



# 2022 Air Quality Annual Status Report (ASR)

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

Date: September, 2022

Information

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# Executive Summary: Air Quality in Our Area

## Air Quality in Dartford

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<sup>1,2</sup>.

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

The main source of air pollution in the borough is road traffic emissions from major roads, notably the M25, A282, A2, A226, A296 and A206. Dartford suffers from significant congestion, especially on the A282 Dartford Tunnel Approach Road, A2 Bean Interchange for Bluewater and main approach roads into Dartford town centre. Four Air Quality Management Areas (AQMA's) have been declared along these roads where exceedences of NO<sub>2</sub> and PM<sub>10</sub> objectives were predicted. Other pollution sources, including commercial, industrial and domestic sources, also make a contribution to background pollution concentrations.

Dartford Borough Council has maintained a large network of air quality monitoring across the Borough. Much of the monitoring is carried out within the existing AQMAs.

Levels of NO<sub>2</sub> between 17.2 & 28.6 µg/m<sup>3</sup> have been recorded in 2020 at background sites.

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<sup>1</sup> Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

<sup>2</sup> Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

<sup>3</sup> Defra. Air quality appraisal: damage cost guidance, July 2021

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

The majority of monitoring carried out within the borough of Dartford is at locations classified as being roadside, and consideration should be given that these results do not indicate the levels of exposure at the nearest receptor to the pollution source. Monitored levels have been corrected for distance to the nearest residential receptor where appropriate. This is displayed in table B1 and full details of the calculations can be found in Appendix C.

Monitored levels of NO<sub>2</sub> have decreased at the majority of sites across the borough. Only 2 out of the 52 monitoring sites breached the annual objective level, all of these are already within the declared AQMA's.

The diffusion tube monitoring location with the highest recorded value in 2021 was DA43 Overy Liberty which recorded a value of 48.1 µg/m<sup>3</sup>. This is below the threshold for where a risk of a breach of the 1-hour mean objective may be present. Monitored levels of PM<sub>10</sub> remained below the objective levels at all monitoring sites within the borough.

## 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<sup>5</sup> sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero<sup>6</sup> 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.

Dartford Borough Council has produced a new air quality action plan that sets out measures to improve air quality within the AQMAs and across the Borough.

The actions within this AQAP that can be considered under five broad topics:

- Priority 1: Public Health and Wellbeing;

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<sup>5</sup> Defra. Clean Air Strategy, 2019

<sup>6</sup> DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

- Priority 2: Transport;
- Priority 3: Air Quality Partnerships;
- Priority 4: Planning and Infrastructure;
- Priority 5: Policy

Details of the actions can be seen in table 2.2

## Conclusions and Priorities

The priorities for the forthcoming year are to carry out consultation and awareness exercise for the new action plan, and to continue progressing the delivery of the measures.

## Local Engagement and How to get Involved

1. Members of the public can help to improve air quality by making small changes to their everyday lives.

- Walking and cycling instead of making car journeys will reduce the amount of traffic on the local roads and reducing emissions and also helping to improve the congestion. Other small changes include not allowing car engines to idle when vehicles are stationary.
- Anticipate traffic flow, keeping in the highest gear possible and maintaining a steady speed at a low revs per minute (RPM). This will help to reduce pollution from your car, and save on fuel consumption.
- Consider purchasing a cleaner electric, hybrid vehicle or one that meets the euro 6 emission standard.
- Maintain your vehicle regularly, if a diesel, make sure the oil and filters are changed frequently. If you notice sooty emissions from the exhaust, take your vehicle to a servicing garage as soon as possible. Ensure your tyres are maintained at the optimum pressure to achieve the best fuel consumption and save you money.
- For short journeys, walking, cycling and public transport can be the best and cheapest option.

2. The majority of properties within the Borough are subject to smoke control orders under the Clean Air Act 1993. Residents can check if their property is included by visiting the [My Property](#) web page.

3. In a Smoke Control area only fuel on the list of authorised fuels, or any of the following ‘smokeless’ fuels can be burned, unless an exempt appliance is used.

- Anthracite
- Semi-anthracite
- Gas
- Low volatile steam coal

4. Appliances that burn solid fuel contribute to local air pollution and evidence is that their contribution is increasing due to the popularity of solid fuel burning for occasional heating requirements, especially in the winter time. Domestic solid fuel burning can generate significant levels of particulate pollution, and the council have noted an increase in complaints concerning smoke emitted from domestic properties. Non-compliance with the smoke control rules can result in a fine of up to £1000.

The Department for Environmental Food and Rural Affairs have produced [Guidance](#) should residents still wish to use solid fuels or solid fuel appliances.

## Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Dartford Borough Council. At the time of writing this ASR has not been signed off by a Director of Public Health.

If you have any comments on this ASR please send them to Environmental Health at:

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# 1 Local Air Quality Management

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

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

## 2 Actions to Improve Air Quality

### Air Quality Management Areas

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

A summary of AQMAs declared by Dartford Borough Council can be found in Table 2.1. The table presents a description of the 3 AQMAs that are currently designated within Dartford Borough Council. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO<sub>2</sub> annual mean;
- PM<sub>10</sub> 24-hour mean;

**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
A282 Tunnel Approach	2001	NO2 annual mean PM10 24 hour mean	The approach road to the Dartford Crossing which is flanked at several points by residential properties.	YES	70 µg/m3	39.3 (36.6 at nearest exposure) µg/m3	A282 Tunnel Approach Road Action Plan (1) 2002	New Action plan in draft.
London Road	2006	NO2 annual mean	The length of London Road (A226) which runs from Swanscombe in the east to the Princes Road roundabout, Dartford.	YES	64 µg/m3	43.5 µg/m3 (38.0 at nearest exposure)	Dartford Town and Approach Roads, A226 London Road and Bean Interchange Action Plan (1) 2009	New Action plan in draft.
Dartford Town Centre and Approach Roads	2006	NO2 annual mean	Several stretches of road converging on Dartford town centre.	YES	52 µg/m3	48.1 (46.9 at nearest exposure)	Dartford Town and Approach Roads, A226 London Road and Bean Interchange Action Plan (1) 2009	New Action plan in draft.

**Dartford Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date.**

**Dartford Borough Council confirm that all current AQAPs have been submitted to Defra.**

## Progress and Impact of Measures to address Air Quality in Dartford Borough

Defra's appraisal of last year's ASR concluded

The Council commissioned Bureau Veritas (BV) to conduct a technical review of the three AQMAs and to finalise the Air Quality Action Plan. Following the analysis of both monitoring data and modelled concentration, BV have made some recommendations for additional NO<sub>2</sub> monitoring which the Council should consider. Progress to the monitoring network and the AQAP should be reported in next year's report.

On the basis of the evidence provided by the local authority the conclusions reached are now **accepted** for all sources and pollutants. The next step is for Dartford Borough Council to submit an Annual Status Report in 2022.

The recommendations for additional monitoring was implemented in 2021.

Dartford Borough Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality.

Dartford Borough Council has produced a new air quality action plan which is undergoing a consultation stage prior to formal adoption by the Council.

Details of all measures in the new action plan are set out in Table 2.2.

More detail on these measures can be found in their respective Action Plans

Dartford Borough Council anticipates that the measures stated in Table 2.2 will achieve compliance in its AQMAs.

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

Measure No.	Measure	Category	Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
Transport Initiatives											
1	Dartford Town Centre – Urban Traffic Management Control (UTMC)	Traffic Management	UTC, Congestion management, traffic reduction								Development of UTMC within the Town Centre to increase the prioritising capacity and right of way for more sustainable travel options, e.g. bus, cycle, pedestrian.
2	Dartford Town Centre – Sustainable Transport Strategy Improvements	Traffic Management	UTC, Congestion management, traffic reduction								Improvements to Dartford Town Centre to be completed in line with the Dartford Borough Council Sustainable Transport Strategy. Proposal for four Phases of improvements to be confirmed.
3	Clean Bus Corridors	Promoting Low Emission Transport	Other								The development of specific corridors whereby only specific bus types are able to travel, building on the success of the existing Fastrack Bus Rapid Transit (BRT) scheme. KCC's Bus Service Implementation Plan (BSIP) has requested funding for zero tailpipe emission buses for a bus corridor on the A226 at Homes Gardens. Implementation is dependent on confirmation of DfT funding expected April 2022.
4	Clean Refuse Collection Corridors	Promoting Low Emission Transport	Other								Improving the efficiency of current routes of refuse collection. To be assessed both as routing and vehicle type/efficiency.
5	Increase of Electric Buses	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles								Expanding the fleet of fully electric buses, both within Dartford and across Kent. The Fastrack BRT network is to be serviced by 28 fully electric buses by 2023, with associated EV charging infrastructure implemented.

Measure No.	Measure	Category	Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
6	Promoting low/zero emission vehicles – Electric LGVs	Promoting Low Emission Transport	Other								Promotion of existing and future schemes relating to the availability and funding of Electric LGV. An existing example being Kent REVS up for Cleaner Air.
7	Promoting low/zero emission vehicles – Electric motorbikes	Promoting Low Emission Transport	Other								Promotion of existing and future schemes relating to the availability and funding of electric motorbikes.
8	Mobility as a Service (MaaS) to be developed within Dartford Borough Council	Traffic Management	Other								New service aimed to join transport initiatives together, allowing travel with ease. Both digital multimodal integration with the use of MaaS multimodal technology platform and physical integration of physical multimodal mobility hubs. MaaS promotes sustainable living, encouraging a modal shift to public transport and active travel thus reducing transport emissions. Geographical implementation of MaaS dependent on funding. The ambition is to expand MaaS scheme that will holistically join up transport across Kent & Medway over time. Dartford to provide support for continual development and implementation of MaaS across the borough.
Planning and Infrastructure											
9	Development of an Air Quality Supplementary Planning Guidance (SPG)	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance								To align all relevant planning documents relating to AQ. Aim to ensure consistency across proposed development in terms AQ, both within the assessment of, and mitigation where impacts are predicted.

Measure No.	Measure	Category	Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
10	Development of EV Charging Infrastructure	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging								Developing the existing EV charging network within Dartford and across Kent.
Sustainable Active Travel											
11	Promoting low/zero emission vehicles. Provision of eCargo bikes and cycling/e-cycling rental schemes.	Promoting Low Emission Transport	Other								Gauging the feasibility of rental schemes within the Dartford area. Working with Ebbsfleet to potentially extend their existing scheme to within and across Dartford. Additionally, promotion of existing and future schemes relating to the availability and funding of eCargo bikes.
12	Improvement of cycling and pedestrian routes – Dartford Riverside Scheme	Transport Planning and Infrastructure	Cycle network								Potential for a walking/cycling bridge across the River Darent plus improving paths along the Thames Embankment and the Dartford Marshes.
13	Improvement of cycling and pedestrian routes – Dartford Town Centre	Transport Planning and Infrastructure	Cycle network								Enhancing the accessibility of Dartford Town Centre to both cyclists and pedestrians. Developing multi-modal transport hubs that combine a number of sustainable transport modes at a single location. E.g., utilising Fastrack bus stations with cycling hubs to allow sustainable transport for the full duration of a journey.
14	Increase in cycle parking across Dartford Borough Council	Transport Planning and Infrastructure	Cycle network								Expanding the number of cycling parking spaces within the borough. Existing infrastructure to be assessed and new locations to be developed following identification, demand and feasibility.



Measure No.	Measure	Category	Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
15	Car Clubs: Promotion of existing car clubs	Alternatives to private vehicle use	Car Clubs								Promoting the success of existing car clubs and extending their reach to ensure they are widely publicised and fully utilised. Combined with assessing the potential for new locations within the borough.
16	Car Clubs: Introduction of electric car clubs	Alternatives to private vehicle use	Car Clubs								Building on the success of measure 15 by assessing the feasibility of developing existing car clubs to incorporate electric vehicles into their fleets.
Behavioural Change Campaigns											
17	Develop and enforce a borough wide anti-idling campaign	Traffic Management	Anti-idling enforcement								Borough-wide anti idling enforcement at taxi ranks, bus stops, and outside schools etc. Social Media an option with posting to encourage behavioural change. Option for a school case study to be chosen in the development of the Dartford strategy.
18	Provision of bikeability across Dartford Borough Council	Promoting Low Emission Transport	Other								The promotion of bikeability training within schools and youth enterprises - <a href="https://bikeability.org.uk/">https://bikeability.org.uk/</a>
19	School Educational Campaign	Public Information	Other								A packaged educational resource to be developed and provided to schools within the borough, to include: - Health impacts of air quality. - Conditions close to the school - Promotion of sustainable travel
20	Dartford Borough Council – Website Air Quality Information Presentation	Public Information	Via the Internet								Development of specific air quality information provided on the Council's website- <a href="https://www.dartford.gov.uk/environmental-services-1/air-quality">https://www.dartford.gov.uk/environmental-services-1/air-quality</a>
Measures Specific to AQMA 1											

Measure No.	Measure	Category	Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
21	Lower Thames Crossing	Traffic Management	Strategic highway improvements								Early estimates are for an opening year of 2029/30 for the proposed Lower Thames Crossing, <a href="https://nationalhighways.co.uk/our-work/lower-thames-crossing/">https://nationalhighways.co.uk/our-work/lower-thames-crossing/</a> Dartford to provide support where relevant and to assess the quantification of impact upon existing air quality within the borough.
22	Junction 1a Improvements	Traffic Management	Strategic highway improvements								Improvements to the existing Junction 1a. Ensuring that any further developments are aligned with the current capacity, and potential expansion of capacity of this junction.
23	A282 Monitoring	Public Information	Other								Potential for supplementing the existing monitoring completed by Dartford and NH on the A282. Allowing for greater understanding of diurnal and annual trends of NO <sub>2</sub> and PM <sub>10</sub> concentrations.

## PM<sub>2.5</sub> – 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<sub>2.5</sub> (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM<sub>2.5</sub> has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The Public Health Outcomes Framework data tool compiled by Public Health England (5) quantifies the mortality burden of PM<sub>2.5</sub> within England on a National, Regional and Local Authority scale. The latest available data (2020) shows the fraction of mortality attributable to air pollution across England is 5.6% and 6.0% within the South East region. In contrast, the fraction within Dartford Borough Council is higher than both the National and Regional averages, at 6.9 %.

Dartford Borough Council is working on producing a new Air Quality Action Plan that will include appropriate measures to reduce PM<sub>2.5</sub> as well as other priority pollutants.

Most of the Borough is subject to smoke control orders under the Clean Air Act 1993. Appliances that burn solid fuel contribute to local air pollution and evidence is that their contribution is increasing due to the popularity of solid fuel burning for occasional heating requirements, especially in the winter time. Non-compliance with the smoke control rules can result in a fine of up to £1000.

The Council will continue to work with developers and planners to reduce particulate emissions from construction site and if necessary, take enforcement action if required.

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

This section sets out the monitoring undertaken within 2021 by Dartford Borough 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

#### 3.1.1 Automatic Monitoring Sites

Dartford Borough Council undertook automatic (continuous) monitoring at 2 sites during 2021. Table A.1 in Appendix A shows the details of the automatic monitoring sites. NB. 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. The [London Air Quality Network](#) page presents automatic monitoring results for Dartford Borough Council, with automatic monitoring results also available through the UK-Air website .

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

#### 3.1.2 Non-Automatic Monitoring Sites

Dartford Borough Council undertook non- automatic (i.e. passive) monitoring of NO<sub>2</sub> at 52 sites during 2021. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

The automatic air quality monitoring station at Bean was closed in December 2020 and will be reinstalled to the south of the A2 once the junction improvement works have been

completed. The particulate monitor will be replaced with a unit capable of monitoring both PM<sub>10</sub> and PM<sub>2.5</sub>.

## 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<sub>2</sub>)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past five years with the air quality objective of 40µg/m<sup>3</sup>. 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.

Table A.5 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past five years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year.

Levels of NO<sub>2</sub> between 18.4 & 28.6 µg/m<sup>3</sup> have been recorded in 2021 at six background sites.

The majority of monitoring carried out within the borough of Dartford is at locations classified as being roadside, and consideration should be given that these results do not indicate the levels of exposure at the nearest receptor to the pollution source. Monitored levels in excess of 36 µg/m<sup>3</sup> have been corrected for distance to the nearest residential receptor where appropriate. This is displayed in table B1 and full details of the calculations can be found in Appendix C.

In 2021 monitored levels of NO<sub>2</sub> continued to decrease with only two of the monitoring sites breaching the annual objective level.

A new monitoring location was installed in London Road following recommendations from consultants who carried out a review of Dartford's AQMAs. This location DA99 recorded a level of 43.5 µg/m<sup>3</sup> which has been distance corrected to 38.0 at the façade of the nearest residential property.

One monitoring location recorded a predicted exceedance at the façade of a dwelling. This was DA43 Overy Liberty which recorded a level of 48.1 µg/m<sup>3</sup> which has been distanced corrected to 46.9 µg/m<sup>3</sup> at the nearest residential property. This is below the threshold for where a risk of a breach of the 1-hour mean objective may be present.

In general 2021 saw lower levels of NO<sub>2</sub> across the borough compared with the previous year.

The increase of NO<sub>2</sub> levels that were observed in 2020 at monitoring locations along London Road to the East of St Clements did not continue in 2021, although levels here were still higher than those recorded in 2019.

#### **3.1.4 Particulate Matter (PM<sub>10</sub>)**

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM<sub>10</sub> annual mean concentrations for the past five years with the air quality objective of 40µg/m<sup>3</sup>.

Table A.7 in Appendix A compares the ratified continuous monitored PM<sub>10</sub> daily mean concentrations for the past five years with the air quality objective of 50µg/m<sup>3</sup>, not to be exceeded more than 35 times per year.

Particulate matter is monitored in the form of PM<sub>10</sub> at two roadside monitoring stations. As was seen in previous years there were no breaches of either the annual mean or the 24 hour mean objectives at the three automatic monitoring station. The annual mean levels recorded at these stations has been fairly constant over the past few years.

## Appendix A: Monitoring Results

**Table A.1 – Details of Automatic Monitoring Sites**

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
ZR2	Dartford Town Centre	Roadside	554117	173852	NO <sub>2</sub> ; PM <sub>10</sub>	YES	API/BAM	N/A	2.7	1.8
ZR4	St Clements 2	Roadside	558488	174671	NO <sub>2</sub> ; PM <sub>10</sub>	YES	API/BAM	8.5	6	1.8

**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 – 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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
DA07	Summerhouse Drive	Urban Background	550749	171924	NO2	No	6.4m	3.1m	N	3
DA10	London Road (Greenhithe)	Roadside	559120	174854	NO2	London Road	2.5m	3m	N	3
DA16	Princes Road II	Roadside	554108	173318	NO2	Town Centre	Y-15.7m	<1m	N	3
DA17	Shepherds Lane	Roadside	552988	173922	NO2	Town Centre	Y-11m	1.5m	N	3
DA18	Alkerden Lane	Urban Background	559748	174073	NO2	No	N	1.5m	N	3
DA20	Eliot Road	Roadside	555661	174865	NO2	Tunnel Approach Road	Y-9.4m	22.3m	N	3
DA21	Brentfield Road	Roadside	555497	174025	NO2	Tunnel Approach Road	Y-10.3m	31m	N	3
DA22	Brent Way	Roadside	555605	174023	NO2	Tunnel Approach Road	Y-7.2m	18.4m	N	3
DA24	Wayville Road	Roadside	555634	173558	NO2	Tunnel Approach Road	Y-0m	34m	N	3
DA25	Queens Gardens	Urban Background	555801	173194	NO2	Tunnel Approach Road	Y-0m	52m	N	3
DA34	The Brent II	Roadside	555373	173763	NO2	Town Centre	Y-6m	7.8m	N	3
DA35	Highfield Road	Roadside	553848	173994	NO2	Town Centre	Y-4.6m	1m	N	3
DA36	Burnham Rd / Bob Dunn	Roadside	553283	175288	NO2	Town Centre	14.2	1.3	N	3
DA38	London Road III (Waterstone)	Roadside	558289	174580	NO2	London Road	Y-3.2m	2.7m	N	3



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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
DA39	Park Road	Roadside	555129	173802	NO2	Town Centre	Y-6m	<1m	N	3
DA41	Church Hill/Hawley Road	Roadside	554123	172805	NO2	No	Y-6.2m	4.2m	N	3
DA43	Overy Liberty	Roadside	554581	173987	NO2	Town Centre	Y-0.8m	6.1m	N	3
DA44	Brent Close	Roadside	555653	174047	NO2	Tunnel Approach Road	Y-0m	80m	N	3
DA47	Westgate Road	Roadside	553922	174325	NO2	Tunnel Approach Road	Y-2.8m	3.3m	N	
DA48	Hawley Road (M25)	Roadside	555297	171327	NO2	No	Y-0m	16m	N	3
DA49	St Albans Road	Roadside	554903	173893	NO2	Town Centre	Y-0m	6.5m	N	3
DA50	A2/Bridge	Roadside	553784	172315	NO2	No	Y-0m	13m	N	2.4
DA53	Park (Swallow Cl)	Urban Background	557695	174665	NO2	No	Y-0m	N/A	N	2.4
DA54	King Edward Ave	Urban Background	553720	174553	NO2	No	Y-0m	25m	N	2.4
DA56	Cranford Road	Urban Background	554222	173460	NO2	No	Y-0m	N/A	N	3
DA60	Burnham Road / Priory Road	Roadside	553895	174678	NO2	Town Centre	Y-4.6m	<1m	N	3.1
DA61	West Hill II	Roadside	553578	174175	NO2	Town Centre	Y-0m	4.8m	N	3
DA62	The Brent/London Road	Roadside	555796	173902	NO2	London Road	Y-5m	<1m	N	3.15
DA63	Churchill Close	Urban Background	555613	173210	NO2	Tunnel Approach Road	Y-15m	66m	N	3

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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
DA67	Hill Rise	Roadside	556900	171294	NO2	No	Y- 7m	14.7m	N	3
DA68	Bow Arrow Lane II	Roadside	555724	174377	NO2	Tunnel Approach Road	Y – 8.3m	250m	N	2
DA69	Hawley Road II (120)	Roadside	554338	172581	NO2	No	Y – 5.3m	2m	N	2
DA70	Hope Cottages	Roadside	558687	172610	NO2	No	Y – 10.5m	150m	N	2
DA72	Little Dale	Roadside	556451	172152	NO2	No	Y – 17m	65m	N	2
DA78	Burnham Road III (54)	Roadside	553686	174905	NO2	Town Centre	Y- 5.3m	1.5m	N	3
DA79	Watling Street II	Roadside	556230	173564	NO2	No	Y-7.4m	2.4m	N	2.5
DA83	Byron Road	Urban Background	555617	175330	NO2	No	Y-18m	44m	N	3
DA84	Brent Way II	Roadside	555574	174068	NO2	Tunnel Approach Road	Y-16m	12m	N	3
DA85	Mount Pleasant Road	Roadside	554556	174034	NO2	Town Centre	No	40m	N	3
DA86	Brent Close II	Urban Background	555780	174012	NO2	Tunnel Approach Road	Y – 5.4m	189m	N	3
DA89	Garden Place	Roadside	553793	172260	NO2	No	Y – 7.7m	11.5m	N	2.5
DA90	Gothic Close	Roadside	553963	172277	NO2	No	Y – 5m	29m	N	2.5
DA91	13 Southfleet Road	Roadside	560876	174001	NO2	No	Y– 2.5m	1.9m	N	2.5
DA92	Pilgrims Road/London Road	Roadside	560534	174877	NO2	London Road	Y – 9.5m	2.35m	N	2.5
DA93	Snowden Hill/London Road	Roadside	561201	174906	NO2	London Road	Y – 3.3	2.4	N	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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
DA94	Green Street Green Road (Park New)	Roadside	556360	172372	NO2	No	10.5	2.7	N	2.5
DA95	13 Green Street Green Road	Roadside	556497	171978	NO2	No	6.5	2.1	N	2.5
DA96	The Bridge (Marsh Street)	Roadside	555117	175718	NO2	No	48.9	10.4	N	2.5
DA97	Bow Arrow Lane (M25) New	Roadside	555495	174436	NO2	Tunnel Approach Road	9.65	3.67	N	3
DA98	Leyton Cross Road	Roadside	551858	172452	NO2	No	4.9	1.9	N	2.5
DA99	London Road Greenhithe 3	Roadside	559207	174877	NO2	London Road	2.0	1.2	N	2.5
DA100	Watling Street 3	Roadside	556715	173464	NO2	Town Centre	2.5	2.5	N	2.7

**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.3 – Annual Mean NO<sub>2</sub> Monitoring Results: Automatic Monitoring (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2021 (%) <sup>(2)</sup>	2017	2018	2019	2020	2021
ZR2 Dartford Town Centre	554117	173852	Roadside		95	34.0	36.0	32.0	24.0	26
ZR3 Bean Interchange	558622	172752	Roadside			<b>55.0</b>	<b>49.0</b>	<b>46.0</b>	32	Closed
ZR4 St Clements 2	558488	174671	Roadside		88			37.0	37.0	35

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

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

**Notes:**

The annual mean concentrations are presented as µg/m<sup>3</sup>.

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

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%).

**Table A.4 – Annual Mean NO<sub>2</sub> Monitoring Results: Non-Automatic Monitoring (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2021 (%) <sup>(2)</sup>	2017	2018	2019	2020	2021
DA07 Summerhouse Drive	550749	171924	Urban Background		100.0	21.8	24.8	23.2	20.8	18.9
DA10 London Road (Greenhithe)	559120	174854	Roadside		90.4	35.1	35.6	31.8	34.3	34.0
DA16 Princes Road 2	554108	173318	Roadside		100.0	<b>43.1</b>	<b>41.4</b>	<b>41.1</b>	38.8	36.5
DA17 Shepherds Lane	552988	173922	Roadside		100.0	30.4	33.7	30.0	29.8	28.3
DA18 Alkerden Lane	559748	174073	Urban Background		100.0	25.3	25.8	26.3	26.2	24.7
DA20 Elliot Road	555661	174865	Roadside		100.0	38.1	<b>43.3</b>	36.1	34.3	33.8
DA21 Brentfield Road	555497	174025	Roadside		100.0	32.5	34.5	32.2	29.0	29.1
DA22 Brent Way	555605	174023	Roadside		100.0	<b>51</b>	<b>47.7</b>	<b>44.0</b>	<b>41.1</b>	39.3
DA24 Wayville Rd	555634	173558	Roadside		92.3	33.5	36.3	32.3	31.1	29.6
DA25 Queens Gardens	555801	173194	Urban Background		100.0	33.7	35.1	30.8	27.5	27.6
DA34 The Brent II	555373	173763	Roadside		100.0	39	<b>42.2</b>	37.6	36.9	34.0
DA35 Highfield Road	553848	173994	Roadside		82.7	35.3	37.5	34.0	27.6	29.2
DA36 Burnham Road/Bob Dunn	553283	175288	Roadside		100.0	34.3	37.8	34.9	31.8	31.2

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2021 (%) <sup>(2)</sup>	2017	2018	2019	2020	2021
DA38 London Road 3 (Waterstone)	558289	174580	Roadside		73.1	37.2	35.4	33.4	32.0	30.6
DA39 Park Road	555129	173802	Roadside		100.0	36.6	<b>40.2</b>	36.8	35.4	33.9
DA41 Church Hill/Hawley Road	554123	172805	Roadside		100.0	38.7	38.8	36.7	34.8	31.3
DA43 Overy Liberty	554581	173987	Roadside		100.0	<b>53</b>	<b>57.9</b>	<b>54.6</b>	<b>50.7</b>	<b>48.1</b>
DA44 Brent Close	555653	174047	Roadside		100.0	39.4	38.6	37.3	35.0	32.4
DA47 Westgate Road	553922	174325	Roadside		100.0	34.8	37.0	34.8	34.5	31.5
DA48 Hawley Road (M25)	555297	171327	Roadside		100.0	33.9	34.7	30.8	30.1	30.9
DA49 St Albans Road	554903	173893	Roadside		100.0	36.3	36.8	37.0	34.0	33.2
DA50 A2/Bridge	553784	172315	Roadside		92.3	<b>42</b>	<b>41.3</b>	37.9	35.5	30.8
DA53 Park (Off Swallow Close)	557695	174665	Urban Background		90.4	19.8	19.9	20.0	18.0	17.2
DA54 King Edward Avenue	553640	174553	Urban Background		84.6	24.8	26.7	25.6	23.7	23.6
DA56 Cranford Road	554222	173460	Urban Background		100.0	24.1	25.4	24.7	22.4	22.2
DA60 Burnham Road II (Priory)	553895	174678	Roadside		100.0	33.8	36.9	32.9	32.4	31.9
DA61 West Hill II	553578	174175	Roadside		100.0	<b>40.9</b>	<b>45.7</b>	<b>45.2</b>	<b>43.5</b>	37.8

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2021 (%) <sup>(2)</sup>	2017	2018	2019	2020	2021
DA62 Brent/London Road	555796	173902	Roadside		100.0	<b>43.8</b>	<b>41.1</b>	39.4	37.1	35.6
DA63 Churchill Close	555613	173210	Urban Background		84.6	30	32.6	30.9	26.6	26.0
DA67 Hill Rise, Darenth	556900	171294	Roadside		100.0	27.3	27.2	25.3	23.5	23.7
DA68 Bow Arrow Lane II	555724	174377	Roadside		90.4	30.5	29.5	30.0	26.8	26.5
DA69 Hawley Road 2 (120)	554338	172581	Roadside		100.0	34.4	32.9	32.4	34.0	32.3
DA70 Bean (Hope Cottages)	558687	172610	Roadside		100.0	33.5	34.8	31.2	28.3	30.6
DA72 Little Dale	556451	172152	Roadside		90.4	36.1	38.4	35.2	33.2	33.3
DA78 Burnham Road 3 (54)	553686	174905	Roadside		50.0	33.9	39.1	35.4	33.1	33.3
DA79 Watling Street 2	556230	173564	Roadside		90.4	32.8	34.5	32.1	29.7	28.0
DA83 Byron Road	555617	175330	Urban Background		92.3	30.1	33.5	30.2	25.8	26.7
DA84 Brent Way 2	555574	174068	Roadside		100.0	<b>49</b>	<b>45.2</b>	<b>43.7</b>	<b>42.9</b>	37.5
DA85 Mount Pleasant Road	554556	174034	Roadside		100.0	30.2	32.8	30.8	29.4	30.8
DA86 Brent Close 2	555780	174012	Urban Background		100.0	34.7	33.3	32.7	30.8	28.6
DA89 Garden Place	553793	172260	Roadside		100.0	28.8	28.7	26.3	24.7	24.2
DA90 Gothic Close	553963	172277	Roadside		100.0	32.5	37.2	30.7	28.2	24.7
DA91 13 Southfleet Road	560876	174001	Roadside		100.0	33.3	33.4	32.6	30.9	29.6

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2021 (%) <sup>(2)</sup>	2017	2018	2019	2020	2021
DA92 Pilgrims Road/London Road	560534	174877	Roadside		100.0	41.6	42.5	35.2	38.1	37.1
DA93 Snowden Hill/London Road	561201	174906	Roadside		100.0	40.3	41.0	38.2	40.1	38.7
DA94 Green Street (Park New)	556360	172372	Roadside		100.0	36.2	35.3	33.0	31.2	29.2
DA95 13 Green Street Green Road	556497	171978	Roadside		100.0	37.9	36.7	33.8	31.6	31.2
DA96 The Bridge (Marsh Street)	555117	175718	Roadside		100.0	42.2	41.8	41.8	39.2	36.6
DA97 Bow Arrow Lane (M25) New	555495	174436	Roadside		100.0	35.3	46.4	44.3	42.7	37.2
DA98 Leyton Cross Road	551858	172452	Roadside		90.4	-		27.2	27.7	26.9
London Road Greenhithe 3	559207	174877	Roadside		100.0					43.5
Watling Street 3	556715	173464	Roadside		92.3					29.4

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:

The annual mean concentrations are presented as  $\mu\text{g}/\text{m}^3$ .



Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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.

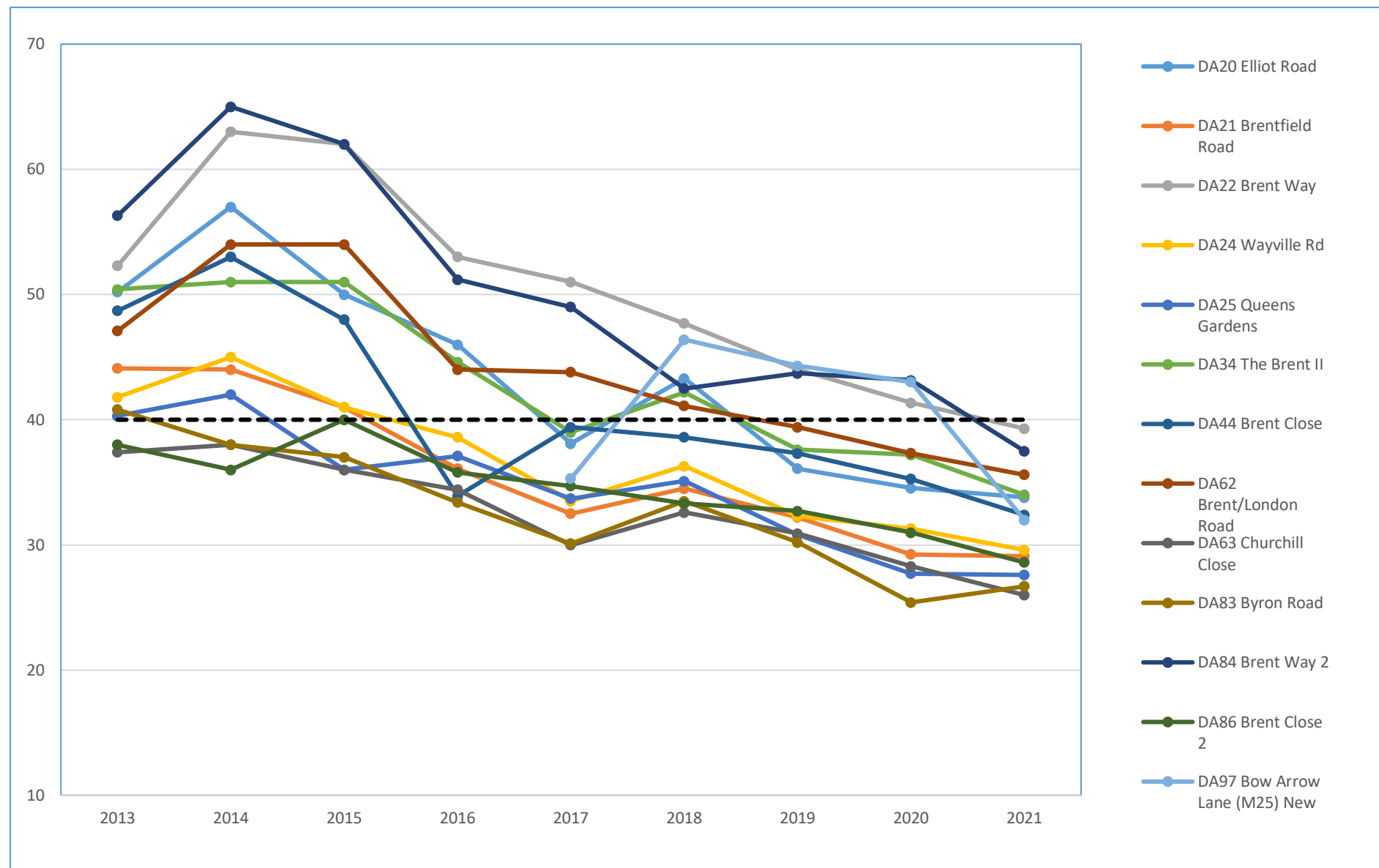
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

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

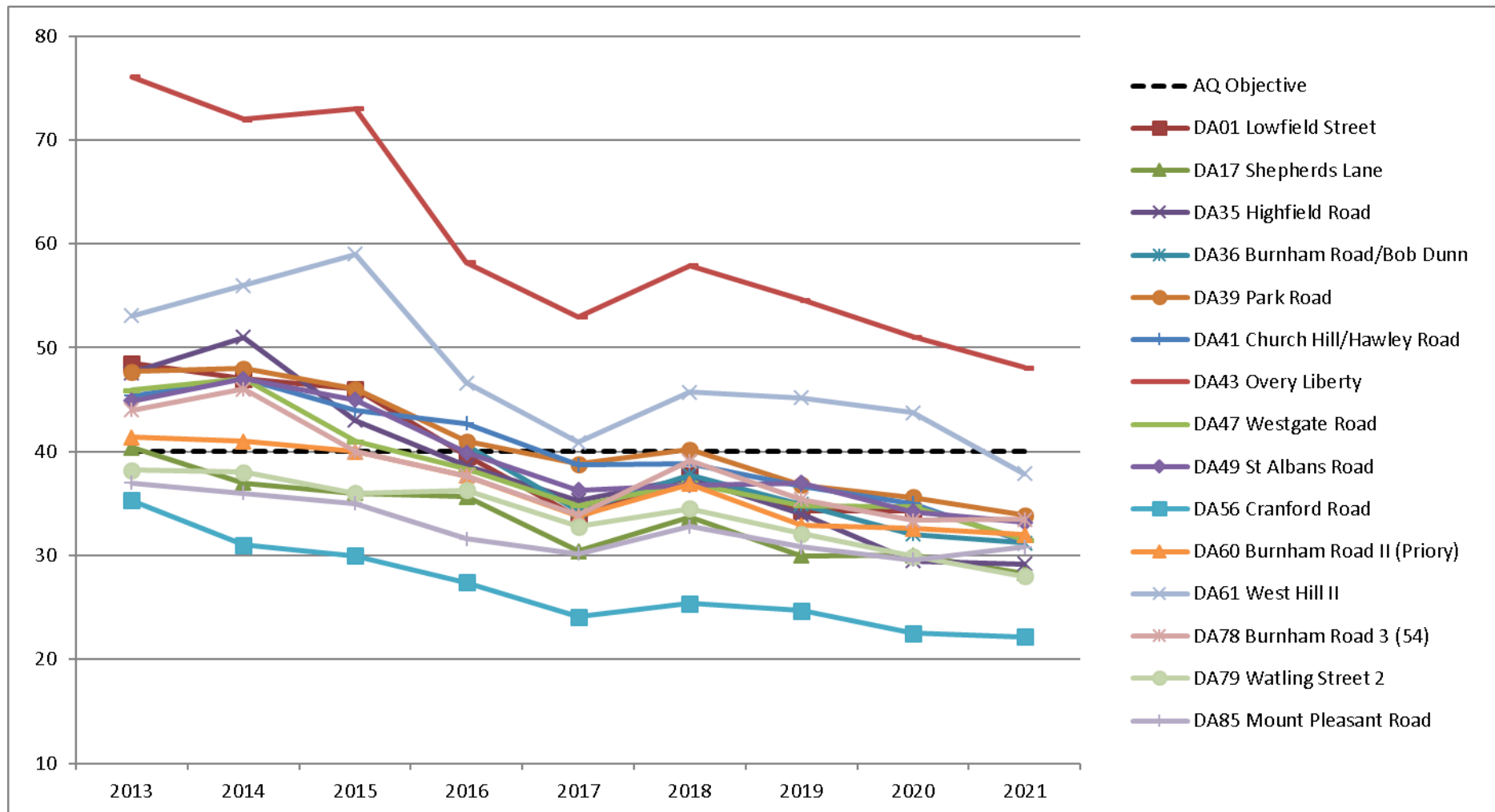
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

**Figure A.1 – Trends in Annual Mean NO<sub>2</sub> Concentrations**

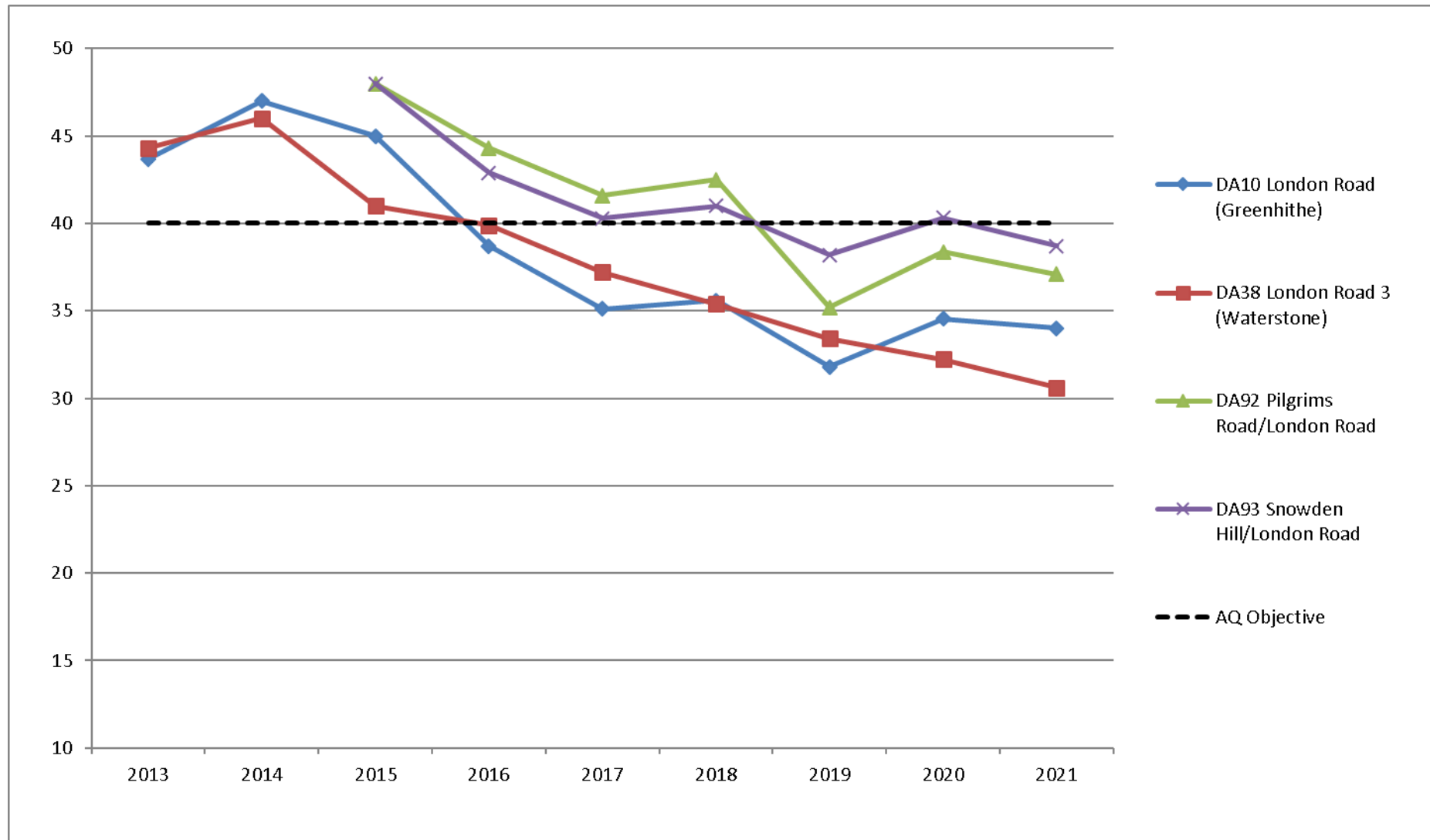
Air Quality monitoring in the proximity of the A282 trunk road Nitrogen dioxide µg/m<sup>3</sup>



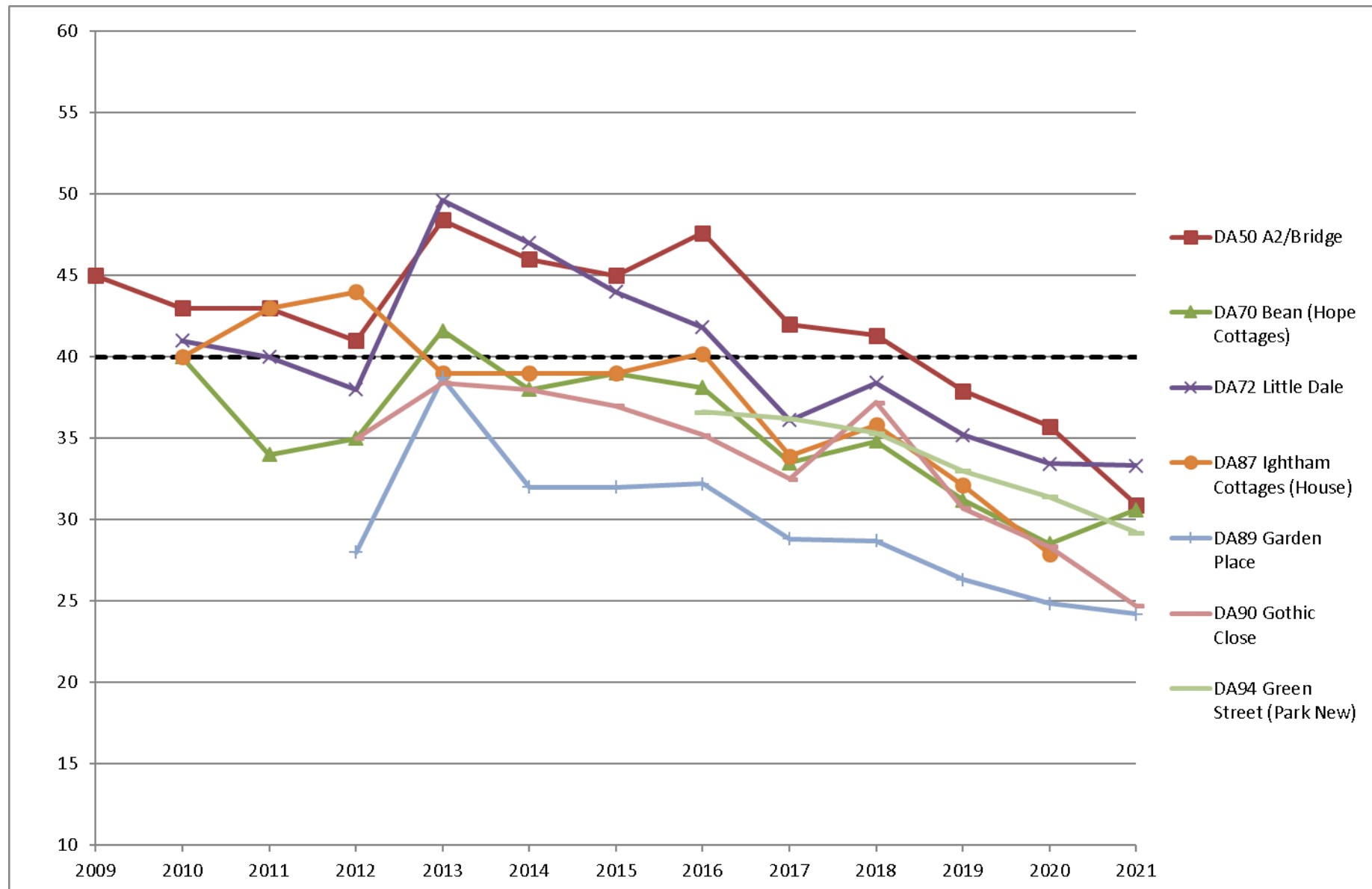
Air Quality monitoring Town Centre (Nitrogen dioxide  $\mu\text{g}/\text{m}^3$ )



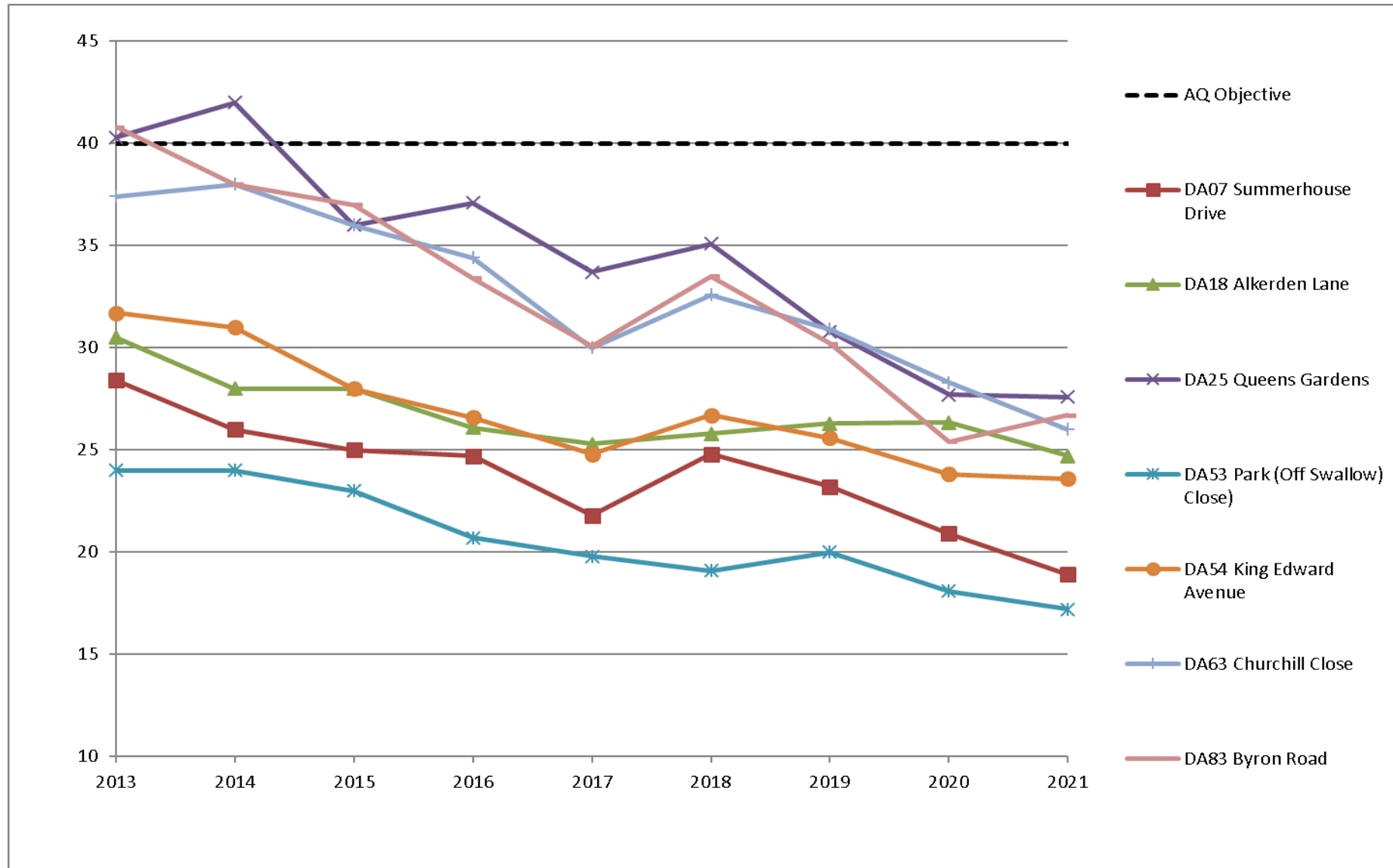
Air Quality monitoring - London Road (Nitrogen dioxide  $\mu\text{g}/\text{m}^3$ )



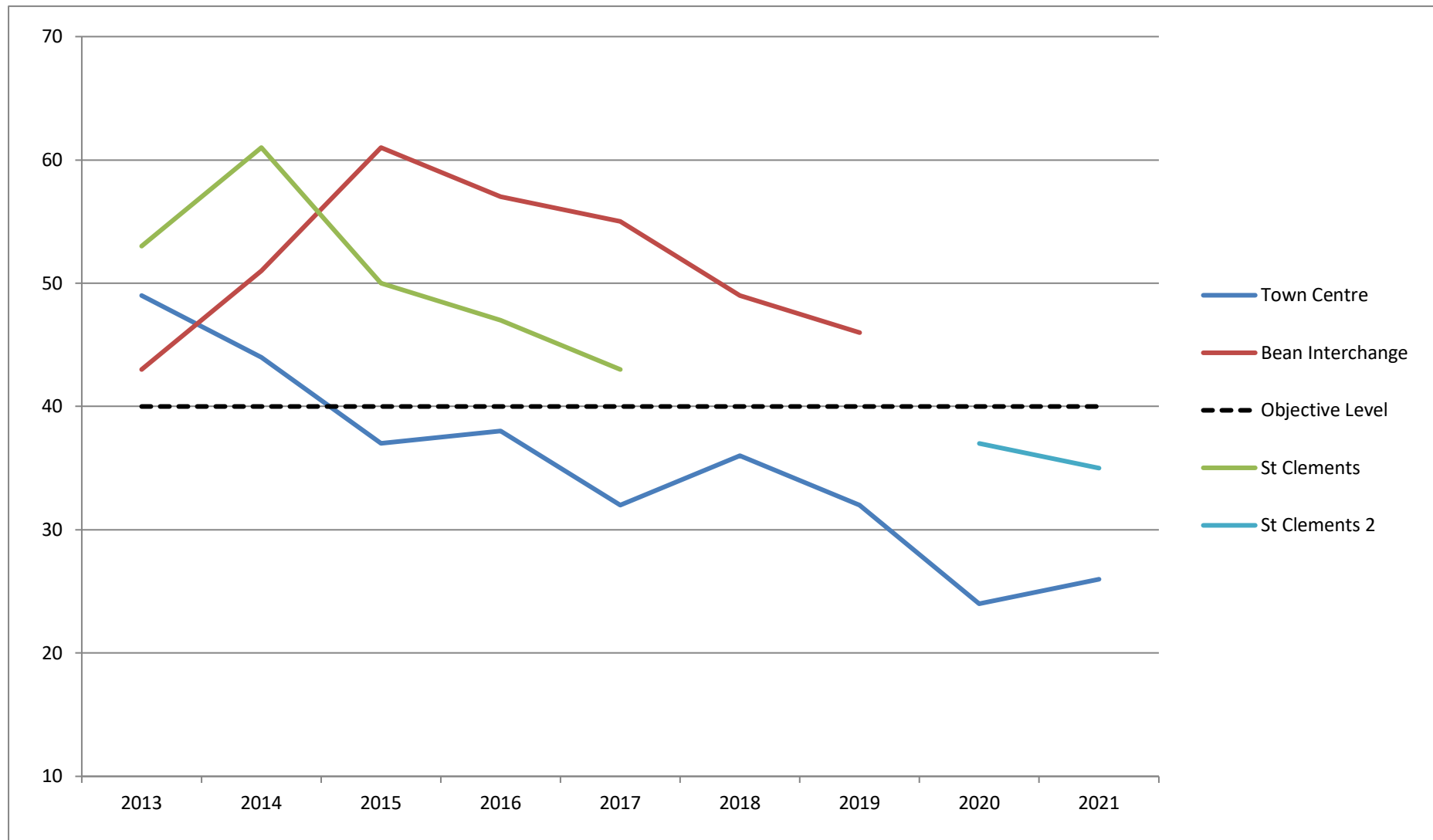
Air Quality monitoring in proximity to the A2 trunk road (Nitrogen dioxide  $\mu\text{g}/\text{m}^3$ )



Air Quality monitoring at background sites (Nitrogen dioxide  $\mu\text{g}/\text{m}^3$ )



Air Quality monitoring at continuous analysers (Nitrogen dioxide  $\mu\text{g}/\text{m}^3$ )



**Table A.5 – 1-Hour Mean NO<sub>2</sub> Monitoring Results, Number of 1-Hour Means > 200µg/m<sup>3</sup>**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2021 (%) <sup>(2)</sup>	2017	2018	2019	2020	2021
ZR2 Dartford Town Centre	554117	173852	Roadside		95	0	1	0	0	2
ZR3 Bean Interchange	558622	172752	Roadside		NA	10	2	0	0	Closed
ZR4 St Clements	558488	174671	Roadside		88				0	0

**Notes:**

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m<sup>3</sup> have been recorded.

Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(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%)



**Table A.6 – Annual Mean PM<sub>10</sub> Monitoring Results (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2021 (%) <sup>(2)</sup>	2017	2018	2019	2020	2021
ZR2 Dartford Town Centre	554117	173852	Roadside		56	25	27	32	26	23.3
ZR3 Bean Interchange	558622	172752	Roadside		N/A	28	32	28	29	Closed
ZR4 St Clements	558488	174671	Roadside		83			24	20.4	21.8

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

**Notes:**

The annual mean concentrations are presented as µg/m<sup>3</sup>.

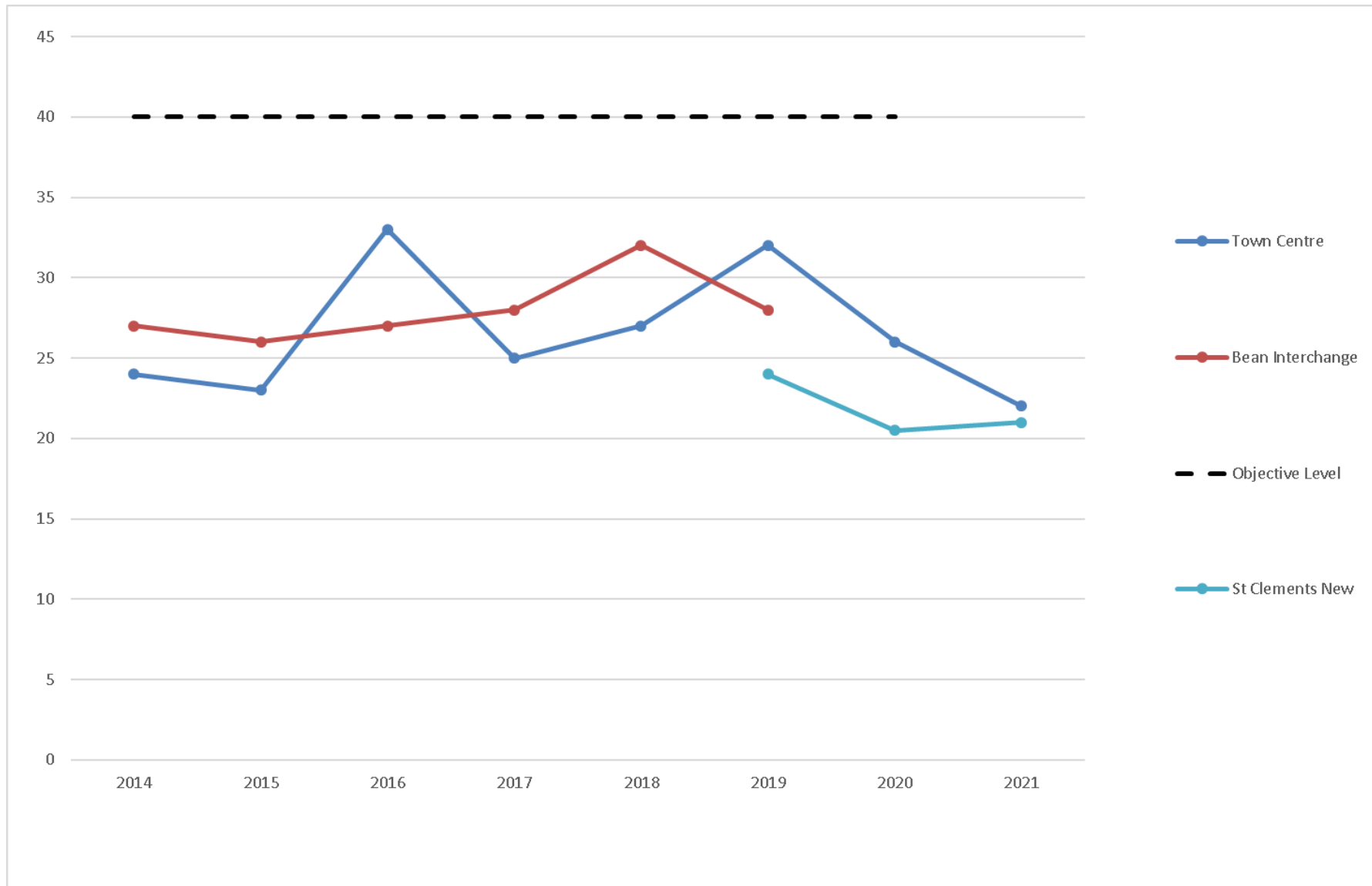
Exceedances of the PM<sub>10</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

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.

(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.2 – Trends in Annual Mean PM<sub>10</sub> Concentrations



**Table A.7 – 24-Hour Mean PM<sub>10</sub> Monitoring Results, Number of PM<sub>10</sub> 24-Hour Means > 50µg/m<sup>3</sup>**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2021 (%) <sup>(2)</sup>	2017	2018	2019	2020	2021
ZR2 Dartford Town Centre	554117	173852	Roadside		56	10	13	24	17	4 (38.7)
ZR3 Bean Interchange	558622	172752	Roadside		N/A	13	22	17	14	Closed
ZR4 St Clements	558488	174671	Roadside		83			18	10	4 (37.9)

**Notes:**

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m<sup>3</sup> have been recorded.

Exceedances of the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

(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%).

## Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO<sub>2</sub> 2021 Diffusion Tube Results (µg/m<sup>3</sup>)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northin g)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.96	Annual Mean: Distance Corrected to Nearest Exposure	Comment
7	550749	171924	27.3	25.9	24.2	21.1	15.5	17.8	15.4	11.3	18.8	15.9	22.6	20.3	19.7	18.9	-	
10	559120	174854	39.6	33.2	37.4		32.6	30.7	28.6	28.0	58.8	28.6	40.9	31.0	35.4	34.0	-	
16	554108	173318	42.1	40.5	42.3	37.7	33.2	34.8	33.8	28.5	40.8	39.3	48.3	34.6	38.0	36.5	26.5	
17	552988	173922	37.0	32.7	29.5	32.1	27.9	27.3	26.3	20.2	36.4	26.2	33.6	24.4	29.5	28.3	-	
18	559748	174073	34.3	28.0	27.6	21.8	23.6	23.1	20.9	17.6	26.2	24.6	34.9	26.2	25.7	24.7	-	
20	555661	174865	37.9	42.7	35.8	36.4	38.5	32.2	32.3	25.2	42.5	35.5	33.0	30.5	35.2	33.8	-	
21	555497	174025	37.5	35.6	33.6	31.3	25.8	29.8	26.3	24.8	33.0	27.3	32.9	25.3	30.3	29.1	-	
22	555605	174023	48.0	42.7	44.8	33.9	38.7	34.3	33.9	35.6	42.4	47.5	53.0	36.8	41.0	39.3	36.6	
24	555634	173558	36.1	35.0	33.6	31.1	27.8		24.7	23.4	33.4	30.4	34.2	29.7	30.9	29.6	-	
25	555801	173194	39.6	32.6	32.4	24.9	25.7	24.2	22.0	21.3	26.2	28.9	38.0	28.8	28.7	27.6	-	
34	555373	173763	40.5	39.2	43.0	33.6	32.8	33.1	29.8	27.0	37.8	34.8	40.2	33.5	35.4	34.0	-	
35	553848	173994	27.6	34.8	36.1		27.7		26.2	22.1	32.7	30.8	35.1	31.5	30.5	29.2	-	
36	553283	175288	40.4	34.4	37.8	35.5	23.6	31.0	27.5	23.9	37.7	30.3	37.6	30.0	32.5	31.2	-	
38	558289	174580	39.5	32.1	37.4	32.5	30.9	29.5	27.6	24.7	32.5				31.8	30.6	-	
39	555129	173802	39.0	42.6	37.6	38.0	32.8	30.5	32.1	25.2	40.1	35.0	40.0	31.3	35.4	33.9	-	
41	554123	172805	38.7	33.5	36.4	31.4	25.9	30.2	29.9	25.9	36.7	33.1	39.0	30.1	32.6	31.3	-	
43	554581	173987	54.2	53.2	47.9	58.7	51.1	52.4	51.2	41.7	63.6	41.0	49.6	36.7	50.1	<b>48.1</b>	<b>46.9</b>	
44	555653	174047	38.9	39.2	37.5	28.7	31.8	26.4	26.7	27.5	35.1	38.0	42.1	33.4	33.8	32.4	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northin g)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.96	Annual Mean: Distance Corrected to Nearest Exposure	Comment
47	553922	174325	33.8	35.2	37.5	34.3	32.2	28.1	29.0	22.8	36.9	34.2	38.0	31.0	32.8	31.5	-	
48	555297	171327	36.5	27.8	37.3	30.6	25.8	30.6	31.5	36.9	36.5	27.6	37.3	28.4	32.2	30.9	-	
49	554903	173893	39.5	39.2	35.9	35.7	32.3	32.0	29.0	26.6	39.9	32.9	40.6	31.2	34.6	33.2	-	
50	553784	172315	40.6	36.2	36.9	32.8	31.4	25.8	30.2	24.1	36.7	31.3		27.5	32.1	30.8	-	
53	557695	174665	24.4	19.5	21.2		15.4	15.5	14.5	11.8	20.3	15.4	22.7	16.7	18.0	17.2	-	
54	553640	174553	29.9	26.8	28.4	23.8			19.1	14.6	26.4	23.2	31.5	22.1	24.6	23.6	-	
56	554222	173460	29.5	24.5	27.3	20.9	17.9	20.3	18.9	16.6	24.4	22.8	31.0	23.0	23.1	22.2	-	
60	553895	174678	39.1	35.4	35.6	34.3	28.8	31.0	29.3	23.8	40.2	32.6	39.6	29.2	33.2	31.9	-	
61	553578	174175	46.0	39.8	43.7	37.9	40.3	35.1	35.7	31.1	44.3	38.6	43.1	37.3	39.4	37.8	-	
62	555796	173902	44.4	39.6	41.5	38.4	33.7	31.3	29.8	30.5	37.2	38.3	46.6	33.3	37.0	35.6	-	
63	555613	173210	33.7	33.0	31.2	28.3	24.7		23.9	21.5	29.0	24.2		21.3	27.1	26.0	-	
67	556900	171294	32.0	24.9	28.1	21.8	21.7	22.3	19.8	18.4	24.2	23.6	35.5	23.8	24.7	23.7	-	
68	555724	174377	33.8	29.3	29.6		24.0	22.7	21.3	21.0	27.0	30.1	34.9	29.4	27.6	26.5	-	
69	554338	172581	43.7	34.3	40.3	32.4	28.7	30.5	27.7	26.0	34.7	32.9	40.9	31.3	33.6	32.3	-	
70	558687	172610	35.2	28.7	32.3	35.5	27.6	32.1	25.7	21.4	32.8	21.7	34.8	54.6	31.9	30.6	-	
72	556451	172152	40.3	31.2	35.6		32.1	35.3	31.1	31.1	37.2	31.0	43.6	33.0	34.7	33.3	-	
78	553686	174905	40.4		37.3	37.6	29.7	32.5	32.6						35.0	33.3	-	
79	556230	173564	38.4	30.5	32.8		27.9	25.2	22.9	21.2	27.6	29.7	38.1	26.3	29.1	28.0	-	
83	555617	175330	33.4	32.8		26.0	27.6	27.7	22.3	18.8	34.5	27.6	29.7	25.9	27.8	26.7	-	
84	555574	174068	48.7	42.4	44.0	29.0	37.8	32.5	32.2	35.1	40.3	44.7	46.5	35.2	39.0	37.5	32.4	
85	554556	174034	35.9	35.4	63.9	27.6	26.4	26.4	25.8	18.7	32.2	30.5	34.4	27.9	32.1	30.8	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northin g)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.96	Annual Mean: Distance Corrected to Nearest Exposure	Comment
86	555780	174012	40.2	30.9	34.1	26.8	24.7	25.3	23.7	24.9	29.9	31.4	39.1	26.6	29.8	28.6	-	
89	553793	172260	31.3	27.7	27.9	29.4	20.7	25.0	20.5	18.6	25.5	19.8	31.9	23.9	25.2	24.2	-	
90	553963	172277	35.0	30.4	28.0	25.1	23.2	20.8	21.5	18.2	0.6	44.9	33.2	27.7	25.7	24.7	-	
91	560876	174001	34.4	30.7	34.7	28.3	30.9	30.6	27.4	25.5	34.3	30.7	36.1	26.5	30.8	29.6	-	
92	560534	174877	40.9	35.8	39.8	36.3	36.1	35.8	35.0	33.4	46.3	42.3	46.1	36.0	38.6	37.1	29.2	
93	561201	174906	30.5	42.4	41.8	36.7	39.6	38.0	36.6	33.0	43.8	51.8	48.4	41.6	40.4	38.7	34.2	
94	556360	172372	36.3	30.5	32.3	25.3	30.6	27.4	27.8	27.5	30.8	30.4	36.6	29.1	30.4	29.2	-	
95	556497	171978	38.3	32.2	36.5	28.7	29.7	30.9	28.1	28.6	33.7	29.3	42.0	31.9	32.5	31.2	-	
96	555117	175718	47.6	40.6	40.5	35.7	36.8	32.2	32.9	28.2	42.1	39.9	45.1	35.5	38.1	36.6	30.9	
97	555495	174436	40.4	39.3	43.8	28.7	41.1	34.8	30.3	39.0	41.0	44.2	48.5	33.7	38.7	37.2	32.0	
98	551858	172452	33.9	28.1	31.4	31.2	23.5	27.3	23.0	21.0	30.7		33.2	25.5	28.1	26.9	-	
99	559207	174877	41.0	46.9	41.9	45.1	45.7	44.1	44.6	43.6	38.2	46.4	60.1	46.2	45.3	<b>43.5</b>	38.0	
100	556715	173464	36.3	35.5	32.9	30.3	29.9	28.7	27.4	24.2	31.4	32.0		28.2	30.6	29.4	-	

- All erroneous data has been removed from the NO<sub>2</sub> diffusion tube dataset presented in Table B.1.
- Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.
- Local bias adjustment factor used.
- National bias adjustment factor used.
- Where applicable, data has been distance corrected for relevant exposure in the final column.
- Dartford Borough Council confirms that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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 Dartford During 2021**

Dartford Borough Council has not identified any new sources relating to air quality within the reporting year of 2021.

### **Additional Air Quality Works Undertaken by Dartford Borough Council During 2021**

Dartford Borough Council has not completed any additional works within the reporting year of 2021.

### **QA/QC of Diffusion Tube Monitoring**

Details of non-automatic (i.e. passive) monitoring using diffusion tubes are as follows:

Diffusion tubes are supplied and analysed by Gradko International. The method of preparation is 20% TEA in water.

Monitoring was carried out in adherence with the 2020 Diffusion Tube Monitoring Calendar, providing commentary of any divergences as necessary.

The additional subsections should be used to provide QA/QC details of the data processing methodologies applied to diffusion tube monitoring data, specifically in relation to annualisation, bias adjustment and fall-off-with-distance calculations.

#### **Diffusion Tube Annualisation**

Diffusion tube annualisation was carried out at one monitoring location using the Diffusion Tube Processing Tool. Details of the calculation undertaken is provided in Table C.2

## Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 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<sub>x</sub>/NO<sub>2</sub> continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Dartford Borough Council have applied a local bias adjustment factor of 0.96 to the 2021 monitoring data. A summary of bias adjustment factors used by Dartford Borough Council over the past five years is presented in Table C.1.

Diffusion Tube Bias Adjustment Factors As there is very little difference between the national and locally derived bias adjustment factors, the more conservative local factor has been used to adjust the data.

Local: Using data from the St Clements 2 automatic station which is part of a colocation study, the diffusion tubes were corrected using a locally derived factor of 0.96

The national bias adjustment factor is highlighted below (0.84)

**Table C.1 – Bias Adjustment Factor**

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	-	0.96
2020	Local	-	1.02
2019	Local	-	0.95
2018	Local	-	0.97
2017	Local	-	0.84

## NO<sub>2</sub> Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO<sub>2</sub> concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO<sub>2</sub> fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-



automatic annual mean NO<sub>2</sub> concentrations corrected for distance are presented in Table B.1.

## **QA/QC of Automatic Monitoring**

Calibrations of the automatic stations are carried out every two weeks in house. Audits are carried out annually by Matts Monitors. Data is ratified by Kings College Environment Research Group as a part of the contract with the London Air Quality Network and published on the London Air Quality Network website.

### **PM<sub>10</sub> and PM<sub>2.5</sub> Monitoring Adjustment**

PM<sub>10</sub> monitoring is carried out using Beta Attenuation Monitors (Met One BAM 1020) a correction factor of 0.833 has been applied.

### **Automatic Monitoring Annualisation**

Annual mean PM<sub>10</sub> Automatic monitoring has been annualised using the tool on London Air Quality Network website.

**Table C.2 – Annualisation Summary (concentrations presented in  $\mu\text{g}/\text{m}^3$ )**

Nitrogen Dioxide.

Diffusion Tube ID	Annualisation Factor Bexley Belvedere West	Annualisation Factor Maidstone Rural	Annualisation Factor Bexley Belvedere	Average Annualisation Factor	Raw Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Annualised Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )
78	1.0280	0.9147	1.0294	0.9907	35.0	34.7

PM<sub>10</sub>

Contiuous Analyser ID	Annualisation Factor Bexley Belvedere FDMS	Annualisation Factor Bexley Belvedere West FDMS	Average Annualisation Factor	Raw Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Annualised Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )
ZR2	1.064	1.055	1.059	22	23.3
ZR4	1.037	1.038	1.037	21	21.8

**Table C.3 – Local Bias Adjustment Calculation**

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
<b>Periods used to calculate bias</b>	10				
<b>Bias Factor A</b>	0.96 (0.86 - 1.09)				
<b>Bias Factor B</b>	4% (-8% - 17%)				
<b>Diffusion Tube Mean (<math>\mu\text{g}/\text{m}^3</math>)</b>	36.6				
<b>Mean CV (Precision)</b>	3.7%				
<b>Automatic Mean (<math>\mu\text{g}/\text{m}^3</math>)</b>	35.0				
<b>Data Capture</b>	99%				
<b>Adjusted Tube Mean (<math>\mu\text{g}/\text{m}^3</math>)</b>	35 (31 - 40)				

**Notes:** The local derived bias calculation showed that the data had good overall precision, but poor overall data capture, however it was used as it was more conservative than the national derived factor.

A single local bias adjustment factor has been used to bias adjust the 2021 diffusion tube results.

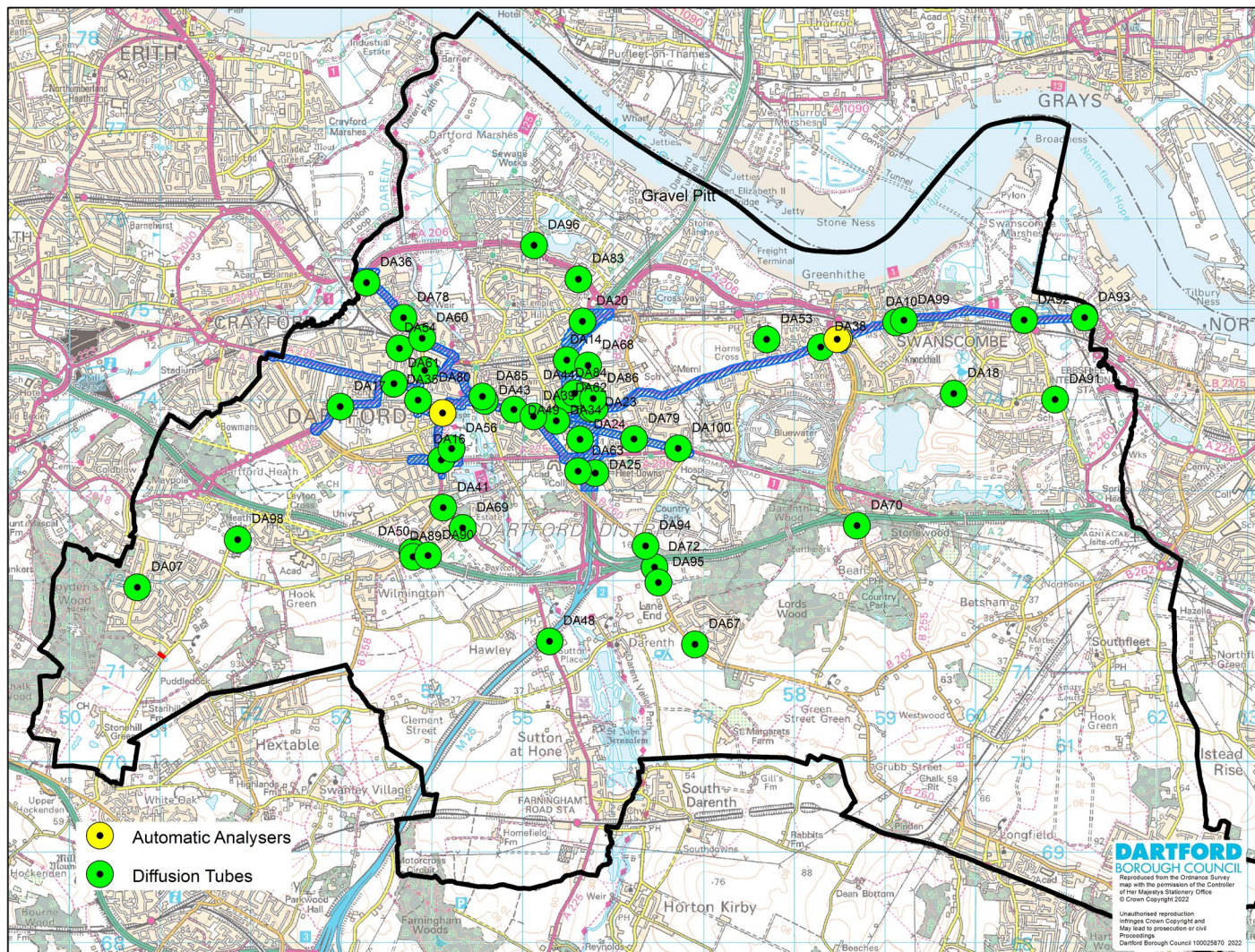
**Table C.4 – NO<sub>2</sub> Fall off With Distance Calculations (concentrations presented in µg/m<sup>3</sup>)**

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted)	Background Concentration	Concentration Predicted at Receptor	Comments
16	1.0	16.7	36.5	18.9	26.5	
22	18.4	25.6	39.3	22.5	36.6	<i>Predicted concentration at Receptor within 10% the AQS objective. Warning: your monitor is more than 10m further from the kerb than your receptor - treat result with caution. Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.</i>
43	6.1	6.9	48.1	18.9	<b>46.9</b>	<i>Predicted concentration at Receptor above AQS objective.</i>
84	12.0	28.0	37.5	22.54	32.4	<i>Warning: your monitor is more than 10m further from the kerb than your receptor - treat result with caution. Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.</i>
92	2.4	11.9	37.1	17.17	29.2	

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted)	Background Concentration	Concentration Predicted at Receptor	Comments
93	2.4	5.7	38.7	17.2	34.2	
96	10.0	29.0	36.6	22.4	30.9	<i>Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.</i>
97	3.7	13.3	37.2	22.5	32.0	
99	1.2	3.2	43.5	16.7	38.0	<i>Predicted concentration at Receptor within 10% the AQS objective.</i>

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

Figure D.1 – Map of Monitoring Sites



## Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England<sup>7</sup>

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO <sub>2</sub> )	40µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM <sub>10</sub> )	40µg/m <sup>3</sup>	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO <sub>2</sub> )	125µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO <sub>2</sub> )	266µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

<sup>7</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## 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 <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	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.