32.7
Site 13	Roadside	Diffusion Tube	100	100	32.9	30.7	32.8	31.2	29.6
Site 16	Roadside	Diffusion Tube	100	100	32.8	33.2	26.9	30.3	29.3
Site 17	Kerbside	Diffusion Tube	83	83	35.7	34.6	31.8	35.2	32.6
Site 18	Roadside	Diffusion Tube	92	92	35.0	34.4	33.3	34.6	32.3
Site 19	Kerbside	Diffusion Tube	100	100	34	32.3	33.8	32.8	30.3
Site 20	Kerbside	Diffusion Tube	100	100	**41.5**	**40.2**	35.6	38.6	37.5
Site 22	Roadside	Diffusion Tube	100	100	38.4	34.8	35.6	33.4	31.2
Site 34	Roadside	Diffusion Tube	83	83	-	-	39.5	38.2	34
Site 35	Roadside	Diffusion Tube	100	100	-	-	39.5	37.6	34.5

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	NO$_2$ Annual Mean Concentration (μg/m^3) [3]				
					2014	2015	2016	2017	2018
Site 36	Roadside	Diffusion Tube	92	92	-	-	39.2	37.9	34.9
Site 45	Urban background	Diffusion Tube	100	100	-	-	-	-	23.8
Site 46	Roadside	Diffusion Tube	100	100	-	-	-	-	29.4
Site 47	Roadside	Diffusion Tube	92	92	-	-	-	-	20.9
Site 48	Roadside	Diffusion Tube	100	100	-	-	-	-	21.0
Site 49	Roadside	Diffusion Tube	100	100	-	-	-	-	26.3
Site 50	Roadside	Diffusion Tube	100	100	-	-	-	-	26.0
Site 51	Roadside	Diffusion Tube	100	100	-	-	-	-	27.7
Site 52	Urban background	Diffusion Tube	100	100	-	-	-	-	20.8
Site 53	Roadside	Diffusion Tube	100	100	-	-	-	-	26.5
Site 54	Roadside	Diffusion Tube	100	100	-	-	-	-	27.2
Site 55	Kerbside	Diffusion Tube	100	100	-	-	-	-	30.6
Site 56	Urban background	Diffusion Tube	92	92	-	-	-	-	27.4
Site 57	Urban Background	Diffusion Tube	82	75	-	-	-	-	30.0
Site 58	Kerbside	Diffusion Tube	73	67	-	-	-	-	36.3

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

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

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 **<u>bold and underlined.</u>**

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

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

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

Figure A.1 – Trends in Annual Mean NO₂ Concentrations at Roadside Monitoring Sites 1 – 36 over the past 5 years
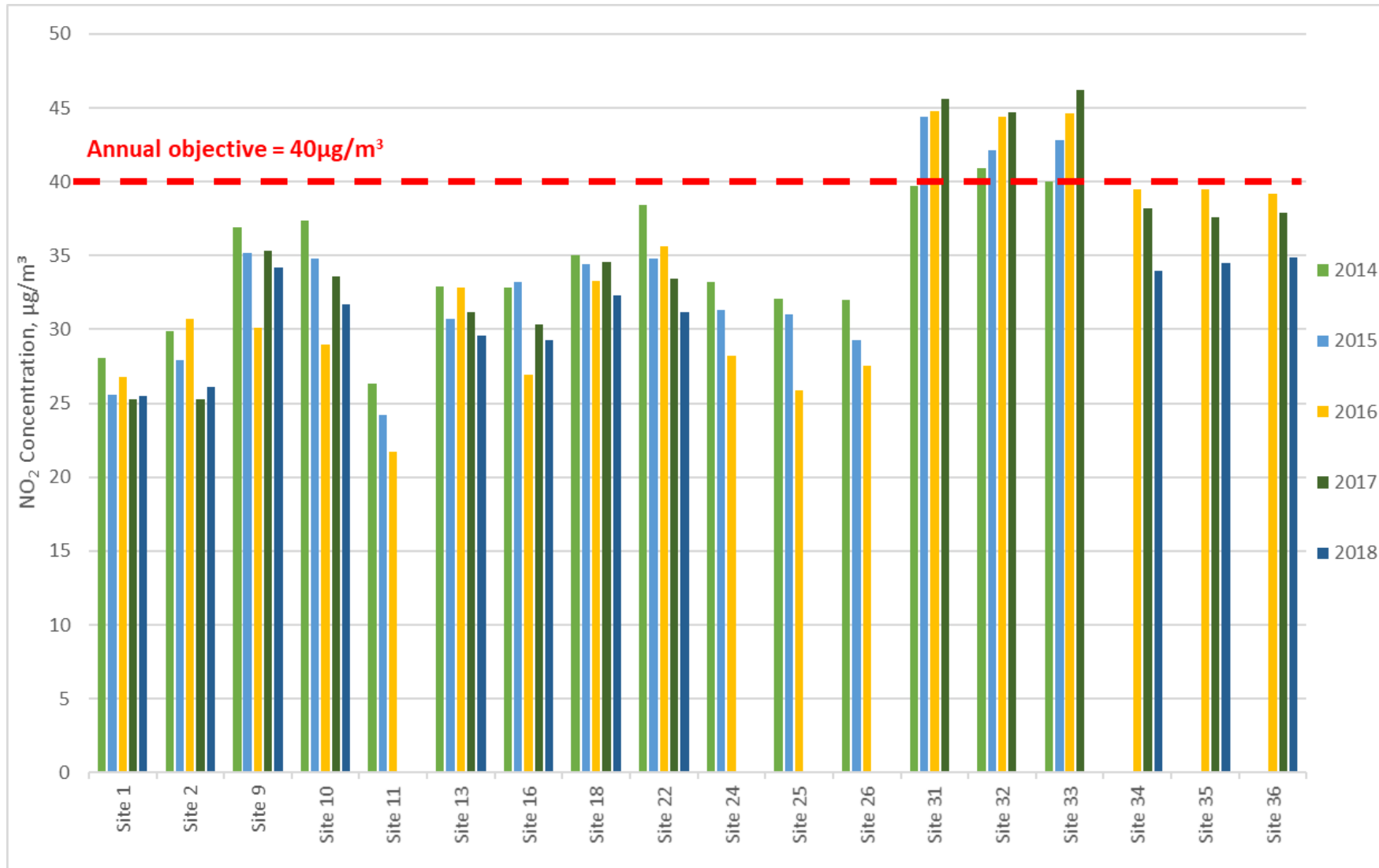
Figure A.2 – Trends in Annual Mean NO₂ Concentrations at Roadside Monitoring Sites 37 – 54 over the past 5 years
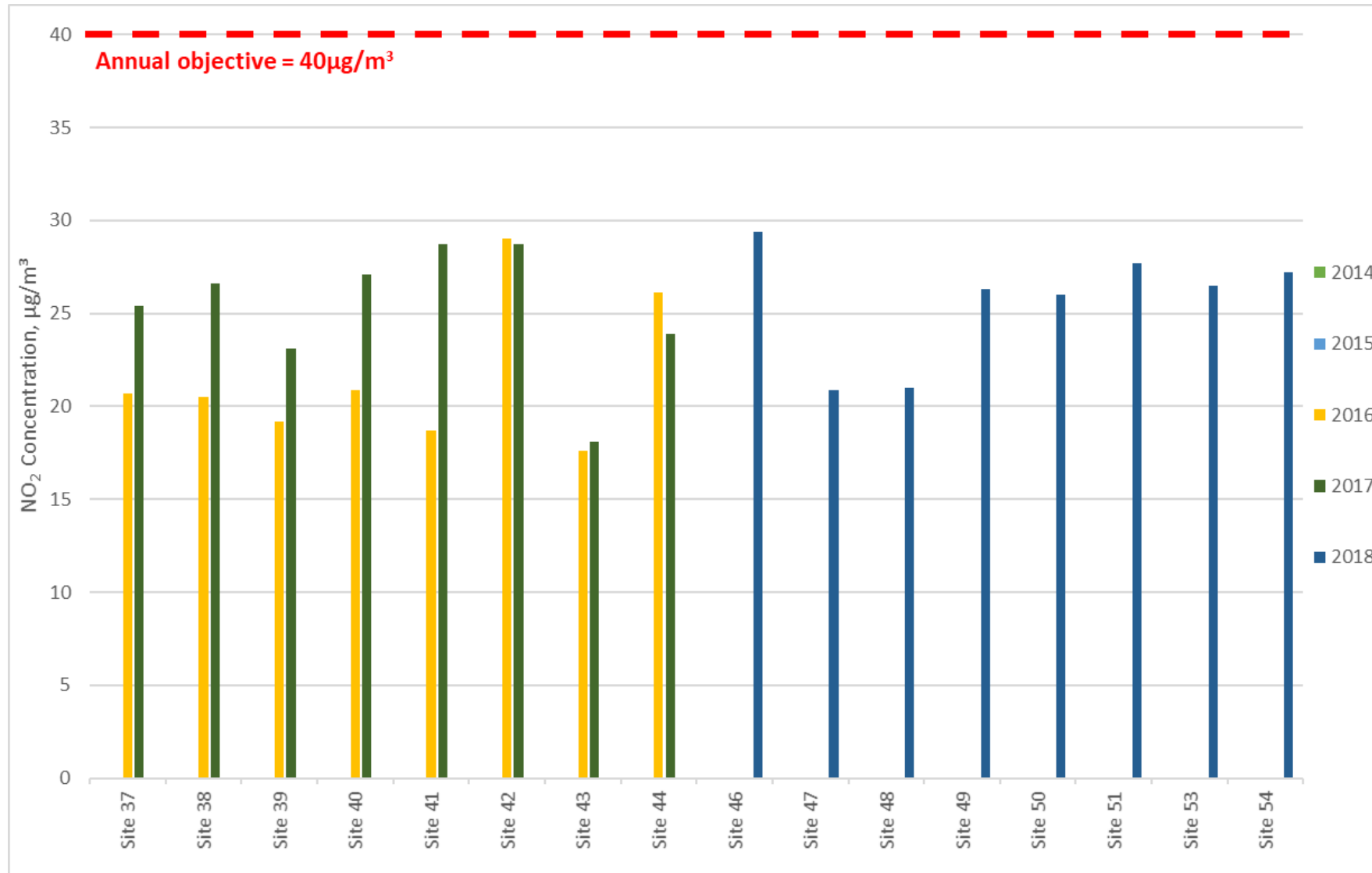
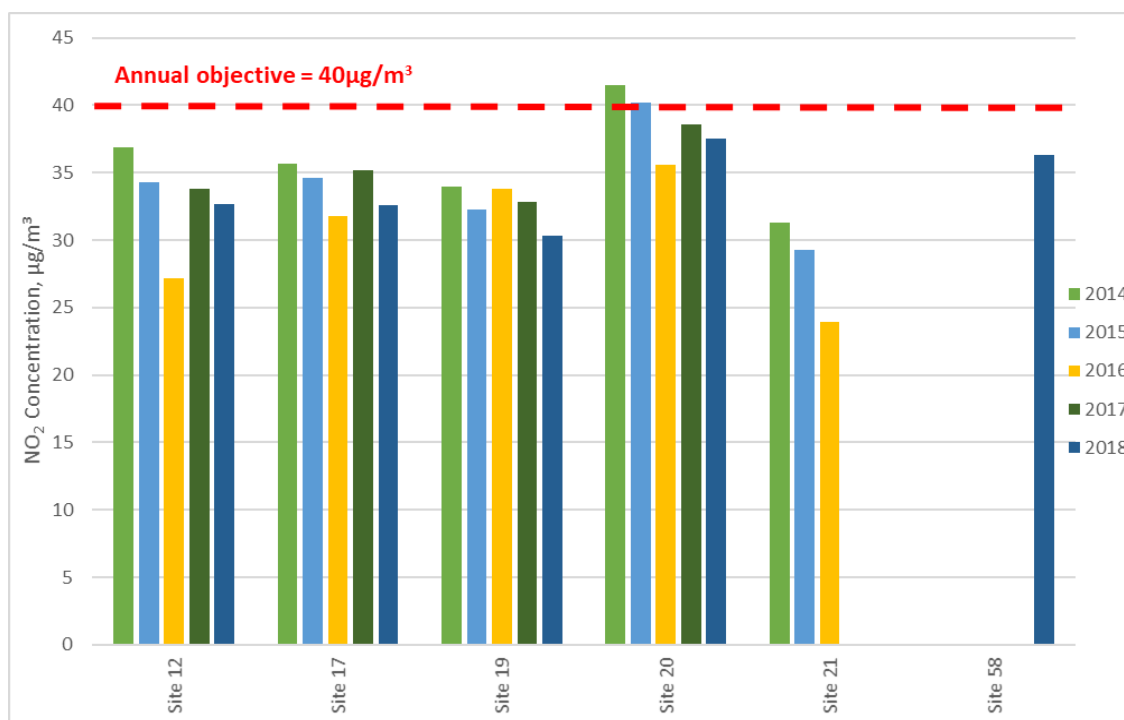**Figure A.3 Trends in Annual Mean NO₂ Concentrations at Kerbside Monitoring Sites over the past 5 years**

Figure A.4 Trends in Annual Mean NO₂ Concentrations at Urban Background Monitoring Sites over the past 5 years
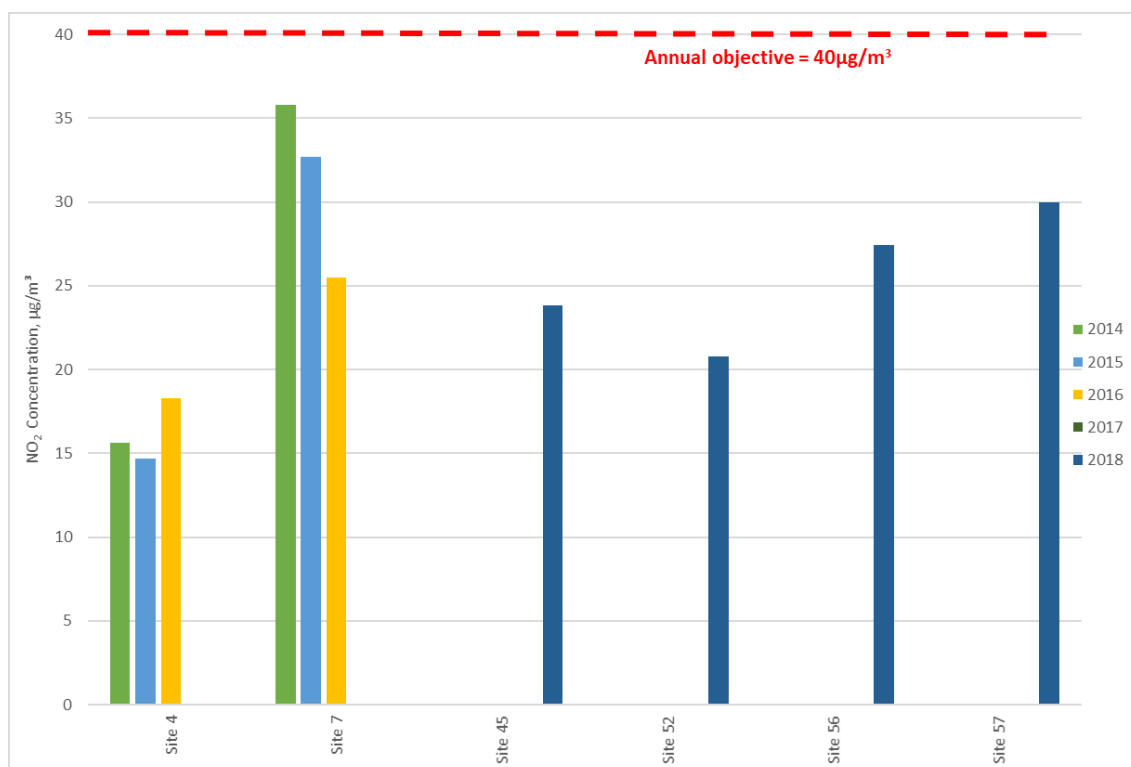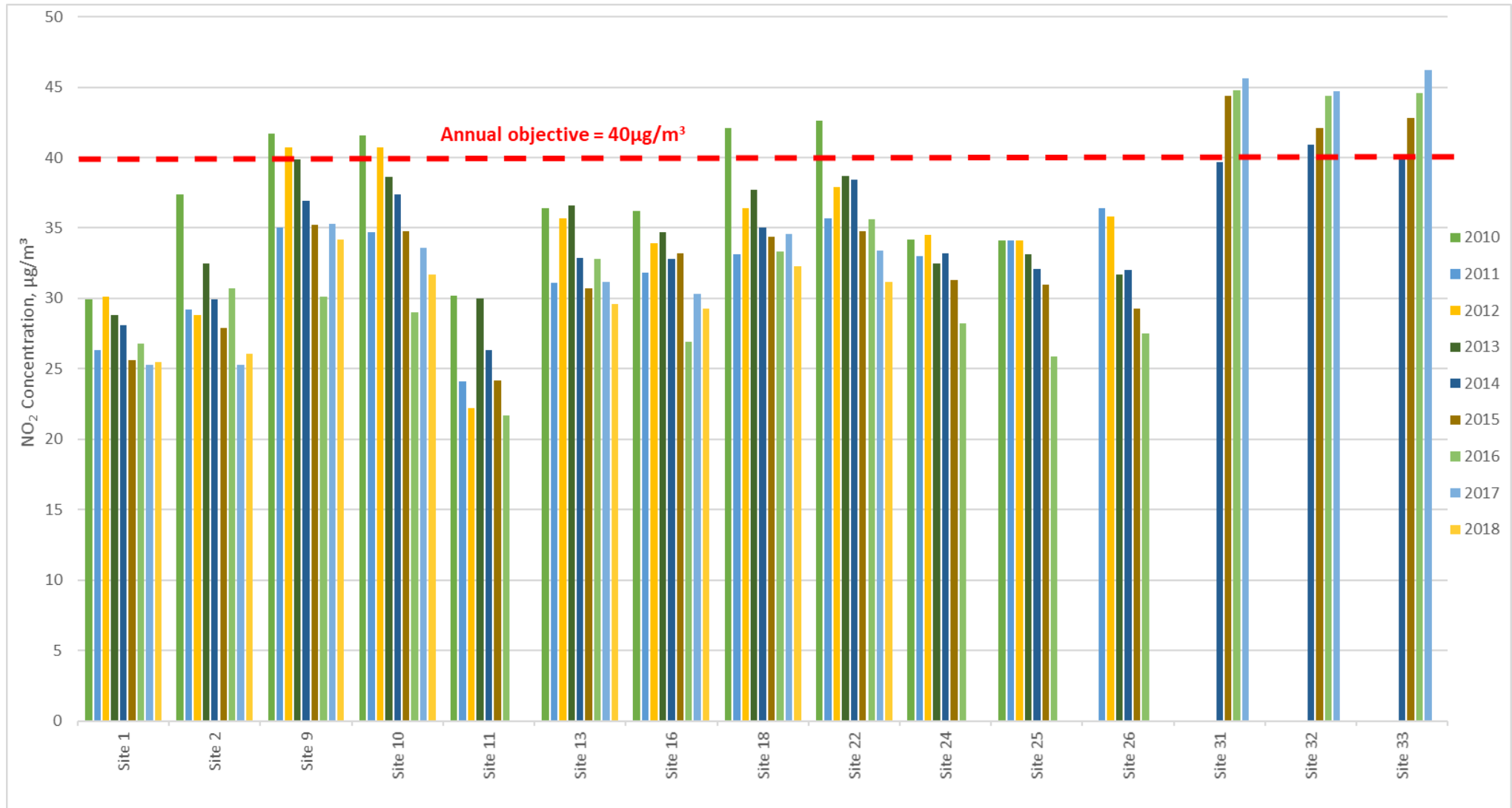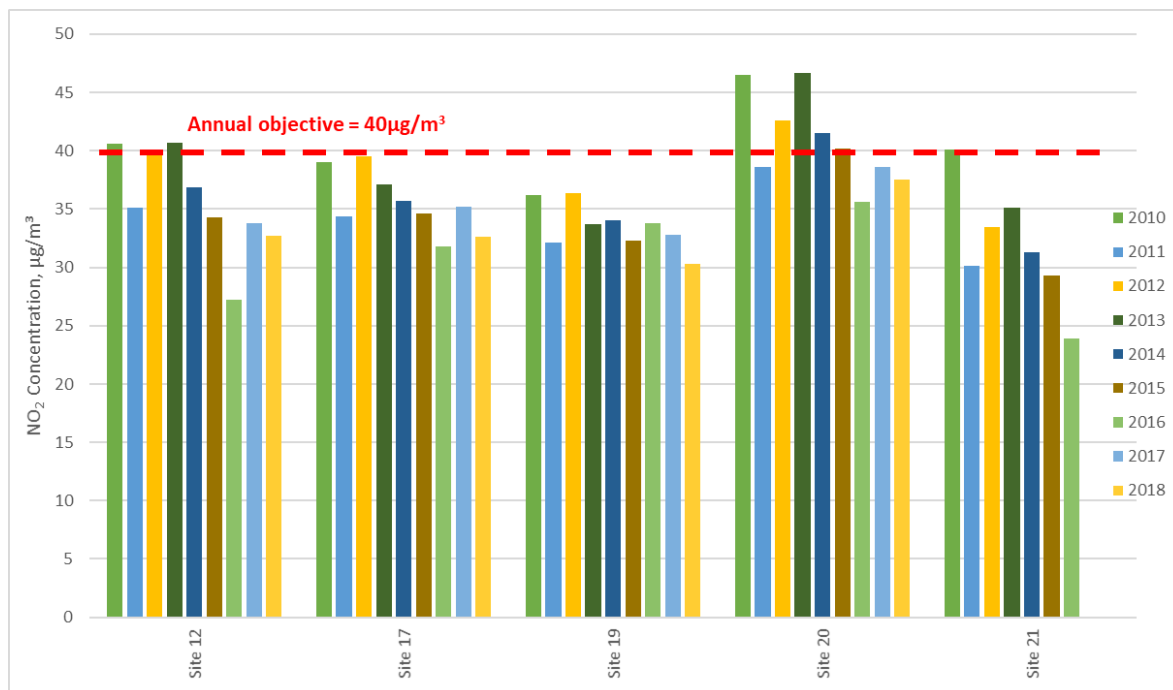

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Figure A.5 Trends in Annual Mean NO₂ Concentrations at Roadside Monitoring Sites between 2010-2018*

* Not including diffusion tubes where only data covering the last 3 years was available

Figure A.6 Trends in Annual Mean NO₂ Concentrations at Kerbside Monitoring Sites between 2010-2018*
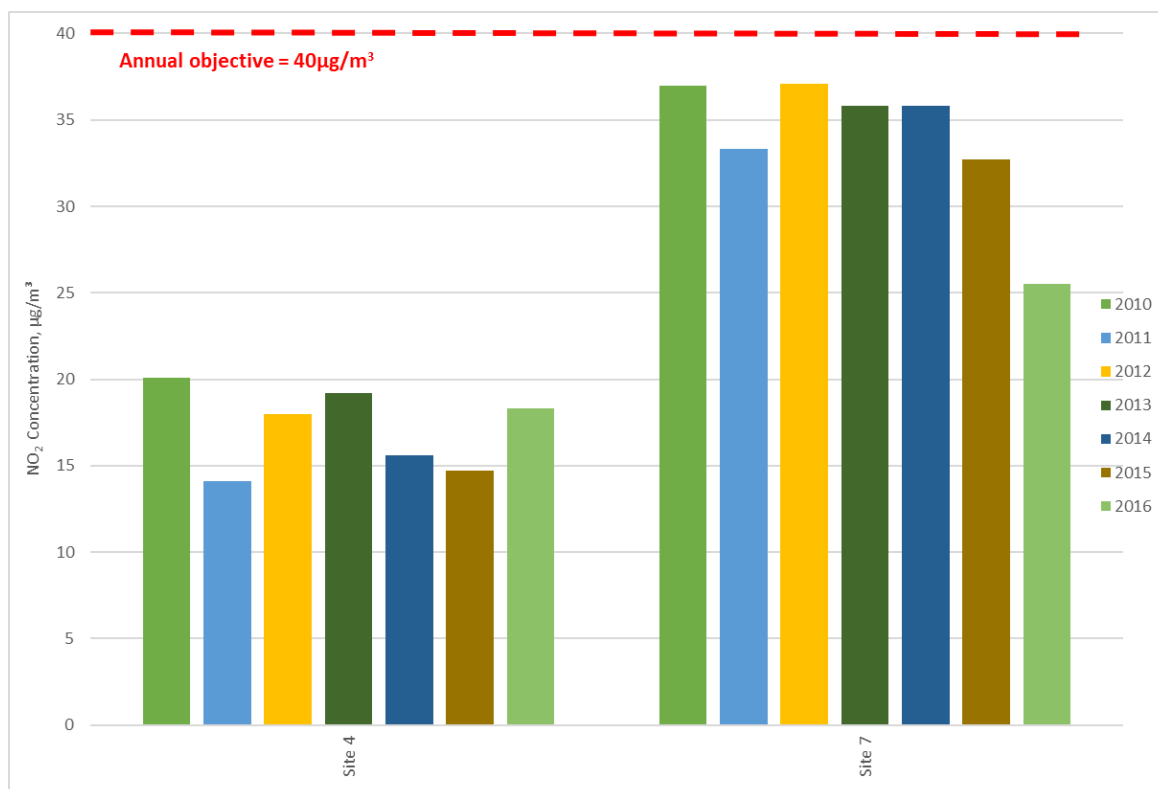

 * Not including Site 58 where only data for 2018 was available

Figure A.7 Trends in Annual Mean NO₂ Concentrations at Urban Background Monitoring Sites between 2010-2016

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Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2018

| Site ID | NO₂ Mean Concentrations (µg/m³) | | | | | | | | | | | | Annual Mean | | |
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.93) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
Site 1	30.8	27.7	24.8	30.6	27.6	26.6	24.5	22.6	22.6	30.2	36.3	24.7	27.4	25.5	24.2
Site 2	31.3	29.5	35.6	29.5	29.5	28.7	26.9	18.8	19.3	29.0	33.2	26.1	28.1	26.1	26.1
Site 9	**43.9**	37.7	29.7	37.8	36.9	35.3	39.0	30.5	38.1	38.1	39.8	34.2	36.7	34.2	28.0
Site 10	37.7	34.8	30.2	33.9	33.1	33.0	36.3	33.6	29.3	36.8	36.6	33.4	34.1	31.7	25.1
Site 12	39.8	32.9	30.4	32.3	39.8	39.1	35.7	28.0	33.9	37.5	**40.5**	32.3	35.2	32.7	24.8
Site 13	38.9	30.4	36.8	15.4	33.8	32.5	32.4	28.2	29.6	33.6	38.5	31.4	31.8	29.6	29.6
Site 16	36.8	35.2	27.7	29.0	31.3	32.0	28.4	26.5	28.5	34.2	36.9	31.1	31.5	29.3	23.6
Site 17	**44.0**	35.7	31.7	33.6	35.9	33.2	36.3	33.2	34.0	M	M	33.3	35.1	32.6	28.4
Site 18	**44.1**	33.4	34.3	M	33.9	32.3	35.9	32.0	33.1	36.6	33.9	32.4	34.7	32.3	30.3
Site 19	**43.8**	31.3	29.6	34.6	31.1	26.4	33.1	30.4	29.3	35.9	33.3	31.8	32.6	30.3	30.3
Site 20	**45.0**	37.7	29.5	**41.8**	**43.0**	**42.0**	**49.6**	37.1	36.8	37.8	**46.4**	36.7	**40.3**	37.5	32.7
Site 22	M	35.2	25.6	34.7	39.1	36.0	33.4	27.1	33.8	38.5	35.0	31.0	33.6	31.2	31.2
Site 34	**45.7**	32.4	28.2	38.6	36.5	31.7	**42.2**	34.9	M	M	38.9	32.7	36.2	34.0	34.0
Site 35	**47.0**	34.0	26.8	**40.5**	36.2	29.7	**44.0**	33.1	35.5	39.2	**43.3**	36.4	37.1	34.5	34.5
Site 36	**45.4**	31.5	29.3	**41.5**	37.0	35.4	38.3	36.1	M	39.5	**43.8**	34.7	37.5	34.9	34.9

Site ID	NO₂ Mean Concentrations (µg/m³)												Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.93) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
Site 45	32.3	21.1	28.8	22.8	15.7	13.9	18.4	18.8	19.4	22.1	30.3	20.8	22.0	23.8	22.7
Site 46	32.2	36.1	33.6	37.1	35.1	31.5	35.9	29.6	28.7	31.8	35.2	28.0	32.9	29.4	23.0
Site 47	25.7	25.1	24.2	D	19.4	18.5	19.5	16.4	18.1	22.6	25.5	19.6	21.3	20.9	15.6
Site 48	28.3	24.7	26.4	23.2	24.6	20.1	20.4	16.0	17.2	22.1	27.5	17.6	22.3	21.0	15.2
Site 49	29.9	26.9	28.6	27.4	22.1	24.3	23.4	20.9	23.3	27.6	31.0	25.6	25.9	26.3	20.1
Site 50	31.5	21.1	24.7	24.3	22.5	17.7	24.1	20.2	20.1	23.7	31.4	24.5	23.8	26.0	14.4
Site 51	35.4	28.6	32.7	25.2	23.4	24.4	26.0	19.9	23.6	29.4	31.3	28.3	27.3	27.7	21.9
Site 52	19.9	24.0	24.9	19.7	20.2	20.3	16.2	13.7	13.5	20.3	26.3	18.4	19.8	20.8	12.7
Site 53	34.3	32.8	32.5	25.0	34.0	35.5	36.3	31.7	33.8	38.3	30.5	26.5	32.6	26.5	25.0
Site 54	34.0	28.6	28.2	23.3	23.5	22.0	22.8	22.8	24.1	27.5	32.3	26.3	26.3	27.2	24.2
Site 55	37.8	34.7	37.2	28.5	32.5	30.6	33.9	31.9	31.7	36.9	32.6	33.2	33.5	30.6	27.0
Site 56	27.9	28.6	25.9	23.8	26.3	21.2	22.3	21.5	22.4	27.9	M	29.4	25.2	27.4	22.1
Site 57	M	38.0	**45.6**	24.1	M	M	**45.7**	35.8	19.0	24.3	34.8	25.9	32.6	30.0	21.6
Site 58	M	36.0	**44.6**	M	M	**51.3**	**56.0**	**45.5**	22.1	27.7	31.5	M	39.3	36.3	22.1

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

☒ **Where applicable, data has been distance corrected for relevant exposure**

Notes:

Exceedances of the NO$_2$ annual mean objective of 40μg/m^3 are shown in **bold**.

NO$_2$ annual means exceeding 60μg/m^3, indicating a potential exceedance of the NO$_2$ 1-hour mean objective are shown in **bold and underlined.**

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

(2) Distance corrected to nearest relevant public exposure.
M – Tube missing for this month.
D – Diffusion Tube was damaged and no data recorded.

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

Diffusion Tube Bias Adjustment Factors

Diffusion tubes may systematically under or over-read NO_2 concentrations when compared to the reference chemiluminescence analyser. This is described as bias and can be corrected to improve the accuracy of the diffusion tube results, using a suitable bias adjustment factor. Basingstoke and Deane Borough Council's diffusion tubes are prepared and analysed by Gradko using the 20% TEA in water method. This laboratory takes part in the QA/QC Field Intercomparison, operated on behalf of Defra.

No automatic monitoring is carried out within the borough therefore the bias adjustment factor used within the Annual Progress Report is derived from the national database.[23] The diffusion tube national adjustment factor spreadsheet is shown in Figure C.1. The national adjustment factor derived from the spreadsheet was 0.93 (Version 3/19). The adjustment of 0.93 has been used to adjust all diffusion tube results in 2018.

Figure C.1 National Bias Adjustment Factor

Analysed By	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm)	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2018	R	Ards and North Down Borough Council	11	36	29	27.4%	G	0.78
Gradko	20% TEA in water	2018	R	Gedling Borough Council	12	33	32	5.6%	G	0.95
Gradko	20% TEA in water	2018	R	Lisburn & Castlereagh City Council	12	32	24	32.1%	G	0.76
Gradko	20% TEA in water	2018	R	Monmouthshire County Council	12	38	36	4.7%	G	0.96
Gradko	20% TEA in water	2018	UB	Northampton Borough Council	12	16	13	26.8%	G	0.79
Gradko	20% TEA in water	2018	R	Bedford Borough Council	11	32	29	9.2%	G	0.92
Gradko	20% TEA in water	2018	R	Borough Council of King's Lynn and West No	12	26	24	6.0%	G	0.94
Gradko	20% TEA in water	2018	R	Cheshire West and Chester	12	36	37	-2.5%	G	1.03
Gradko	20% TEA in water	2018	R	Cheshire West and Chester	12	43	40	6.1%	G	0.94
Gradko	20% TEA in water	2018	R	Fareham Borough Council	12	28	34	-17.5%	G	1.21
Gradko	20% TEA in water	2018	R	Fareham Borough Council	12	37	34	8.9%	G	0.92
Gradko	20% TEA in water	2018	R	Fareham Borough Council	12	32	28	12.6%	G	0.89
Gradko	20% TEA in water	2018	R	NOTTINGHAM CITY COUNCIL	12	35	34	0.3%	G	1.00
Gradko	20% TEA in water	2018	R	Bracknell Forest Borough Council	12	44	37	19.4%	G	0.84
Gradko	20% TEA in water	2018	R	Brighton & Hove City Council	9	48	50	-3.7%	G	1.04
Gradko	20% TEA in water	2018	R	Eastleigh Borough Council	11	28	32	-12.0%	G	1.14
Gradko	20% TEA in water	2018	R	Eastleigh Borough Council	12	42	38	10.2%	G	0.91
Gradko	20% TEA in water	2018	UB	Eastleigh Borough Council	12	27	28	-4.4%	G	1.05
Gradko	20% TEA in water	2018	R	Gateshead Council	12	29	25	13.9%	G	0.88
Gradko	20% TEA in water	2018	R	Gateshead Council	12	32	29	10.8%	G	0.90
Gradko	20% TEA in water	2018	R	Gateshead Council	9	40	41	-1.8%	G	1.02
Gradko	20% TEA in water	2018	R	Wokingham Borough Council	12	38	33	13.2%	G	0.88
Gradko	20% TEA in water	2018	R	Bath & North East Somerset	12	40	39	4.0%	G	0.96
Gradko	20% TEA in water	2018	R	Bedford Borough Council	10	30	27	8.8%	G	0.92
Gradko	20% TEA in water	2018	KS	Marylebone Road Intercomparison	11	93	85	9.3%	G	0.91
Gradko	20% TEA in water	2018	R	South Gloucestershire Council	12	21	20	6.3%	G	0.94
Gradko	20% TEA in water	2018	R	Thurrock Borough Council	12	53	52	2.3%	S	0.98
Gradko	20% TEA in water	2018	R	Thurrock Borough Council	12	34	30	15.1%	G	0.87
Gradko	20% TEA in water	2018	R	Thurrock Borough Council	12	31	24	28.8%	G	0.78
Gradko	20% TEA in water	2018	UB	Thurrock Borough Council	12	27	25	9.2%	S	0.92
Gradko	20% TEA in water	2018		**Overall Factor** [30 studies]					**Use**	**0.93**

[23] https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

Data used to derive the annualisation factors

The Technical Guidance document provided by Defra (TG16) outlines a method to annualise monitoring when data capture is less than 75%. This method is outlined in box 7.10. The method recommends selecting automatic monitoring data from background locations in the vicinity of the local authority. The hourly nitrogen dioxide concentrations were downloaded from UK-AIR. A summary of the annualisation is presented in Table C.1 and

Table C.2.

Table C.1 Annualisation of NO$_2$ Data for Tube 57

Background Site	Annual Mean 2018	Period Mean 2018	Ratio (Am/Pm)
Chilbolton Observatory	9.6	9.5	1.01
London Hillingdon	46.2	47.5	0.97
Average Ratio			0.99
Months Available Tube 57			31/01/2018-02/05/2018; 04/07/2018-09/01/2019
Raw Period Mean Tube 57 (µg/m^3)			32.6
Annual Mean (Bias adj and annualised) Tube 57 (µg/m^3)			30.0

Table C.2 Annualisation of NO$_2$ Data for Tube 58

Background Site	Annual Mean 2018	Period Mean 2018	Ratio (Am/Pm)
Chilbolton Observatory	9.6	9.0	1.06
London Hillingdon	46.2	44.3	1.04
Average Ratio			1.05
Months Available Tube 58			31/01/2018-28/03/2018; 06/06/2018-05/12/2018
Raw Period Mean Tube 58 (µg/m^3)			39.3
Annual Mean (Bias adj and annualised) Tube 58 (µg/m^3)			36.3

Distance correction for NO₂ measurements

Distance correction of NO₂ diffusion tube measurements used the NO₂ fall-off with distance calculator available on the LAQM website and discussed in Paragraphs 7.77-7.79 of LAQM.TG16. The spreadsheet is shown in Table C.3 below. Background concentrations were sourced from the Defra background 1km x 1km maps.[24]

Table B.1 presents the 2018 NO₂ diffusion tube measurements as distance corrected to the nearest exposure.

Table C.3 Distance Correction Tool for NO₂ measurements

Enter data into the pink cells

Site Name/ID	Distance (m)		NO₂ Annual Mean Concentration (µg/m³)		
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor
Site 1	1.7	2.7	13.0	25.5	24.2
Site 2	6.0	6.0	12.9	26.1	26.1
Site 9	1.4	5.4	13.0	34.2	28.0
Site 10	1.1	6.1	13.0	31.7	25.1
Site 12	0.9	6.9	13.0	32.7	24.8
Site 13	4.8	4.8	14.2	29.6	29.6
Site 16	1.1	6.1	13.0	29.3	23.6
Site 17	0.4	1.4	13.0	32.6	28.4
Site 18	1.7	2.7	13.0	32.3	30.3
Site 19	3.0	3.0	13.0	30.3	30.3
Site 20	0.5	1.5	13.0	37.5	32.7
Site 22	1.3	1.3	13.0	31.2	31.2
Site 34	1.8	1.8	13.0	34.0	34.0
Site 35	1.8	1.8	13.0	34.5	34.5

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[24] Background maps available at https://uk-air.defra.gov.uk/data/laqm-background-home

Site Name/ID	Distance (m)		NO₂ Annual Mean Concentration (µg/m³)		
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor
Site 36	1.8	1.8	13.0	34.9	34.9
Site 45	32.0	40.7	17.2	23.8	22.7
Site 46	2.7	9.2	8.8	29.4	23.0
Site 47	3.3	19.9	9.9	20.9	15.6
Site 48	1.4	12.4	8.6	21.0	15.2
Site 49	2.0	9.3	9.1	26.3	20.1
Site 50	1.8	42.0	9.9	26.0	14.4
Site 51	2.3	8.7	9.9	27.7	21.9
Site 52	2.2	43.2	9.4	20.8	12.7
Site 53	24.0	28.1	9.4	26.5	25.0
Site 54	3.4	7.8	13.9	27.2	24.2
Site 55	1.0	3.0	14.2	30.6	27.0
Site 56	58.0*	90.0*	16.5	27.4	22.1**
Site 57	21.0	66.0*	16.0	30.0	21.6**
Site 58	6.0	55.0*	16.0	36.3	22.1**

* The Distance Correction tool does not allow for distances greater than 50m. Therefore, a distance of 50m was entered instead of the value shown, resulting in an overprediction of the distance corrected NO₂ concentration in the final column.

** These concentrations were calculated in-house using the same methods as the distance correction spreadsheet, to enable use of the correct distances over 50m and prevent over prediction of the distance corrected NO₂ concentration. Distance corrected concentrations were calculated for all sites and compared to those from the Defra tool to ensure validity of the results.

Appendix D: Maps of Monitoring Locations

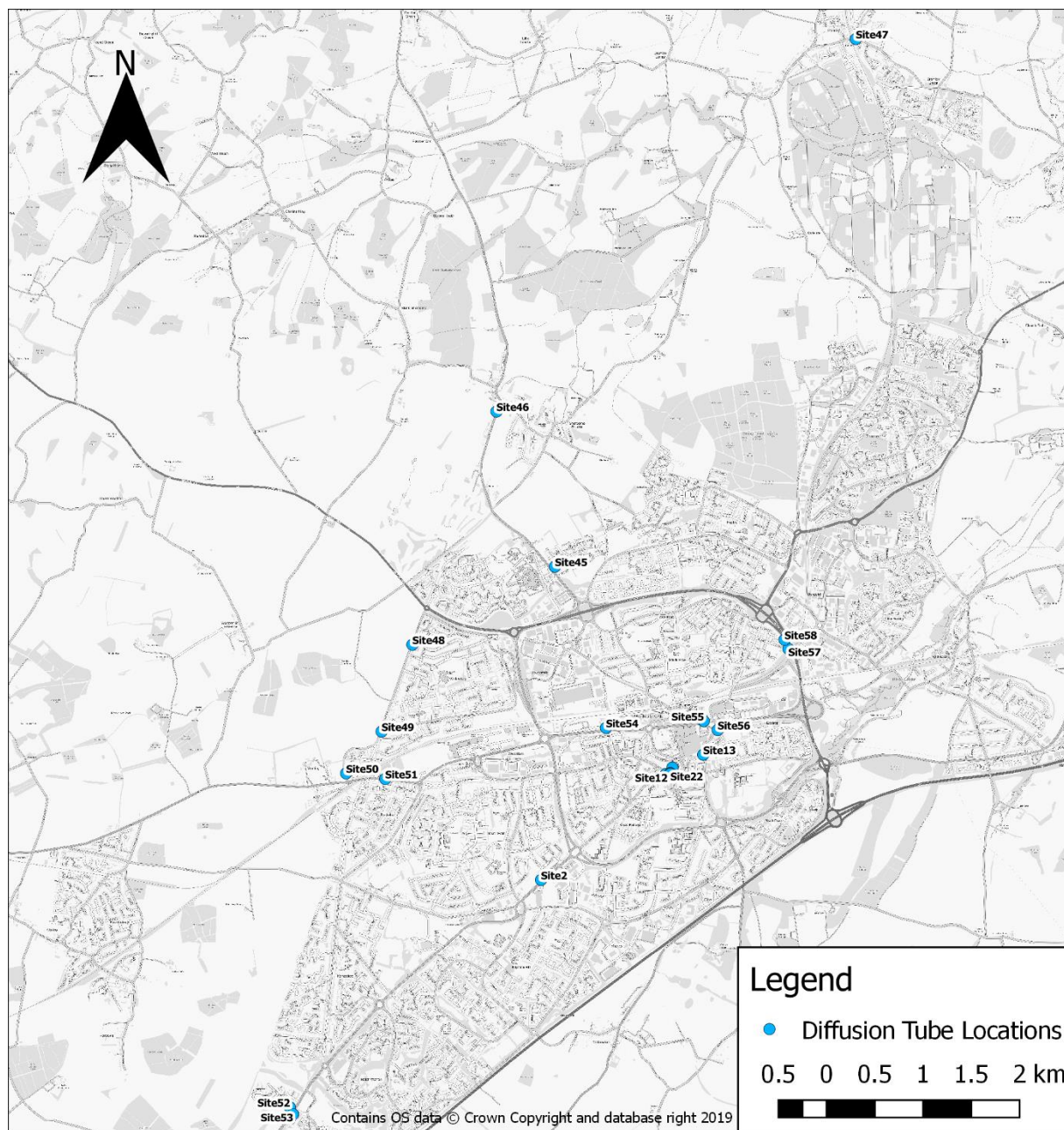**Figure D.1 Overview of Diffusion Tube Monitoring Locations in Basingstoke and Deane Borough**

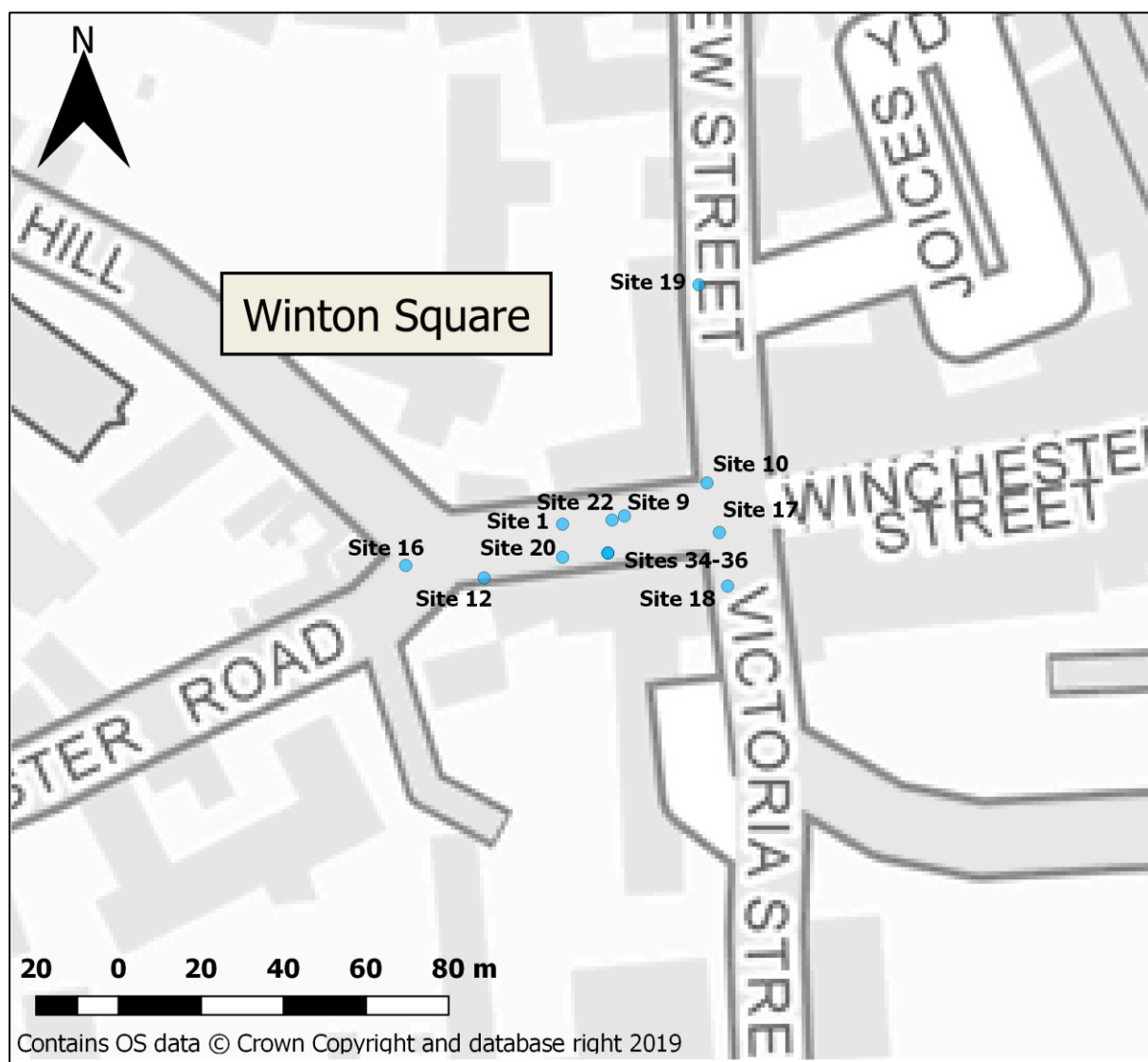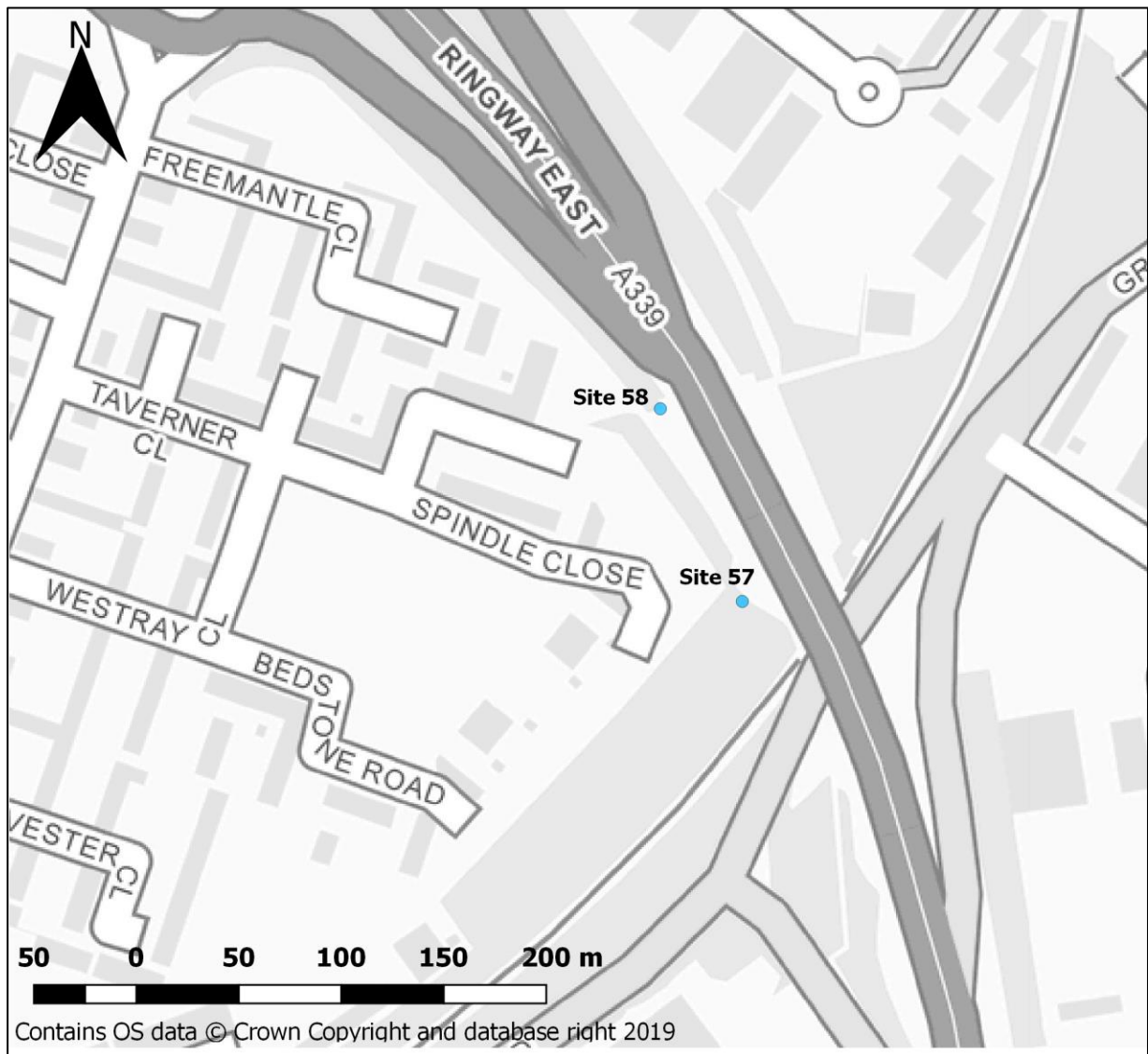**Figure D.2 Diffusion Tube Monitoring Locations Winton Square**

Figure D.3 Diffusion Tube Monitoring Locations adjacent to A339

Appendix E: Summary of Air Quality Objectives in England

Table E.1 Air Quality Objectives in England

| Pollutant | Air Quality Objective[25] | |
	Concentration	Measured as
Nitrogen Dioxide (NO$_2$)	200 μg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 μg/m^3	Annual mean
Particulate Matter (PM$_{10}$)	50 μg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 μg/m^3	Annual mean
Sulphur Dioxide (SO$_2$)	350 μg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 μg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 μg/m^3, not to be exceeded more than 35 times a year	15-minute mean

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

Glossary of Terms

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

References

Technical Guidance (2018), available at:

https://laqm.defra.gov.uk/documents/LAQMTG16-February-18-v1.pdf