
# 2018 Air Quality Annual Status Report (ASR)

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

June, 2018

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# Executive Summary: Air Quality in Our Area

This Report constitutes the 2018 Air Quality Annual Status Report (ASR) Report for Dacorum Borough Council. The Report includes air quality monitoring data from 2015 - 2017 and also covers other issues and developments that have occurred in the last 36 months since the Updating and Screening Assessment Report of 2015 that may have an impact on the local air quality.

In the Dacorum Borough and generally across Hertfordshire, industrial sources only represent a small percentage of total emissions for most air pollutants whilst road transport is the main source of local air pollution within the region. The review of the new monitoring data has identified the following:

The review of the new passive monitoring data in all the three AQMAs with the exemption of DC98 (London Road, Apsley A) indicated that the annual mean $NO_2$ objective is continued to decrease since 2014.

There is a decrease in High Street, Northchurch, High Street, Northchurch A and B, Lawn Lane 1, 3, 1A, 1B, 3A and 3B, London Road, Apsley, London Road, Apsley B and Watford Road though, these concentrations are still above the annual mean objective of 40µg/$m^3$. (Table A.3)

The 1 hour mean $NO_2$ concentration for the last 5 years at the automatic monitoring station has never been exceeded (Table A.4) neither has the annual mean objective of 40µg/$m^3$ for the $PM_{10}$ for the last three years as stated in (Table A.5).

The 24hrs mean $PM_{10}$ has never been exceeded for the last three years (Table A.6) whilst the annual mean $PM_{2.5}$ in the last three years has been consistently 8µg/$m^3$ which is far less than the required air quality objective for the pollutant (Table A.7).

Compared to our 2015 updating and screening assessment report, it is only at the Watford Road, Kings Langley passive monitoring location that the $NO_2$ air quality objective has been exceeded outside the three AQMAs but this location is not a relevant exposure and the 2017 assessment has not identified any new sources that have not been previously considered. Therefore, a detailed assessment of any new sources is not required but; we will continue to monitor the level of $NO_2$ concentrations at all the existing and new locations so as to make an informed decision on if and when there is any need to declare such locations as an AQMA in addition to the existing AQMA.

The challenges of maintaining a good air quality in the wider district is focussed on minimising the impacts from (or to) the new major developments and the Council will continue to request for an AQ assessment prior any such major development, to see if there is any need for relevant mitigation scheme to be put in place before embarking on such.

Where relevant, the Council will continue to recommend planning conditions requiring the installation of an electric car charging point, enhanced cycle provision, limited car parking and active ventilation on new buildings in sensitive areas.
Dacorum Borough Council will continue monitoring at all the existing sites within the Borough and will continue to implement the measures outlined in its Air Quality Action Plan for the existing AQMA and the other single location currently exceeding the AQ objectives for $NO_2$.

The next air quality review and assessment will be 2019 ASR. In addition, where it deemed to be reasonable, the Council will be reviewing its Air Quality Strategy following the expiration of the current AQAP set to expire in December, 2018. It is acknowledged that greater partnership working amongst local authority's and transport planners is vital to implement any significant improvements with regards to air quality particularly those associated with the impacts from highways and the Council will continue to do this by working effectively with the Highway Department of the Hertfordshire County Council.

## Air Quality in Dacorum Borough Council

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

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

Within Dacorum Borough Council, the absence of heavy industry means that the key pollutants of concern are Nitrogen Dioxide and Particulates associated with automotive transport.

The major roads within the district include the M1, which crosses the eastern side of the borough, the M25, which is located near the southern boundary of the Borough and the A41, which closely bypasses Hemel Hempstead, Berkhamsted and Tring, linking Aylesbury to the west with Watford to the east. The area is well connected to London and the midlands via a major rail link that traverses the borough and terminates at London Euston.

[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

Car ownership within the borough is higher than the national average. Based on the last national census conducted in 2011, 84 per cent of households within Dacorum had at least one car, compared to 74 per cent nationally.

The dominant source of air pollution in Dacorum is from road traffic and the Council declared an Air Quality Management Area in 2012 due to the exceedance of nitrogen dioxide at High Street, Northchurch, Lawn Lane, Hemel Hempstead and London Road, Apsley. The Council has continued to monitor this pollutant and particulate matter since 2012 and 2015 respectively focussing its effort on the three AQMAs and other relevant parts of the borough with the current report showing an improvement from our 2014 results for all the three AQMAs diffusion tubes monitoring locations apart from one.

## Actions to Improve Air Quality

It is recognised by the Council that implementing measures which will actually deliver improvements or mitigate impacts in relation to air quality are often not tangible and difficult to achieve, particularly on major new developments where local planning policies do not categorically state what measures will be required unless national objectives are threatened. As such, efforts were made in December 2014 to achieve improvements through twenty different measures classified as an air quality action plan (AQAP) among which are improving the links with the Local Transport Plan and improving links with the Local Planning and Development Framework in pursuit of the air quality standards within the three AQMAs and in order to improve air quality across the Borough as a whole.

Whilst it is true that the Council does not necessarily have the power to implement them all directly but potentially it does have a role in attempting to influence those bodies or individuals such as the Hertfordshire County Council who could implement them.

## Conclusions and Priorities

Whilst, there has been an huge improvement in the 2017 monitoring results for both the passive and automatic monitoring results compared to the values recorded at all the AQMAs monitoring site since 2014, the Council will however continue to implement all its current AQAP where applicable and see to how any additional actions may be incorporated to the existing one in order to reduce the current pollutant concentration in all the AQMAs. It is the Council desire to see the concentrations at the various locations falling below the current air quality objective and a more concerted effort will be dedicated to liaison with the Hertfordshire County Council and Dacorum Borough planning department, two of our key partners for the current Council AQAP.

# Local Engagement and How to get Involved

Air quality is a material planning consideration and contained within Dacorum Borough Council's Core Strategy, which was published on 25 September 2013. It is proposed to produce either a Supplementary Planning Document or Technical Guidance on air quality in conjunction with members of the Hertfordshire and Bedfordshire Air Quality Network. This will help planners and developers to understand the air quality impact of any proposed development and provide consistency in the regulatory approach across Hertfordshire and Bedfordshire.

In addition, some of the Council AQAPs interventions are rooted in its partnership with Hertfordshire County Council of whom its contribution to the improvement seen on air quality to date can not be under - estimated.

The Council initiative on encouraging smart driving is also one of the ways the Council has identified for improving the local air quality. This is achieve by encouraging people to drive and operate their vehicles more efficiently for the purpose of reducing fuel consumption and exhaust emissions by incorporating messages into relevant communication channels and campaigns since December 2016.

# Table of Contents



## List of Tables

## List of Figures

# 1 Local Air Quality Management

This report provides an overview of air quality in Dacorum Borough Council during 2017. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

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

# 2 Actions to Improve Air Quality

## 2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Dacorum Borough Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at: https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=73.

Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

## Table 2.1 – Declared Air Quality Management Areas

| AQMA Name | Date of Declaration | Pollutants and Air Quality Objectives | City / Town | One Line Description | Is air quality in the AQMA influenced by roads controlled by Highways England? | Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure) | | | | Action Plan | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | At Declaration | | Now | | Name | Date of Publication | Link |
| Lawn Lane, Hemel Hempstead | 1st June, 2012 | NO2 Annual Mean | Hemel Hempstead | An area encompassing a number of properties and junctions at both end of declared areas. | NO | 57 | µg/m3 | 48.9 | µg/m3 | Junction Investigations | Dec. 2014 | http://www.dacorum.gov.uk/docs/default-source/environment-street-care/air-quality-action-plan-2014.pdf |
| London Road, Apsley | 1st June, 2012 | NO2 Annual Mean | Hemel Hempstead | An area encompassing residential properties near industrial facility. | YES | 55.9 | µg/m3 | 54 | µg/m3 | Congestion Study | Dec. 2014 | http://www.dacorum.gov.uk/docs/default-source/environment-street-care/air-quality-action-plan-2014.pdf |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High Street, Northchurch | 1st June, 2012 but was amended in October 2013 | NO2 Annual Mean | Hemel Hempstead | An area encompassing a number of residential properties and junctions. The AQMA was further extended in October 2013 to include residential properties from 84-96 High Street. | NO | 42.2 | µg/m3 | 42.3 | µg/m3 | Congestion Study, Promote the use of public transport, Promote Walking and Cycling | Dec. 2014 | http://www.dacorum.gov.uk/docs/default-source/environment-street-care/air-quality-action-plan-2014.pdf |

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

## 2.2 Progress and Impact of Measures to address Air Quality in Dacorum Borough Council

Dacorum Borough Council has taken forward a number of direct measures during the current reporting year of 2018 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on these measures can be found in their respective Action Plans. Key completed measures are:

Improve links with the Local Planning and Development Framework.

Improve links with the Local Transport Plan.

Although, progress on some of the measures have been slower than expected due to some logistical problems with our partners.

Dacorum Borough Council anticipates that the measures stated above and in Table 2.2 with the others which are still under on-going implementation will continue to achieve compliance in the Council AQMA but it is also anticipates that further additional measures not yet prescribed may also be required in subsequent years to achieve compliance and enable the revocation of AQMA in all the three Council designated sites.

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

| Measure No. | Measure | EU Category | EU Classification | Organisations involved and Funding Source | Planning Phase | Implementation Phase | Key Performance Indicator | Reduction in Pollutant / Emission from Measure | Progress to Date | Estimated / Actual Completion Date | Comments / Barriers to implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Improve links with the Local Transport Plan | Traffic Management | Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane | LA and County Council Funding | 2015 | Dec-16 | Integration of AQAP into LTP | Can't be Quantified | Implemented | Dec-16 | Need to be an on-going measure. |
| 2 | Improve links with the Local Planning and Development Framework | Policy Guidance and Development Control | Air Quality Planning and Policy Guidance | Lead + Funded: LA Environmental Health | 2013 | Dec-15 | No of planning applications assessed and regulated, EV charging points etc. | Part Quantifiable | Implemented | Dec-15 | Funding for monitoring |
| 3 | Improve links with Public Health | Public Information | Via the Internet | LA Environmental Health, LA Public Health Dept. and other Neighbouring LA | 2015 | Dec-15 | Policies, Creation of Hertfordshire Air Quality Strategy | Can't be Quantified | Implementation on-going | 01/12/2015 but project still on-going | First phase successful, second phase on-going |
| 4 | Junction Investigations | Traffic Management | Strategic highway improvements, Re-prioritising road space away from cars, including Access management, | Hertfordshire County Council - Highways | 2015 | Apr-16 | Undertaking of junction investigations | Can't be Quantified | Implementation on-going | On-going | Requires on-going investigation |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Selective vehicle priority, bus priority, high vehicle occupancy lane | | | | | | | | |
| 5 | ANPR Traffic Study | Traffic Management | UTC, Congestion management, traffic reduction | Hertfordshire County Council - Highways and Dacorum Borough Council | 2015 | Apr-16 | Undertaking of ANPR traffic study | Can't be Quantified | Implementation on-going | On-going | Logistical |
| 6 | Congestion Study | Transport Planning and Infrastructure | Public transport improvements-interchanges stations and services | Hertfordshire County Council - Policy Team | 2015 | Dec-15 | Congestion study and review of its action plan | Quantifiable | | | |
| 7 | Road Signage and Satellite Navigation Alterations | Traffic Management | UTC, Congestion management, traffic reduction | Hertfordshire County Council - Highways and Dacorum Borough Council | 2016 | Apr-16 | Determine the impact of road signage and satellite navigation routes | Quantifiable | | | |
| 8 | Potential Relocation of bus stops | Traffic Management | UTC, Congestion management, traffic reduction | Hertfordshire County Council - Passenger Transport | 2015 | Dec-15 | Effect of bus position | Quantifiable | | | |
| 9 | Determine significance of School Traffic | Transport Planning and Infrastructure | Other | Dacorum Borough Council - Regulatory Services | 2015 | Dec-15 | Changes in automatic monitoring data between a term time and school holiday | Quantifiable | Completed. More emission during the school term than in holiday. | | None |
| 10 | Potential relocation of on - street parking | Traffic Management | UTC, Congestion management, traffic reduction | Hertfordshire County Council - Highways and Dacorum Borough Council | 2016 | Apr-16 | Undertaking of on-street parking investigation | Quantifiable | | | |
| 11 | Promote the use of Electric Vehicles | Promoting Low Emission Transport | Other | Hertfordshire County Council and Dacorum Borough Council | 2016 | 2016 | Increase in public awareness of the use of EV, Increase in usage, its introduction to | Quantifiable | Still Ongoing | N/A | Anxiety and environmental issues as well as installation costs |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | new development | | | | |
| 12 | Promote Car Share Scheme | Promoting Travel Alternatives | Other | Hertfordshire County Council and Dacorum Borough Council | 2015 | Dec-16 | Increase in number of registered members, research etc. | Quantifiable | Still Ongoing | N/A | |
| 13 | Green incentives for taxi drivers | Promoting Low Emission Transport | Taxi emission incentives | Hertfordshire County Council and Dacorum Borough Council | 2016 | Dec-16 | Discuss with the licensing team to determine viability and possible implementation. | Quantifiable | Still Ongoing | N/A | |
| 14 | Reducing emissions from goods vehicle within AQMA | Transport Planning and Infrastructure | Public transport improvements-interchanges stations and services | Dacorum Borough Council - Regulatory Services | 2015 | Dec-17 | Initiate meeting with local freight companies, businesses and undertaking of investigation. | Quantifiable | Still Ongoing | | |
| 15 | Reducing emissions from Council fleet | Vehicle Fleet Efficiency | Fleet efficiency and recognition schemes | Dacorum Borough Council - Regulatory Services, Finance, Procurement and Fleet manager | 2015 | 2015 - ? | Annual fuel usage reduction, no of vehicles purchased/leased etc. | Quantifiable | Still Ongoing | N/A | |
| 16 | Encourage Smarter driving. | Public Information | Via leaflets | Dacorum Borough Council - Regulatory Services | 2015 | Dec-16 | Messages incorporated into relevant communication channels and campaigns | Quantifiable | Still Ongoing | N/A | |
| 17 | Promote Travel Planning | Promoting Travel Alternatives | School Travel Plans | Hertfordshire County Council - School Team and Dacorum Borough Council | 2015 | 2016 - ? | Number of travel plans produced /year, new or refreshed travel plans and creation of corporate travel plan for the Council | Quantifiable | Still Ongoing | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | Promote Walking and Cycling | Promoting Travel Alternatives | Intensive active travel campaign & infrastructure | Dacorum Borough Council | 2014 | Annually | Number of new members, applicants, promotional campaign etc. | Quantifiable | Still Ongoing | N/A | |
| 19 | Promote the use of public transport | Alternatives to private vehicle use | Bus based Park & Ride | Hertfordshire County Council and Dacorum Borough Council | 2015 | Apr- 15 - ? | Increased bus patronage and identification of gaps and opportunities for improvement | Quantifiable | | | |
| 20 | Promote Travel Smart Projects | Promoting Travel Alternatives | Intensive active travel campaign & infrastructure | Dacorum Borough Council - Regulatory Services | 2015 | Apr- 15 - ? | Publicising of the Council travel smart project and identified further areas and potential sources of funding | | | | |

## 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.

Therefore, the Public Health Outcomes Framework contains an indicator specific to $PM_{2.5}$ and Dacorum Borough Council is taking the following measures to address its impact and that of the other pollutants within the Borough:

a. Seeking opportunities to strengthen the link between Public Health and air quality through joint working and policy development with Public Health in Hertfordshire.

b. The Council, in collaboration with the other ten local authorities across the County, are also in the final stage of the reintroduction of AirAlert and County-wide $PM_{2.5}$ monitoring.

c. Lowering of emission transport fleet (buses and taxis)

d. Promoting walking and cycling rather than driving.

e. Designating part of the Borough as a smoke control area.

Since 2015, Dacorum Borough Council continues monitoring for $PM_{2.5}$ at its High Street Northchurch automatic monitoring station. The monitored concentrations for 2015, 2016 and 2017 have been consistently lower than the AQ objective for this pollutant at 8µg/$m^3$ for each year.

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

## 3.1 Summary of Monitoring Undertaken

Dacorum Borough Council operated Automatic Monitoring Stations at one site and also undertook non-automatic (passive) monitoring of $NO_2$ at 63 sites within the District in 2017.

The Council automatic monitoring station is located at High Street, Northchurch and measured $NO_2$, $PM_{10}$ and $PM_{2.5}$ with all the pollutants achieving the annual mean objective in 2017.

The $NO_2$ annual mean objective was achieved at all the current diffusion tubes monitoring locations within borough with the exception of the three AQMA and Watford Road, Kings Langley.

However, the results at all the three AQMA's has continue to improve since 2014 with the exception of DC98 (London Road, Apsley A) whilst the Watford Road, Kings Langley is not a relevant exposure.

### 3.1.1 Automatic Monitoring Sites

The Automatic Monitoring Station at High Street, Northchurch is a roadside site which has been operational since 13 November 2012. It is not affiliated to the national network and situated adjacent to a busy road (A4251 - High Street, Northchurch). The site is located within the Air Quality Management Area for $NO_2$.

Data capture for $NO_2$, $PM_{10}$ and $PM_{2.5}$ was above 99%.

The monitoring results show that:

- The annual mean objective for all the monitoring pollutants ($NO_2$, $PM_{10}$ and $PM_{2.5}$) was achieved at the site.
- The hourly mean objective for the $NO_2$ i.e. (hours where concentrations were calculated to be >200µg/$m^3$) was also achieved.
- The daily mean for $PM_{10}$ i.e. (days where concentrations were calculated to be >50 µg/$m^3$) was achieved.

Table A.1 in Appendix A shows the details of the site.

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

With the exception of DC108, DC109, DC110, DC130 and DC131 where monitoring locations were swapped for a more relevant exposure for DC108, DC109, DC110 and start in the middle of the year for DC130 and DC131, data capture for all the passive monitoring locations was over 75% in 2017. Therefore data for these tubes were annualised according to Technical Guidance LAQM.TG16 (Box 7.10).

Following the national bias adjustment process, results for all diffusion tubes show compliance with the annual mean objective for Nitrogen Dioxide with the exception of those at the current AQMA's and Watford Road, Kings Langley.
Although, monitoring results since our last report submission for updating and screening assessment report USA 2015 has continue to improve in all the AQMA's locations with the exception of DC98 (London Road, Apsley A) whilst the Watford Road, Kings Langley is not a relevant exposure.
The improvement at all the locations may be traceable to the effect of the current AQAP by the Council and we hope such positive effect will continue to be the case.

Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. "annualisation" and/or 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 ($NO_2$)

Results for all the diffusion tubes show compliance with the annual mean objective for Nitrogen Dioxide with the exception of those at the current AQMA's and Watford Road, Kings Langley.
Although, monitoring results since our last report submission for updating and screening assessment report USA 2015 has continue to improve in all the AQMA's locations with the exception of DC98 (London Road, Apsley A) whilst the Watford Road, Kings Langley is not a relevant exposure and none of the annual means even where exceeded is greater than 60µg/$m^3$.

Table A.3 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 2017 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored $NO_2$ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m$^3$, not to be exceeded more than 18 times per year.

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

Dacorum Borough Council has been monitoring $PM_{10}$ at the automatic monitoring station in High Street, Northchurch since August 2015 and the annual and daily mean objectives were achieved in 2017 with good data capture. The monitoring result over the last three years has been fairly consistent and far below the AQ objective. Therefore, there is no exceedance of the air quality objectives.

Table A.5 in Appendix A compares the ratified and adjusted monitored $PM_{10}$ annual mean concentrations for the past 3 years with the air quality objective of 40µg/m$^3$.

Table A.6 in Appendix A compares the ratified continuous monitored $PM_{10}$ daily mean concentrations for the past 3 years with the air quality objective of 50µg/m$^3$, not to be exceeded more than 35 times per year.

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

Dacorum Borough Council has been monitoring $PM_{2.5}$ at the automatic monitoring station in High Street, Northchurch since August 2015 and the annual mean objectives was achieved in 2017 with good data capture. The monitoring result over the last three years has remained consistent at 8µg/m$^3$ which is far below the AQ objective. Therefore, there is no exceedance of the air quality objectives.

Table A.7 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 3 years.

### 3.2.4 Sulphur Dioxide ($SO_2$)

Dacorum Borough Council does not monitor sulphur dioxide concentrations as no relevant sources have been identified in previous rounds of updating and screening assessment.

# Appendix A: Monitoring Results

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

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Monitoring Technique | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Inlet Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| CM1 | High Street, Northchurch | Roadside | 497295 | 208901 | NO2; PM10; PM2.5 | YES | Chemiluminescent; FIDAS | 10 | 3 | 2 |

**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

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| DC40 | Sawyers Way HH | Background | 506780 | 207180 | NO2 | NO | 5 | 2 | NO | |
| DC42 | Wood Lane End HH | Background | 508177 | 207934 | NO2 | NO | 12 | 1 | NO | |
| DC46 | High Street Bovingdon | Kerbside | 501541 | 203659 | NO2 | NO | 13 | N/A | NO | |
| DC47 | High Street Berkhamsted | Roadside | 499365 | 207724 | NO2 | NO | 20 | N/A | NO | |
| DC48 | Prince Edward Street Berkhamsted | Background | 499207 | 207754 | NO2 | NO | 12 | 35 | NO | |
| DC50 | High Street Northchurch | Roadside | 497346 | 208835 | NO2 | YES | 1 | N/A | NO | |
| DC51 | Brook Street Tring | Kerbside | 492552 | 211824 | NO2 | NO | 8 | N/A | NO | |
| DC52 | High Street Tring | Roadside | 492335 | 211386 | NO2 | NO | 30 | N/A | NO | |
| DC54 | Watford Road Kings Langley | Roadside | 507606 | 201624 | NO2 | NO | 34 | 1.6 | NO | |
| DC55 | High Street Kings Langley | Roadside | 507184 | 202690 | NO2 | NO | 15 | N/A | NO | |
| DC57 | Lawn Lane 1 HH | Roadside | 505923 | 205761 | NO2 | YES | 2 | N/A | NO | |
| DC58 | Gammon Close HH | Background | 507058 | 206727 | NO2 | NO | 6 | 22 | NO | |
| DC59 | Wadley Close HH | Background | 506981 | 206829 | NO2 | NO | 10 | 11 | NO | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DC60 | Field Road HH | Background | 507483 | 206898 | NO2 | NO | 1 | 17 | NO | |
| DC61 | St Agnells Lane HH | Roadside | 507121 | 209252 | NO2 | NO | 10 | 1 | NO | |
| DC62 | New Road Northchurch | Roadside | 497335 | 208860 | NO2 | YES | 1 | N/A | NO | |
| DC63 | Darrs Lane Northchurch | Roadside | 497264 | 208927 | NO2 | YES | 5 | 1 | NO | |
| DC64 | Lawn Lane 2 HH | Roadside | 505969 | 205726 | NO2 | YES | 8 | 1 | NO | |
| DC65 | Lawn Lane 3 HH | Roadside | 505930 | 205740 | NO2 | YES | 1 | 1 | NO | |
| DC66 | London Road Apsley | Roadside | 505674 | 205514 | NO2 | YES | 1 | 1 | NO | |
| DC67 | Allandale | Roadside | 505948 | 207814 | NO2 | NO | 16 | 1 | NO | |
| DC68 | Belswains Sappi | Roadside | 507005 | 204677 | NO2 | NO | 3 | 1 | NO | |
| DC69 | Lawn Lane Belswains | Roadside | 506053 | 205664 | NO2 | NO | 8 | 25 | NO | |
| DC70 | Lawn Lane 4 | Roadside | 505888 | 205801 | NO2 | NO | 6 | 2 | NO | |
| DC71 | Orchard Street | Kerbside | 505636 | 205504 | NO2 | NO | 3 | 1 | NO | |
| DC73 | Durrants Hill Road | Roadside | 505734 | 205519 | NO2 | YES | 1 | 2 | NO | |
| DC74 | Avia Close | Roadside | 505841 | 205395 | NO2 | YES | 6 | 1 | NO | |
| DC75 | The Meads | Roadside | 497472 | 208730 | NO2 | NO | 10 | 2 | NO | |
| DC76 | The Cotterells | Kerbside | 505355 | 206504 | NO2 | NO | 5 | 1 | NO | |
| DC81 | Sappi 2 | Roadside | 507122 | 204470 | NO2 | NO | 10 | 1 | NO | |
| DC85 | Health Centre, London Road | Kerbside | 505663 | 205528 | NO2 | YES | 4 | 1 | NO | |
| DC86 | Northchurch Co-location A | Roadside | 497295 | 208901 | NO2 | YES | 10 | 3 | YES | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DC87 | Northchurch Co-location B | Roadside | 497295 | 208901 | NO2 | YES | 10 | 3 | YES | |
| DC88 | Northchurch Co-location C | Roadside | 497295 | 208901 | NO2 | YES | 10 | 3 | YES | |
| DC89 | High Street, Markyate | Roadside | 506227 | 216317 | NO2 | NO | 0 | 1.67 | NO | |
| DC90 | High Street Northchurch A | Roadside | 497346 | 208835 | NO2 | YES | 1 | N/A | NO | |
| DC91 | High Street Northchurch B | Roadside | 497346 | 208835 | NO2 | YES | 1 | N/A | NO | |
| DC92 | New Road Northchurch A | Roadside | 497335 | 208860 | NO2 | YES | 1 | N/A | NO | |
| DC93 | New Road Northchurch B | Roadside | 497335 | 208860 | NO2 | YES | 1 | N/A | NO | |
| DC94 | Health Centre, London Road A | Kerbside | 505663 | 205528 | NO2 | YES | 4 | 1 | NO | |
| DC95 | Health Centre, London Road B | Kerbside | 505663 | 205528 | NO2 | YES | 4 | 1 | NO | |
| DC96 | Durrants Hill Road A | Roadside | 505734 | 205519 | NO2 | YES | 1 | 2 | NO | |
| DC97 | Durrants Hill Road B | Roadside | 505734 | 205519 | NO2 | YES | 1 | 2 | NO | |
| DC98 | London Road Apsley A | Roadside | 505674 | 205514 | NO2 | YES | 1 | 1 | NO | |
| DC99 | London Road Apsley B | Roadside | 505674 | 205514 | NO2 | YES | 1 | 1 | NO | |
| DC100 | Lawn Lane 1A | Roadside | 505923 | 205761 | NO2 | YES | 2 | N/A | NO | |
| DC101 | Lawn Lane | Roadside | 505923 | 205761 | NO2 | YES | 2 | N/A | NO | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1B | | | | | | | | | |
| DC102 | Lawn Lane 2A | Roadside | 505969 | 205726 | NO2 | YES | 8 | 1 | NO | |
| DC103 | Lawn Lane 2B | Roadside | 505969 | 205726 | NO2 | YES | 8 | 1 | NO | |
| DC104 | Lawn Lane 3A | Roadside | 505930 | 205740 | NO2 | YES | 1 | 1 | NO | |
| DC105 | Lawn Lane 3B | Roadside | 505930 | 205740 | NO2 | YES | 1 | 1 | NO | |
| DC106 | Outside 24 Cotterells | Roadside | 505349 | 206667 | NO2 | YES | 3.75 | 14.1 | NO | |
| DC107 | Marlowes R/B | Roadside | 505508 | 207613 | NO2 | NO | 0.3 | 3.02 | NO | |
| DC108 | Old Town Hemel Hempstead | Kerbside | 499703 | 207838 | NO2 | NO | 0 | 5.55 | NO | |
| DC109 | St Marys 1 | Background | 496938 | 209235 | NO2 | NO | 0 | 9 | NO | |
| DC110 | St Marys 2 | Background | 496938 | 209235 | NO2 | NO | 0 | 3.52 | NO | |
| DC111 | St Marys 3 | Background | 496938 | 209235 | NO2 | NO | 0.7 | 1.3 | NO | |
| DC112 | High Street Markyate 2 | Roadside | 505876 | 216805 | NO2 | NO | 0.15 | 1.2 | NO | |
| DC113 | Chapel Street, Berkhamsted | Roadside | 499448 | 207870 | NO2 | NO | 0.19 | 1.6 | NO | |
| DC114 | Lower Kings Road, Berkhamsted | Roadside | 498417 | 208214 | NO2 | NO | 0.16 | 0.75 | NO | |
| DC115 | Kings Road, Berkhamsted | Roadside | 498287 | 206978 | NO2 | NO | 1.05 | 1.1 | NO | |
| DC116 | Castle Street, Berkhamsted | Roadside | 499384 | 207722 | NO2 | NO | 0.75 | 1.95 | NO | |
| DC117 | High Street, Berkhamsted 2 | Kerbside | 498417 | 208214 | NO2 | NO | 0.15 | 1.7 | NO | |
| DC118 | O/S 158 | Roadside | 505508 | 207613 | NO2 | NO | 10 | 7.1 | NO | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Marlowes | | | | | | | | | |
| DC119 | The Point Hemel A | Roadside | 505529 | 206298 | NO2 | NO | 36 | 13 | NO | |
| DC120 | The Point Hemel B | Roadside | 505529 | 206298 | NO2 | NO | 36 | 13 | NO | |
| DC121 | The Point Hemel C | Roadside | 505529 | 206298 | NO2 | NO | 36 | 13 | NO | |
| DC122 | Bridge Street Hemel Hempstead | Kerbside | 505551 | 206947 | NO2 | NO | 2 | 1 | NO | |
| DC123 | High St/Lower Kings Rd Junct., Berkhamsted | Kerbside | 498417 | 208214 | NO2 | NO | ? | 0 | NO | |
| DC124 | Waitrose Entrance, Lower Kings Rd, Berkham | Kerbside | 499108 | 207860 | NO2 | NO | 5 | 1 | NO | |
| DC125 | Canal, Lower Kings Road, Berkhamsted | Kerbside | 499108 | 207860 | NO2 | NO | 3 | 3 | NO | |
| DC126 | Broadwater, Berkhamsted | Background | 499208 | 208140 | NO2 | NO | N/A | 1 | NO | |
| DC127 | BFI, Kings Road, Berkhamsted | Kerbside | 498287 | 206978 | NO2 | NO | 5 | 2 | NO | |
| DC128 | Shootersway, Berkhamsted | Background | 495608 | 208711 | NO2 | NO | 10 | 2 | NO | |
| DC129 | Stone Cottage, Kings Road, Berkhamsted | Roadside | 498293 | 207011 | NO2 | NO | 0 | 5 | NO | |
| DC130 | 2 The Cottages, Kingshill Way | Roadside | 498313 | 206945 | NO2 | NO | 0 | 2 | NO | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DC131 | Gravel Path, Berkhamsted | Kerbside | 499703 | 207838 | NO2 | NO | 0 | 1 | NO | |

**Notes:**

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

(2) N/A if not applicable.

## Table A.3 – Annual Mean $NO_2$ Monitoring Results

| Site ID | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2017 (%) (2) | $NO_2$ Annual Mean Concentration ($\mu g/m^3$) (3) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2013 | 2014 | 2015 | 2016 | 2017 |
| CM1 | Roadside | Automatic | 99.7 | 99.7 | 27.0 | 30.0 | 26.0 | 29.0 | 29.0 |
| DC40 | Background | Diffusion Tube | 83.3 | 83.3 | 20.8 | 21.1 | 19.0 | 19.4 | 18.2 |
| DC42 | Background | Diffusion Tube | 100.0 | 100.0 | 23.9 | | 21.0 | 21.5 | 19.4 |
| DC46 | Kerbside | Diffusion Tube | 100.0 | 100.0 | 21.6 | 23.5 | 19.7 | 19.0 | 19.1 |
| DC47 | Roadside | Diffusion Tube | 100.0 | 100.0 | 35.9 | 36.7 | 31.4 | 32.7 | 32.1 |
| DC48 | Background | Diffusion Tube | 100.0 | 100.0 | 20.8 | 20.7 | 19.0 | 19.6 | 18.1 |
| DC50 | Roadside | Diffusion Tube | 100.0 | 100.0 | **42.0** | **44.8** | 39.4 | **42.4** | **42.3** |
| DC51 | Kerbside | Diffusion Tube | 83.3 | 83.3 | 27.3 | 29.2 | 25.3 | 23.7 | 24.4 |
| DC52 | Roadside | Diffusion Tube | 100.0 | 100.0 | 31.5 | 32.0 | 27.7 | 28.7 | 29.4 |
| DC54 | Roadside | Diffusion Tube | 100.0 | 100.0 | **44.6** | **54.5** | **44.0** | **44.6** | **44.3** |
| DC55 | Roadside | Diffusion Tube | 100.0 | 100.0 | 31.6 | 34.4 | 30.1 | 31.0 | 29.9 |
| DC57 | Roadside | Diffusion Tube | 100.0 | 100.0 | **52.3** | **53.9** | **47.8** | **52.6** | **46.8** |
| DC58 | Background | Diffusion Tube | 100.0 | 100.0 | 26.2 | 27.3 | 24.4 | 33.4 | 23.8 |
| DC59 | Background | Diffusion Tube | 100.0 | 100.0 | 30.6 | 34.4 | 28.9 | 29.2 | 27.8 |
| DC60 | Background | Diffusion Tube | 100.0 | 100.0 | 23.8 | 24.7 | 20.9 | 22.4 | 19.2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DC61 | Roadside | Diffusion Tube | 100.0 | 100.0 | 28.2 | 29.6 | 26.3 | 27.0 | 26.0 |
| DC62 | Roadside | Diffusion Tube | 100.0 | 100.0 | 39 | 39.7 | 31.8 | 33.3 | 34.2 |
| DC63 | Roadside | Diffusion Tube | 100.0 | 100.0 | 26.7 | 29.0 | 25.2 | 25.8 | 25.3 |
| DC64 | Roadside | Diffusion Tube | 100.0 | 100.0 | 35.7 | 36.6 | 31.2 | 32.5 | 31.2 |
| DC65 | Roadside | Diffusion Tube | 100.0 | 100.0 | **57.5** | **59.9** | **53.3** | **48.3** | **48.9** |
| DC66 | Roadside | Diffusion Tube | 100.0 | 100.0 | **51.7** | **56.9** | **51.6** | **51.1** | **54.0** |
| DC67 | Roadside | Diffusion Tube | 100.0 | 100.0 | 27.3 | 28.5 | 25.0 | 26.9 | 25.0 |
| DC68 | Roadside | Diffusion Tube | 100.0 | 100.0 | 35.9 | 36.3 | 32.9 | 33.3 | 32.2 |
| DC69 | Roadside | Diffusion Tube | 100.0 | 100.0 | 23.4 | 24.5 | 21.0 | 23.6 | 21.1 |
| DC70 | Roadside | Diffusion Tube | 100.0 | 100.0 | 37.2 | 39.4 | 34.2 | 35.1 | 34.1 |
| DC71 | Kerbside | Diffusion Tube | 100.0 | 100.0 | 26.7 | 27.9 | 23.0 | 26.0 | 23.9 |
| DC73 | Roadside | Diffusion Tube | 100.0 | 100.0 | 30.7 | 34.8 | 27.7 | 29.2 | 27.5 |
| DC74 | Roadside | Diffusion Tube | 91.7 | 91.7 | 36.7 | **43.5** | 35.0 | 34.7 | 36.1 |
| DC75 | Roadside | Diffusion Tube | 100.0 | 100.0 | 24.7 | 27.6 | 24.0 | 26.6 | 23.4 |
| DC76 | Kerbside | Diffusion Tube | 100.0 | 100.0 | 33.7 | 37.4 | 31.7 | 32.9 | 32.1 |
| DC81 | Roadside | Diffusion Tube | 100.0 | 100.0 | 39.8 | **43 (40.3)** | 33.8 | 35.1 | 35.4 |
| DC85 | Kerbside | Diffusion Tube | 100.0 | 100.0 | 37.9 | **40.5** | 34.0 | 31.3 | 34.6 |
| DC86 | Roadside | Diffusion Tube | 75.0 | 75.0 | 26.6 | 30.0 | 26.6 | 26.1 | 23.9 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DC87 | Roadside | Diffusion Tube | 75.0 | 75.0 | 27.2 | 28.9 | 25.3 | 25.4 | 23.4 |
| DC88 | Roadside | Diffusion Tube | 75.0 | 75.0 | 27.1 | 29.0 | 25.4 | 24.8 | 23.9 |
| DC89 | Roadside | Diffusion Tube | 100.0 | 100.0 | 26.3 | 27.0 | 23.2 | 24.0 | 23.0 |
| DC90 | Roadside | Diffusion Tube | 100.0 | 100.0 | **42.1** | **47.9** | 38.0 | **43.6** | **40.4** |
| DC91 | Roadside | Diffusion Tube | 100.0 | 100.0 | **42.5** | **47.1** | **40.7** | **40.5** | **42.6** |
| DC92 | Roadside | Diffusion Tube | 100.0 | 100.0 | 35.2 | 39.5 | 33.3 | 34.6 | 33.1 |
| DC93 | Roadside | Diffusion Tube | 83.3 | 83.3 | 36.3 | 37.8 | 31.0 | 35.2 | 35.2 |
| DC94 | Kerbside | Diffusion Tube | 100.0 | 100.0 | 35.6 | **43.0** | 35.8 | 35.3 | 35.6 |
| DC95 | Kerbside | Diffusion Tube | 100.0 | 100.0 | 33.9 | **40.4** | 33.5 | 37.1 | 35.2 |
| DC96 | Roadside | Diffusion Tube | 100.0 | 100.0 | 30.6 | **37.1** | 33.1 | 30.2 | 29.1 |
| DC97 | Roadside | Diffusion Tube | 100.0 | 100.0 | 31.7 | **35.0** | 30.7 | 30.9 | 28.6 |
| DC98 | Roadside | Diffusion Tube | 100.0 | 100.0 | **51.7** | **48.9** | **52.0** | **55.2** | **55.8** |
| DC99 | Roadside | Diffusion Tube | 100.0 | 100.0 | **50.9** | **60.2** | **51.6** | **52.4** | **52.9** |
| DC100 | Roadside | Diffusion Tube | 100.0 | 100.0 | **51.8** | **55.8** | **48.1** | **49.9** | **44.6** |
| DC101 | Roadside | Diffusion Tube | 100.0 | 100.0 | **55.8** | **53.5** | **41.8** | **52.6** | **46.6** |
| DC102 | Roadside | Diffusion Tube | 100.0 | 100.0 | 33.8 | 36.8 | 30.8 | **44.5** | 38.5 |
| DC103 | Roadside | Diffusion Tube | 100.0 | 100.0 | 34.4 | 36.5 | 30.6 | 31.8 | 31.7 |
| DC104 | Roadside | Diffusion Tube | 100.0 | 100.0 | **55.5** | **59.1** | **54.8** | **54.7** | **55.6** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DC105 | Roadside | Diffusion Tube | 100.0 | 100.0 | **55.2** | **64.2** | **55.3** | **57.3** | **54.6** |
| DC106 | Roadside | Diffusion Tube | 100.0 | 100.0 | 29.6 | 34.6 | 28.3 | 29.3 | 26.9 |
| DC107 | Roadside | Diffusion Tube | 100.0 | 100.0 | 30.2 | 32.0 | 28.0 | 27.4 | 29.5 |
| DC108 | Kerbside | Diffusion Tube | 58.3 | 58.3 | 19.2 | 21.8 | 18.2 | 19.2 | 18.0 |
| DC109 | Background | Diffusion Tube | 50.0 | 50.0 | 19.0 | 19.8 | 20.6 | 18.3 | 18.3 |
| DC110 | Background | Diffusion Tube | 50.0 | 50.0 | 22.8 | 25.9 | 25.0 | 25.1 | 25.2 |
| DC111 | Background | Diffusion Tube | 100.0 | 100.0 | 23.9 | 26.9 | 24.6 | 25.4 | 26.3 |
| DC112 | Roadside | Diffusion Tube | 91.7 | 91.7 | 20.6 | 26.6 | 19.6 | 21.9 | 19.3 |
| DC113 | Roadside | Diffusion Tube | 91.7 | 91.7 | 18.0 | 20.9 | 16.8 | 19.5 | 17.6 |
| DC114 | Roadside | Diffusion Tube | 91.7 | 91.7 | 33.9 | **44.9** | 36.2 | 35.4 | 33.3 |
| DC115 | Roadside | Diffusion Tube | 91.7 | 91.7 | 23.6 | 23.7 | 22.4 | 22.2 | 19.0 |
| DC116 | Roadside | Diffusion Tube | 100.0 | 100.0 | 25.8 | 31.2 | 23.8 | 23.2 | 21.9 |
| DC117 | Kerbside | Diffusion Tube | 100.0 | 100.0 | 27.9 | 36.5 | 27.8 | 28.8 | 27.4 |
| DC118 | Roadside | Diffusion Tube | 91.7 | 91.7 | 32.6 | 39.6 | 27.7 | 30.9 | 30.6 |
| DC119 | Roadside | Diffusion Tube | 100.0 | 100.0 | | **45.0** | 36.2 | 37.3 | 34.6 |
| DC120 | Roadside | Diffusion Tube | 100.0 | 100.0 | | **44.0** | 35.3 | 37.4 | 34.6 |
| DC121 | Roadside | Diffusion Tube | 91.7 | 91.7 | | **43.8** | 35.9 | 38.2 | 36.1 |
| DC122 | Kerbside | Diffusion Tube | 100.0 | 100.0 | | **55.7** | 37.2 | 30.9 | 31.3 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DC123 | Kerbside | Diffusion Tube | 91.7 | 91.7 | | | | | 32.9 |
| DC124 | Kerbside | Diffusion Tube | 91.7 | 91.7 | | | | | 21.1 |
| DC125 | Kerbside | Diffusion Tube | 91.7 | 91.7 | | | | | 19.9 |
| DC126 | Background | Diffusion Tube | 75.0 | 75.0 | | | | | 14.1 |
| DC127 | Kerbside | Diffusion Tube | 91.7 | 91.7 | | | | | 35.7 |
| DC128 | Background | Diffusion Tube | 91.7 | 91.7 | | | | | 29.9 |
| DC129 | Roadside | Diffusion Tube | 91.7 | 91.7 | | | | | 25.3 |
| DC130 | Roadside | Diffusion Tube | 41.7 | 41.7 | | | | | 35.0 |
| DC131 | Kerbside | Diffusion Tube | 41.7 | 41.7 | | | | | 23.6 |

☒ **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**.

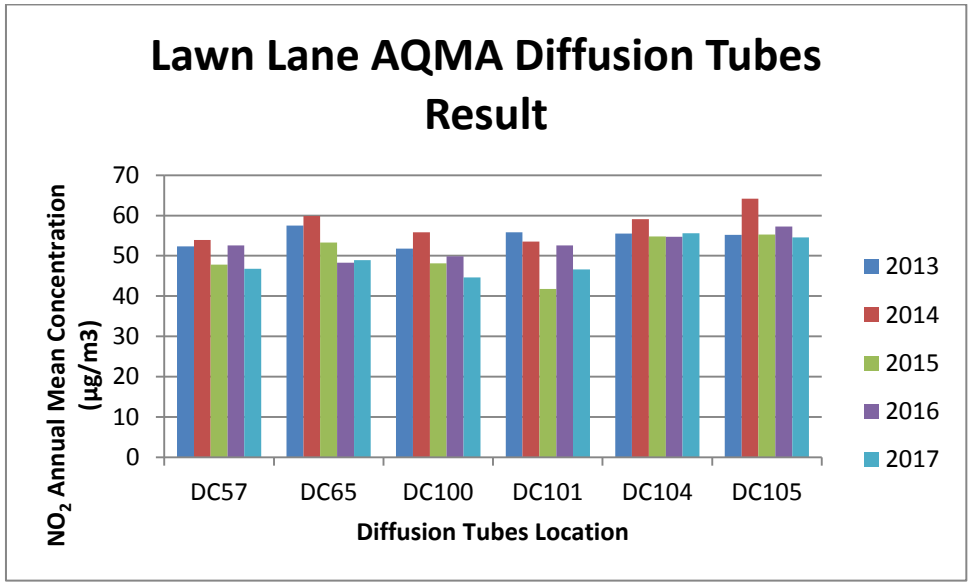
$NO_2$ annual means exceeding 60µg/$m^3$, indicating a potential exceedance of the $NO_2$ 1-hour mean objective are shown in **bold and underlined.**

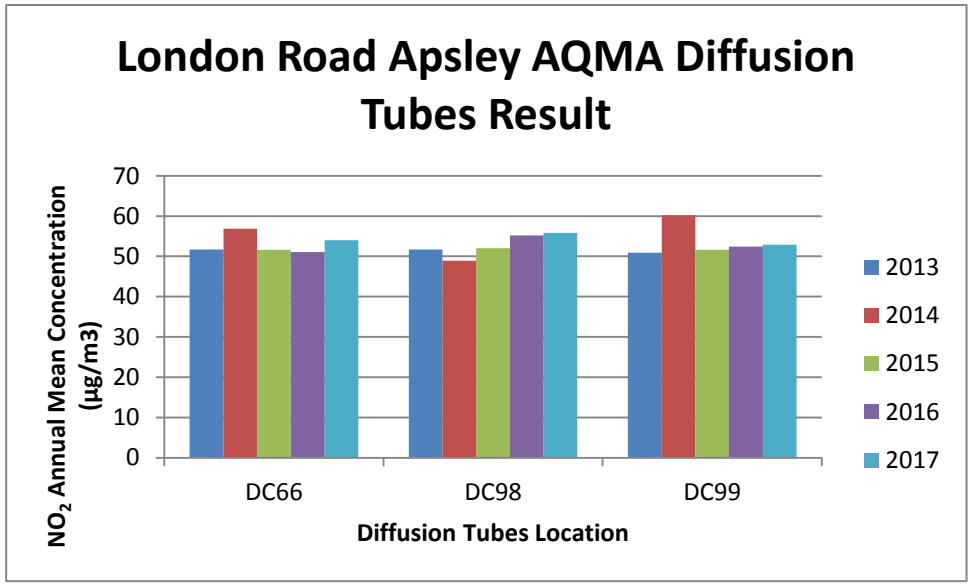
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

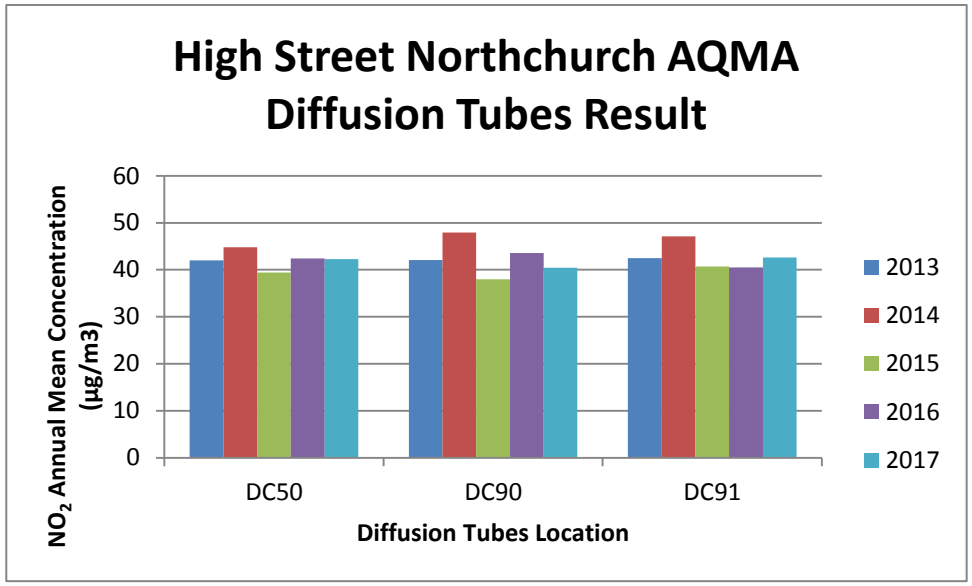
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

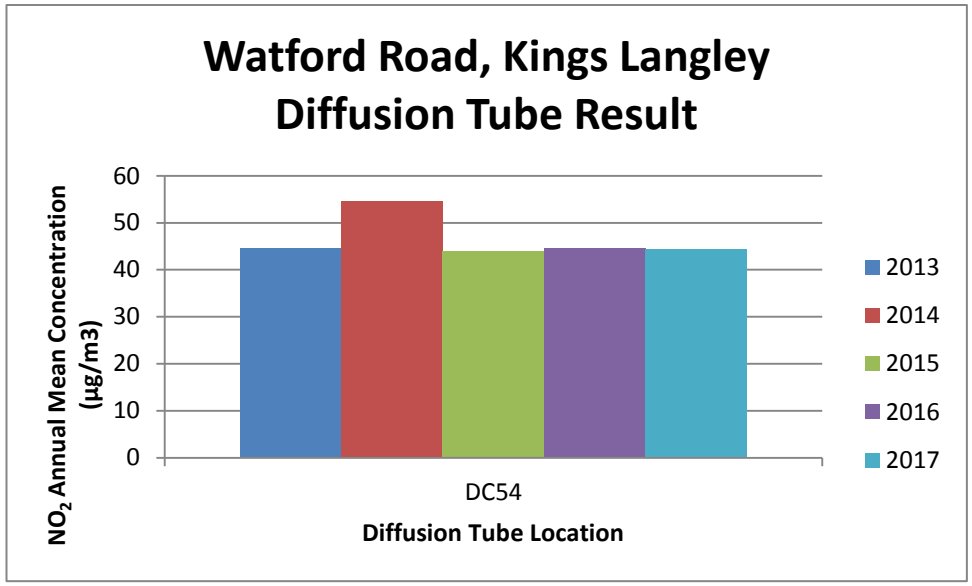
(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

## Figure A.2 – Trends in Annual Mean $NO_2$ Concentrations




London Road Apsley AQMA Diffusion Tubes Result
NO2 Annual Mean Concentration (µg/m3)
70
60
50
40
30
20
10
0
DC66
DC98
DC99
Diffusion Tubes Location
2013
2014
2015
2016
2017


High Street Northchurch AQMA
Diffusion Tubes Result
NO2 Annual Mean Concentration (µg/m3)
60
50
40
30
20
10
0
DC50
DC90
DC91
Diffusion Tubes Location
2013
2014
2015
2016
2017


Watford Road, Kings Langley
Diffusion Tube Result
NO2 Annual Mean Concentration (µg/m3)
60
50
40
30
20
10
0
DC54
Diffusion Tube Location
2013
2014
2015
2016
2017

## Table A.4 – 1-Hour Mean $NO_2$ Monitoring Results

| Site ID | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2017 (%) (2) | $NO_2$ 1-Hour Means > 200µg/m$^3$ (3) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2013 | 2014 | 2015 | 2016 | 2017 |
| CM1 | Roadside | Automatic | 99.7 | 99.7 | **0** | 0 | 0 | 0 | **0** |

**Notes:**

Exceedances of the $NO_2$ 1-hour mean objective (200µg/m$^3$ not to be exceeded more than 18 times/year) are shown in **bold.**

(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) If the period of valid data is less than 85%, the 99.8$^{th}$ percentile of 1-hour means is provided in brackets.

Table A.5 – Annual Mean $PM_{10}$ Monitoring Results

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2017 (%) (2) | $PM_{10}$ Annual Mean Concentration ($\mu g/m^3$) (3) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2013 | 2014 | 2015 | 2016 | 2017 |
| CM1 | Roadside | 99.95 | 99.95 | | | **13** | **12** | **12** |

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

**Notes:**

Exceedances of the $PM_{10}$ annual mean objective of 40µg/$m^3$ are shown in **bold.**

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

## Table A.6 – 24-Hour Mean $PM_{10}$ Monitoring Results

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2017 (%) (2) | $PM_{10}$ 24-Hour Means > 50µg/m$^3$ (3) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2013 | 2014 | 2015 | 2016 | 2017 |
| CM1 | Roadside | 99.95 | 99.95 | | | 1 | 1 | 0 |

**Notes:**

Exceedances of the $PM_{10}$ 24-hour mean objective (50µg/m$^3$ not to be exceeded more than 35 times/year) are shown in **bold.**

(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) If the period of valid data is less than 85%, the 90.4$^{th}$ percentile of 24-hour means is provided in brackets.

## Table A.7 – $PM_{2.5}$ Monitoring Results

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2017 (%) (2) | $PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2013 | 2014 | 2015 | 2016 | 2017 |
| CM1 | Roadside | 99.95 | 99.95 | | | 8 | 8 | 8 |

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

**Notes:**

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

# Appendix B: Full Monthly Diffusion Tube Results for 2017

## Table B.1 – $NO_2$ Monthly Diffusion Tube Results - 2017

| Site ID | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Raw Data | Bias Adjusted (0.77) and Annualised (1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC40 | 48.3 | 31.8 | 24.8 | 19.3 | 18.7 | 11.8 | 14.6 | 17.1 | | | 26.3 | 23.5 | 23.6 | 18.2 |
| DC42 | 41.1 | 30.7 | 27.0 | 25.9 | 23.7 | 16.6 | 18.6 | 19.7 | 22.4 | 24.8 | 26.3 | 25.7 | 25.2 | 19.4 |
| DC46 | 42.5 | 27.6 | 27.0 | 22.3 | 21.5 | 16.6 | 17.7 | 16.9 | 21.4 | 23.6 | 32.4 | 28.5 | 24.8 | 19.1 |
| DC47 | 65.7 | 47.0 | 43.3 | 38.4 | 40.7 | 33.3 | 31.5 | 30.6 | 36.8 | 42 | 47.4 | 42.9 | 41.6 | 32.1 |
| DC48 | 44.9 | 25.6 | 23.7 | 21.8 | 21.8 | 16.5 | 15.3 | 14.8 | 20.6 | 23.3 | 27 | 26.8 | 23.5 | 18.1 |
| DC50 | 81.0 | 58.9 | 62.8 | 55.0 | 49.0 | 54.2 | 44.8 | 44.8 | 50.4 | 48.2 | 60.2 | 49.4 | 54.9 | **42.3** |
| DC51 | 53.1 | 37.0 | 35.3 | 27.1 | 31.5 | 25.5 | 25.1 | 23.8 | 29.5 | 29.1 | | | 31.7 | 24.4 |
| DC52 | 60.1 | 45.2 | 40.9 | 35.9 | 33.1 | 31.0 | 27.1 | 27 | 35.5 | 36 | 45.5 | 40.2 | 38.1 | 29.4 |
| DC54 | 75.4 | 65.9 | 60.9 | 55.5 | 55.7 | 49.1 | 46.9 | 50.2 | 55.2 | 57.5 | 58.2 | 59.7 | 57.5 | **44.3** |
| DC55 | 65.7 | 48.5 | 44.0 | 33.6 | 35.0 | 26.1 | 27.9 | 28.7 | 34.8 | 39.2 | 37.8 | 44.2 | 38.8 | 29.9 |
| DC57 | 87.1 | 76.3 | 67.3 | 61.4 | 64.6 | 56.2 | 52.6 | 31.1 | 50.2 | 56.1 | 70.7 | 56.3 | 60.8 | **46.8** |
| DC58 | 56.1 | 32.4 | 36.2 | 15.1 | 29.9 | 23.1 | 21.8 | 24.3 | 30.5 | 29.9 | 39.4 | 32.3 | 30.9 | 23.8 |
| DC59 | 60.2 | 42.5 | 41.7 | 31.7 | 31.0 | 27.6 | 24.8 | 26.1 | 34 | 35.4 | 39.6 | 38.9 | 36.1 | 27.8 |
| DC60 | 45.8 | 28.0 | 26.4 | 21.6 | 21.0 | 18.0 | 16.9 | 19.9 | 23.9 | 24.4 | 26.8 | 25.8 | 24.9 | 19.2 |
| DC61 | 56.9 | 42.4 | 37.6 | 29.7 | 30.2 | 20.7 | 22.1 | 27.6 | 33.7 | 37.7 | 36.1 | 31.2 | 33.8 | 26.0 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC62 | 68.6 | 51.7 | 44.6 | 50.5 | 45.3 | 32.1 | 34.6 | 37.6 | 41 | 38.3 | 51.6 | 36.5 | 44.4 | 34.2 |
| DC63 | 53.1 | 32.6 | 33.5 | 31.8 | 28.6 | 27.0 | 22.5 | 26.5 | 33.6 | 29.7 | 41.5 | 33.3 | 32.8 | 25.3 |
| DC64 | 64.8 | 43.4 | 45.1 | 42.8 | 38.6 | 31.8 | 33 | 20.3 | 35.6 | 40.1 | 49.3 | 41.9 | 40.6 | 31.2 |
| DC65 | 60.8 | 44.7 | 45.8 | 80.4 | 70.0 | 68.9 | 62.7 | 41.1 | 60.3 | 72.4 | 83.7 | 71.5 | 63.5 | **48.9** |
| DC66 | 86.5 | 75.9 | 73.8 | 71.7 | 61.1 | 62.7 | 58.5 | 66.2 | 63.5 | 71.9 | 78.6 | 71.6 | 70.2 | **54.0** |
| DC67 | 56.1 | 39.2 | 29.5 | 27.1 | 30.0 | 22.6 | 25.2 | 27.7 | 32.4 | 32.2 | 35.3 | 31.9 | 32.4 | 25.0 |
| DC68 | 68.2 | 44.7 | 42.7 | 39.6 | 31.9 | 34.6 | 33.2 | 32 | 39.4 | 41.7 | 50.2 | 44.3 | 41.9 | 32.2 |
| DC69 | 49.4 | 32.7 | 32.3 | 26.5 | 22.9 | 16.2 | 18.2 | 18.7 | 25.4 | 24.7 | 31.9 | 29.7 | 27.4 | 21.1 |
| DC70 | 68.4 | 50.5 | 51.3 | 41.7 | 49.7 | 36.0 | 31.9 | 31.9 | 40 | 41.6 | 44.9 | 42.9 | 44.2 | 34.1 |
| DC71 | 48.4 | 32.7 | 32.1 | 28.5 | 27.7 | 25.0 | 22.3 | 22.2 | 29.7 | 32 | 38 | 34.6 | 31.1 | 23.9 |
| DC73 | 57.1 | 40.9 | 39.4 | 29.3 | 35.5 | 26.2 | 28.3 | 29 | 33.9 | 36.7 | 38.3 | 34 | 35.7 | 27.5 |
| DC74 | 69.1 | 51.1 | 52.6 | 44.5 | 39.4 | 38.1 | 34.9 | 40.1 | 43.3 | 47.7 | 54.2 | | 46.8 | 36.1 |
| DC75 | 1.7 | 37.8 | 35.7 | 33.3 | 30.6 | 27.0 | 26.7 | 27.2 | 32.6 | 32.8 | 44 | 35.3 | 30.4 | 23.4 |
| DC76 | 67.8 | 44.6 | 44.7 | 33.6 | 39.9 | 32.5 | 31.2 | 36.8 | 40.5 | 41.4 | 44.3 | 42.3 | 41.6 | 32.1 |
| DC81 | 62.0 | 52.4 | 50.8 | 42.9 | 45.1 | 38.8 | 38.4 | 39.9 | 45.2 | 42.4 | 48 | 46.5 | 46.0 | 35.4 |
| DC85 | 76.4 | 51.0 | 46.7 | 44.8 | 40.9 | 34.6 | 32.5 | 35 | 42.1 | 40.2 | 50.6 | 45 | 45.0 | 34.6 |
| DC86 | | 31.8 | 39.2 | | | 24.4 | 25.9 | 25.1 | 27.5 | 33 | 35.8 | 36.4 | 31.0 | 23.9 |
| DC87 | | 34.8 | 35.2 | | | 24.5 | 24.7 | 24.7 | 31.6 | 30.1 | 32.7 | 35.7 | 30.4 | 23.4 |
| DC88 | | 37.1 | 36.7 | | | 25.0 | 25.6 | 23.4 | 29.4 | 32.5 | 34.5 | 34.9 | 31.0 | 23.9 |
| DC89 | 41.7 | 33.9 | 31.3 | 28.2 | 27.2 | 20.0 | 21.5 | 20.7 | 30.4 | 28.7 | 41 | 33.2 | 29.8 | 23.0 |
| DC90 | 80.8 | 72.4 | 61.6 | 55.3 | 51.7 | 46.7 | 35.5 | 35.6 | 42.1 | 51.4 | 53.1 | 43.2 | 52.5 | **40.4** |
| DC91 | 77.6 | 65.9 | 57.4 | 54.7 | 49.6 | 48.6 | 46 | 46.7 | 52.7 | 47.7 | 62 | 54.9 | 55.3 | **42.6** |
| DC92 | 70.7 | 44.7 | 42.3 | 47.1 | 41.1 | 32.9 | 31.1 | 33.2 | 41.4 | 39.3 | 47.2 | 45.3 | 43.0 | 33.1 |
| DC93 | 54.2 | 50.9 | 44.7 | 44.0 | 45.7 | 34.0 | 45.1 | 44.7 | 50.9 | 42.4 | | | 45.7 | 35.2 |
| DC94 | 76.7 | 51.6 | 46.1 | 43.5 | 44.1 | 38.8 | 34.2 | 39.3 | 46 | 43.5 | 51.1 | 40.5 | 46.3 | 35.6 |
| DC95 | 68.8 | 53.6 | 43.1 | 41.8 | 42.5 | 35.5 | 31.6 | 39.6 | 46.3 | 45.2 | 50.2 | 50.1 | 45.7 | 35.2 |
| DC96 | 57.5 | 39.2 | 45.7 | 31.9 | 37.0 | 31.4 | 27.4 | 30.1 | 36.8 | 37.1 | 40.4 | 39 | 37.8 | 29.1 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC97 | 61.7 | 36.3 | 46.4 | 28.1 | 35.1 | 30.7 | 26.9 | 30 | 34.7 | 35.8 | 39.7 | 39.6 | 37.1 | 28.6 |
| DC98 | 96.3 | 78.1 | 72.7 | 69.1 | 58.1 | 68.0 | 63.3 | 63.4 | 70.7 | 71.1 | 86.9 | 72 | 72.5 | **55.8** |
| DC99 | 92.8 | 70.0 | 77.7 | 74.3 | 59.7 | 62.2 | 60.2 | 63.6 | 59.1 | 66.5 | 71 | 67.8 | 68.7 | **52.9** |
| DC100 | 76.7 | 61.8 | 67.7 | 59.9 | 71.6 | 55.7 | 48.9 | 30.7 | 50.7 | 52.1 | 62 | 57.3 | 57.9 | **44.6** |
| DC101 | 83.7 | 66.0 | 59.7 | 65.0 | 69.0 | 60.0 | 54.1 | 33.4 | 53.5 | 56.2 | 70 | 56.2 | 60.6 | **46.6** |
| DC102 | 93.6 | 75.2 | 84.0 | 42.6 | 40.3 | 32.9 | 32.2 | 25.1 | 37.1 | 41.6 | 51.2 | 43.9 | 50.0 | 38.5 |
| DC103 | 62.5 | 47.8 | 41.0 | 41.4 | 37.4 | 32.6 | 32.5 | 24.9 | 37.7 | 37.8 | 52.3 | 45.9 | 41.2 | 31.7 |
| DC104 | 103.7 | 85.3 | 79.6 | 79.8 | 67.2 | 61.2 | 62.4 | 41.5 | 66.1 | 75.1 | 83.2 | 61.5 | 72.2 | **55.6** |
| DC105 | 94.1 | 78.7 | 81.6 | 77.6 | 65.9 | 69.0 | 63.2 | 43.4 | 60.4 | 68.2 | 75.6 | 72.8 | 70.9 | **54.6** |
| DC106 | 56.2 | 43.8 | 38.2 | 31.7 | 32.3 | 23.9 | 23.9 | 24.7 | 30.2 | 33.8 | 40.7 | 39.6 | 34.9 | 26.9 |
| DC107 | 55.6 | 43.7 | 44.3 | 35.0 | 37.2 | 36.3 | 26.9 | 29.6 | 35.8 | 33.7 | 43 | 38.4 | 38.3 | 29.5 |
| DC108 | 41.6 | 28.4 | 25.1 | 18.7 | 18.6 | 13.0 | 17.7 | | | | | | 23.4 | 18.0 |
| DC109 | 39.9 | 28.6 | 27.3 | 21.5 | 17.2 | 15.0 | | | | | | | 23.8 | 18.3 |
| DC110 | 51.6 | 33.5 | 37.8 | 31.6 | 27.6 | 22.8 | | | | | | | 32.7 | 25.2 |
| DC111 | 52.5 | 38.5 | 34.4 | 35.9 | 29.9 | 23.3 | 23.9 | 26 | 31.8 | 35.2 | 42.4 | 36.8 | 34.2 | 26.3 |
| DC112 | 43.6 | 32.8 | 30.0 | 24.2 | 25.7 | 15.4 | 17 | 16.8 | 23.1 | 22 | | 25.5 | 25.1 | 19.3 |
| DC113 | 43.4 | 25.4 | 26.0 | 18.8 | 18.9 | 14.0 | 12.7 | 13.6 | 20 | | 29.4 | 28.4 | 22.8 | 17.6 |
| DC114 | 60.8 | 46.4 | 48.1 | 42.1 | 38.5 | 34.5 | 33.6 | 32.6 | 39.2 | | 53 | 47.9 | 43.3 | 33.3 |
| DC115 | | 33.5 | 30.4 | 21.2 | 23.7 | 19.1 | 14.4 | 15.2 | 22.7 | 25.4 | 36.6 | 29.2 | 24.7 | 19.0 |
| DC116 | 41.5 | 35.8 | 36.7 | 24.9 | 27.2 | 19.4 | 19.2 | 18.3 | 27.9 | 28.3 | 37.3 | 24.9 | 28.5 | 21.9 |
| DC117 | 59.2 | 39.6 | 40.3 | 36.1 | 35.7 | 28.7 | 26.4 | 25.2 | 32.4 | 31.2 | 42.3 | 29.6 | 35.6 | 27.4 |
| DC118 | 51.0 | 50.3 | 45.5 | 38.1 | 33.2 | 30.2 | 31.9 | 34.2 | 39.7 | 42.4 | 40.9 | | 39.8 | 30.6 |
| DC119 | 63.2 | 52.9 | 51.0 | 46.0 | 43.7 | 37.5 | 37.3 | 37 | 40.7 | 44.5 | 43.7 | 41.6 | 44.9 | 34.6 |
| DC120 | 61.6 | 54.3 | 48.3 | 46.1 | 44.9 | 33.9 | 35.7 | 39.9 | 42.7 | 42.4 | 42.4 | 46.7 | 44.9 | 34.6 |
| DC121 | 60.9 | 60.3 | 54.1 | | 44.4 | 36.5 | 36 | 39 | 45.2 | 44.3 | 47.3 | 47 | 46.8 | 36.1 |
| DC122 | 59.1 | 57.6 | 43.5 | 44.2 | 35.2 | 27.6 | 27.5 | 29.1 | 34.9 | 37 | 46.8 | 45 | 40.6 | 31.3 |
| DC123 | | 53.1 | 45.2 | 50.5 | 40.4 | 32.2 | 33.2 | 30.4 | 43.8 | 38.4 | 55.8 | 47.3 | 42.8 | 32.9 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC124 | | 35.9 | 34.9 | 30.0 | 26.0 | 20.6 | 18.4 | 18.9 | 25.9 | 28.2 | 32.4 | 30.8 | 27.5 | 21.1 |
| DC125 | | 29.8 | 29.5 | 27.8 | 26.9 | 20.0 | 18 | 20 | 28.5 | 23.6 | 30.5 | 29 | 25.8 | 19.9 |
| DC126 | | 23.1 | 21.8 | | 16.8 | 13.4 | 12.6 | 12.2 | 21.4 | 20.3 | | 23 | 18.3 | 14.1 |
| DC127 | | 48.2 | 57.7 | 54.2 | 53.9 | 45.8 | 48.1 | 36.8 | 43 | 35.8 | 46 | 40 | 46.3 | 35.7 |
| DC128 | | 42.5 | 48.5 | 42.0 | 37.7 | 33.9 | 27.2 | 28.5 | 41.5 | 39.3 | 45.8 | 40.1 | 38.8 | 29.9 |
| DC129 | | 39.0 | 38.2 | 34.5 | 32.0 | 28.3 | 23.9 | 24 | 32.7 | 34.2 | 38.9 | 34.6 | 32.8 | 25.3 |
| DC130 | | | | | | | | 46.9 | 47.4 | 38 | 53.9 | 42.5 | 45.4 | 35.0 |
| DC131 | | | | | | | | 21.3 | 32.4 | 32.1 | 35.3 | 33.0 | 30.61 | 23.6 |

☒ **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.

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

**QA/QC of Automatic Monitoring**

The High Street, Northchurch automatic monitoring station has been operating a $NO_2$ chemiluminescent analyser since November 2012 and FIDAS for Particulate Matters since August 2015. The 2017 data validation and ratification was carried out by AEA Technology (http://www.aeat.co.uk) now Ricardo – AEA.

The Local Site Operative (LSO) duties and bi – annual services of the NOx analyser was undertaken by ESU1 Ltd; with the routine calibrations carried out every fortnight.
The particulate matter analyser bi-annual service in 2017 was done by air monitor in accordance with the manufacturers' instructions. Quality control audits are undertaken twice yearly and supplied by National Physical Laboratory (NPL).

**QA/QC of Diffusion Tube Monitoring**

The monitoring of nitrogen dioxide by diffusion tube has been an on-going project since 1993.
During 2017, $NO_2$ monitoring was undertaken at 63 sites within the borough using passive diffusion tubes. The Northchurch diffusion tube location DC86, 87 and 88 was used as a co-location site with triplicate tubes co-located with the continuous monitor.

The tubes were supplied and analysed by ESG Didcot (a UKAS accredited laboratory). The tubes were prepared by spiking acetone:triethanolamine (50:50) onto the grids prior to the tubes being assembled. The tubes were desorbed with distilled water and the extract analysed using a segmented flow auto analyser with ultraviolet detection.

The exposure periods for the diffusion tubes are those of the UK Nitrogen Dioxide Diffusion Tube Network run by NETCEN which effectively is a four or five week duration. QA/QC procedures are as detailed in the UK NO2 Diffusion Tube Network Instruction Manual which can be found in the link below:
https://uk-air.defra.gov.uk/assets/documents/reports/cat06/no2instr.pdf

Data capture for all tube results were sufficient as to not warrant annualisation with the exception of DC 108, 109, 110, 130 and 131.

A national bias adjustment factor of 0.77 was applied to the 2017 diffusion tube results.

The address of the analysing lab is:
ESG Didcot (Now SOCOTEC)
Unit 12, Moorbrook,
Southmead Industrial Park,
Didcot, Oxfordshire
OX11 7HP

ESG Ltd confirms that the methods and procedures they follow meet the guidelines set out in Defra's "Diffusion Tubes for Ambient Monitoring: Practical Guidance".
ESG takes part in the WASP Proficiency Scheme and the laboratory performance is rated at the highest level of "good".

## Annualisation Information According to Box 7.10 TG (16)

### Annualisation Factor for Period Mean of Old Town Hemel Hempstead (DC108)

| Start Date | End Date | B1 (Am) | D1 | B1 when D1 is available (Pm) |
|---|---|---|---|---|
| 4 January 2017 | 1 February 2017 | 52.5 | 41.6 | 52.5 |
| 1 February 2017 | 1 March 2017 | 38.5 | 28.4 | 38.5 |
| 1 March 2017 | 29 March 2017 | 34.4 | 25.1 | 34.4 |
| 29 March 2017 | 25 April 2017 | 35.9 | 18.7 | 35.9 |
| 25 April 2017 | 2 June 2017 | 29.9 | 18.6 | 29.9 |
| 2 June 2017 | 28 June 2017 | 23.3 | 13.0 | 23.3 |
| 28 June 2017 | 2 August 2017 | 23.9 | 17.7 | 23.9 |
| 2 August 2017 | 30 August 2017 | 26.0 | | |
| 30 August 2017 | 27 September 2017 | 31.8 | | |
| 27 September 2017 | 4 November 2017 | 35.2 | | |
| 4 November 2017 | 5 December 2017 | 42.4 | | |
| 5 December 2017 | 3 January 2018 | 36.8 | | |
| **Average** | | **34.2** | **23.3** | **34.06** |

The annual mean ($A_m$) for B1 **(using St Mary's 3 DC111) as the background site data** is 34.2 µg/m$^3$.The Period mean (Pm) of B1 is 34.06 µg/m$^3$. The ratio R of the annual mean to the period means ($A_m/P_m$) is 1.004
Therefore, with the measured period mean concentration M been 23.3µg/m$^3$;
D1 = M x $R_a$
D1 = 23.3 X 1.004
= 23.4µg/m$^3$.

### Annualisation Factor for Period Mean of St Marys 1 (DC109)

| Start Date | End Date | B1 ($A_m$) | D1 | B1 when D1 is available (Pm) |
|---|---|---|---|---|
| 4 January 2017 | 1 February 2017 | 52.5 | 39.9 | 52.5 |
| 1 February 2017 | 1 March 2017 | 38.5 | 28.6 | 38.5 |
| 1 March 2017 | 29 March 2017 | 34.4 | 27.3 | 34.4 |
| 29 March 2017 | 25 April 2017 | 35.9 | 21.5 | 35.9 |
| 25 April 2017 | 2 June 2017 | 29.9 | 17.2 | 29.9 |
| 2 June 2017 | 28 June 2017 | 23.3 | 15.0 | 23.3 |
| 28 June 2017 | 2 August 2017 | 23.9 | | |
| 2 August 2017 | 30 August 2017 | 26.0 | | |
| 30 August 2017 | 27 September 2017 | 31.8 | | |
| 27 September 2017 | 4 November 2017 | 35.2 | | |
| 4 November 2017 | 5 December 2017 | 42.4 | | |
| 5 December 2017 | 3 January 2018 | 36.8 | | |
| **Average** | | **34.2** | **24.9** | **35.75** |

The annual mean ($A_m$) for B1 **(using St Mary's 3 DC111) as the background site data is** 34.2 µg/m$^3$.The Period mean (Pm) of B1 is 35.75 µg/m$^3$. The ratio R of the annual mean to the period means ($A_m/P_m$) is 0.9566
Therefore, with the measured period mean concentration M been 24.9µg/m$^3$;
D1 = M x $R_a$
D1 = 24.9 X 0.9566
= 23.8µg/m$^3$.

## Annualisation Factor for Period Mean of St Marys 2 (DC110)

| Start Date | End Date | B1 ($A_m$) | D1 | B1 when D1 is available (Pm) |
|---|---|---|---|---|
| 4 January 2017 | 1 February 2017 | 52.5 | 51.6 | 52.5 |
| 1 February 2017 | 1 March 2017 | 38.5 | 33.5 | 38.5 |
| 1 March 2017 | 29 March 2017 | 34.4 | 37.8 | 34.4 |
| 29 March 2017 | 25 April 2017 | 35.9 | 31.6 | 35.9 |
| 25 April 2017 | 2 June 2017 | 29.9 | 27.6 | 29.9 |
| 2 June 2017 | 28 June 2017 | 23.3 | 22.8 | 23.3 |
| 28 June 2017 | 2 August 2017 | 23.9 | | |
| 2 August 2017 | 30 August 2017 | 26.0 | | |
| 30 August 2017 | 27 September 2017 | 31.8 | | |
| 27 September 2017 | 4 November 2017 | 35.2 | | |
| 4 November 2017 | 5 December 2017 | 42.4 | | |
| 5 December 2017 | 3 January 2018 | 36.8 | | |
| **Average** | | **34.2** | **34.2** | **35.75** |

The annual mean ($A_m$) for B1 **(using St Mary's 3 DC111) as the background site data is** 34.2 µg/m$^3$.The Period mean (Pm) of B1 is 35.75 µg/m$^3$. The ratio R of the annual mean to the period means ($A_m/P_m$) is 0.9566
Therefore, with the measured period mean concentration M been 34.2µg/m$^3$;
D1 = M x $R_a$
D1 = 34.2 X 0.9566
= 32.7µg/m$^3$.

## Annualisation Factor for Period Mean of 2 The Cottages, Kingshill Way (DC130)

| Start Date | End Date | B1 ($A_m$) | D1 | B1 when D1 is available (Pm) |
|---|---|---|---|---|
| 4 January 2017 | 1 February 2017 | 52.5 | | |
| 1 February 2017 | 1 March 2017 | 38.5 | | |
| 1 March 2017 | 29 March 2017 | 34.4 | | |
| 29 March 2017 | 25 April 2017 | 35.9 | | |
| 25 April 2017 | 2 June 2017 | 29.9 | | |
| 2 June 2017 | 28 June 2017 | 23.3 | | |
| 28 June 2017 | 2 August 2017 | 23.9 | | |
| 2 August 2017 | 30 August 2017 | 26.0 | 46.9 | 26.0 |
| 30 August 2017 | 27 September 2017 | 31.8 | 47.4 | 31.8 |
| 27 September 2017 | 4 November 2017 | 35.2 | 38.0 | 35.2 |
| 4 November 2017 | 5 December 2017 | 42.4 | 53.9 | 42.4 |
| 5 December 2017 | 3 January 2018 | 36.8 | 42.5 | 36.8 |
| **Average** | | **34.2** | **45.7** | **34.4** |

The annual mean ($A_m$) for B1 **(using St Mary's 3 DC111) as the background site data is** 34.2 µg/m$^3$.The Period mean (Pm) of B1 is 34.4µg/m$^3$. The ratio R of the annual mean to the period means ($A_m/P_m$) is 0.9941
Therefore, with the measured period mean concentration M been 45.7µg/m$^3$;
D1 = M x $R_a$
D1 = 45.7 X 0.9941
= 45.4µg/m$^3$.

## Annualisation Factor for Period Mean of Gravel Path, Berkhamstead (DC131)

| Start Date | End Date | B1 ($A_m$) | D1 | B1 when D1 is available (Pm) |
|---|---|---|---|---|
| 4 January 2017 | 1 February 2017 | 52.5 | | |
| 1 February 2017 | 1 March 2017 | 38.5 | | |
| 1 March 2017 | 29 March 2017 | 34.4 | | |
| 29 March 2017 | 25 April 2017 | 35.9 | | |
| 25 April 2017 | 2 June 2017 | 29.9 | | |
| 2 June 2017 | 28 June 2017 | 23.3 | | |
| 28 June 2017 | 2 August 2017 | 23.9 | | |
| 2 August 2017 | 30 August 2017 | 26.0 | 21.3 | 26.0 |
| 30 August 2017 | 27 September 2017 | 31.8 | 32.4 | 31.8 |
| 27 September 2017 | 4 November 2017 | 35.2 | 32.1 | 35.2 |
| 4 November 2017 | 5 December 2017 | 42.4 | 35.3 | 42.4 |
| 5 December 2017 | 3 January 2018 | 36.8 | 33.0 | 36.8 |
| **Average** | | **34.2** | **30.8** | **34.4** |

The annual mean ($A_m$) for B1 **(using St Mary's 3 DC111) as the background site data is** 34.2 µg/m$^3$.The Period mean (Pm) of B1 is 34.4µg/m$^3$. The ratio R of the annual mean to the period means ($A_m/P_m$) is 0.9941

Therefore, with the measured period mean concentration M been 30.8µg/m$^3$;

D1 = M x $R_a$

D1 = 30.8 X 0.9941

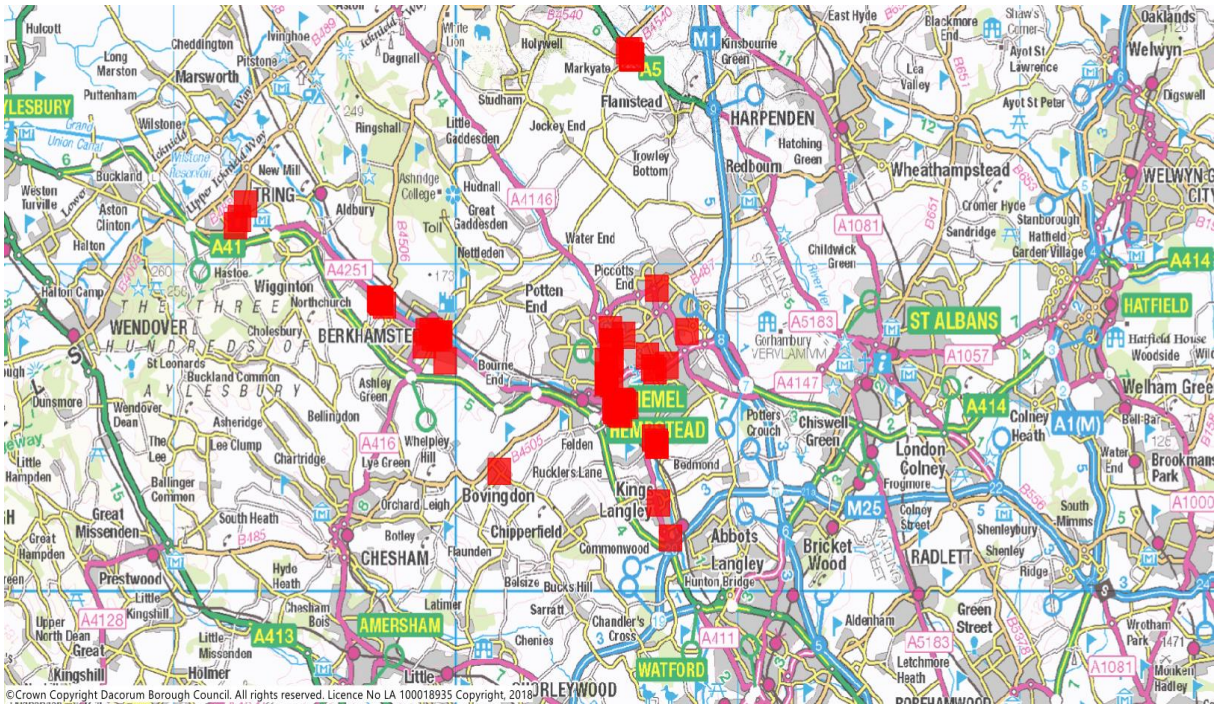
= 30.61µg/m$^3$.

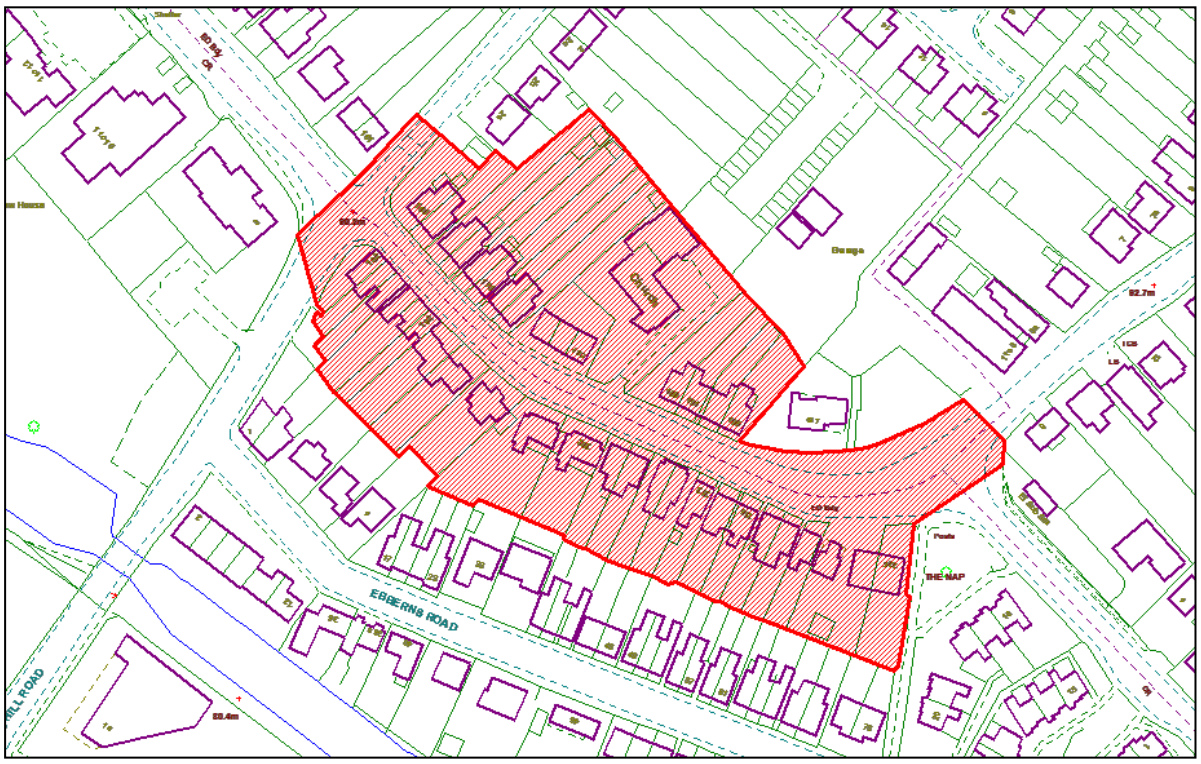
## National Bias Adjustment Information

| Analysed By[1] | Method (To undo your selection, choose (All) from the pop-up list) | Year[2] (To undo your selection, choose (All)) | Site Type | Local Authority | Length of Study (months) | Diffusion Tube Mean Conc. (Dm) (µg/m$^3$) | Automatic Monitor Mean Conc. (Cm) (µg/m$^3$) | Bias (B) | Tube Precision[4] | Bias Adjustment Factor (A) (Cm/Dm) |
|---|---|---|---|---|---|---|---|---|---|---|
| ESG Didcot | 50% TEA in acetone | 2017 | R | Suffolk Coastal DC | 12 | 45 | 37 | 21.7% | G | 0.82 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Dumfries and Galloway Council | 12 | 36 | 30 | 19.6% | G | 0.84 |
| ESG Didcot | 50% TEA in acetone | 2017 | KS | Marylebone Road Intercomparison | 12 | 106 | 79 | 34.3% | G | 0.74 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Vale of White Horse District Council | 11 | 31 | 25 | 26.0% | G | 0.79 |
| ESG Didcot | 50% TEA in acetone | 2017 | UB | Cardiff City Council | 10 | 29 | 21 | 35.1% | G | 0.74 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Cambridge City Council | 12 | 45 | 33 | 37.7% | G | 0.73 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Wrexham County Borough Council | 12 | 20 | 17 | 14.5% | G | 0.87 |
| ESG Didcot | 50% TEA in acetone | 2017 | UI | North Lincolnshire Council | 12 | 22 | 16 | 40.7% | G | 0.71 |
| ESG Didcot | 50% TEA in acetone | 2017 | KS | Caerphilly CBC | 12 | 37 | 32 | 15.8% | G | 0.86 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Caerphilly CBC | 11 | 44 | 29 | 51.2% | G | 0.66 |
| ESG Didcot | 50% TEA in acetone | 2017 | UB | City of York Council | 12 | 23 | 15 | 53.4% | G | 0.65 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | City of York Council | 10 | 37 | 28 | 30.8% | G | 0.76 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | City of York Council | 11 | 32 | 23 | 41.0% | G | 0.71 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | City of York Council | 12 | 40 | 25 | 58.6% | G | 0.63 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Hambleton District Council | 10 | 21 | 20 | 4.0% | G | 0.96 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Horsham District Council | 11 | 35 | 29 | 18.1% | G | 0.85 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Horsham District Council | 12 | 31 | 26 | 21.3% | G | 0.82 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Horsham District Council | 11 | 33 | 22 | 47.3% | G | 0.68 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Slough Borough Council | 12 | 45 | 35 | 26.4% | G | 0.79 |
| ESG Didcot | 50% TEA in acetone | 2017 | UB | Slough Borough Council | 12 | 32 | 25 | 28.6% | G | 0.78 |
| ESG Didcot | 50% TEA in acetone | 2017 | UB | Slough Borough Council | 11 | 39 | 33 | 19.2% | G | 0.84 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Tunbridge Wells | 12 | 56 | 40 | 38.2% | G | 0.72 |
| ESG Didcot | 50% TEA in acetone | 2017 | UB | Kingston upon Hull City Council | 12 | 32 | 23 | 38.2% | G | 0.72 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Suffolk Coastal DC | 12 | 45 | 37 | 23.8% | G | 0.81 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Dacorum Borough Council | 9 | 31 | 27 | 14.7% | G | 0.87 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | North East Lincolnshire Council | 11 | 37 | 24 | 53.5% | G | 0.65 |
| ESG Didcot | 50% TEA in acetone | 2017 | UB | Swansea Council | 10 | 17 | 14 | 23.4% | G | 0.81 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Swansea Council | 12 | 33 | 24 | 34.5% | G | 0.74 |
| ESG Didcot | 50% TEA in acetone | 2017 | UB | Derry City and Strabane District Council | 12 | 14 | 10 | 39.1% | G | 0.72 |
| ESG Didcot | 50% TEA in acetone | 2017 | R | Derry City and Strabane District Council | 12 | 36 | 36 | 0.9% | G | 0.99 |
| ESG Didcot | 50% TEA in acetone | 2017 | | Overall Factor[3] (30 studies) | | | | Use | | 0.77 |

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

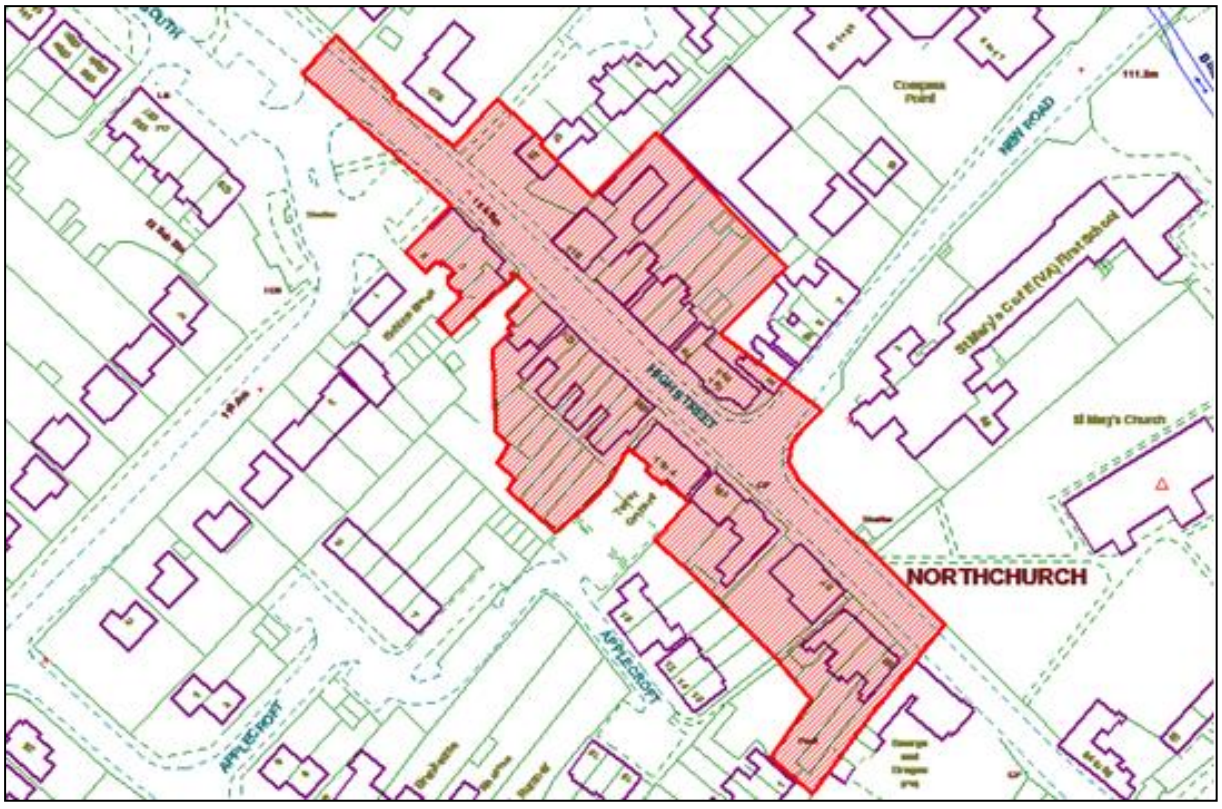
## Map of Non-Automatic Monitoring Sites



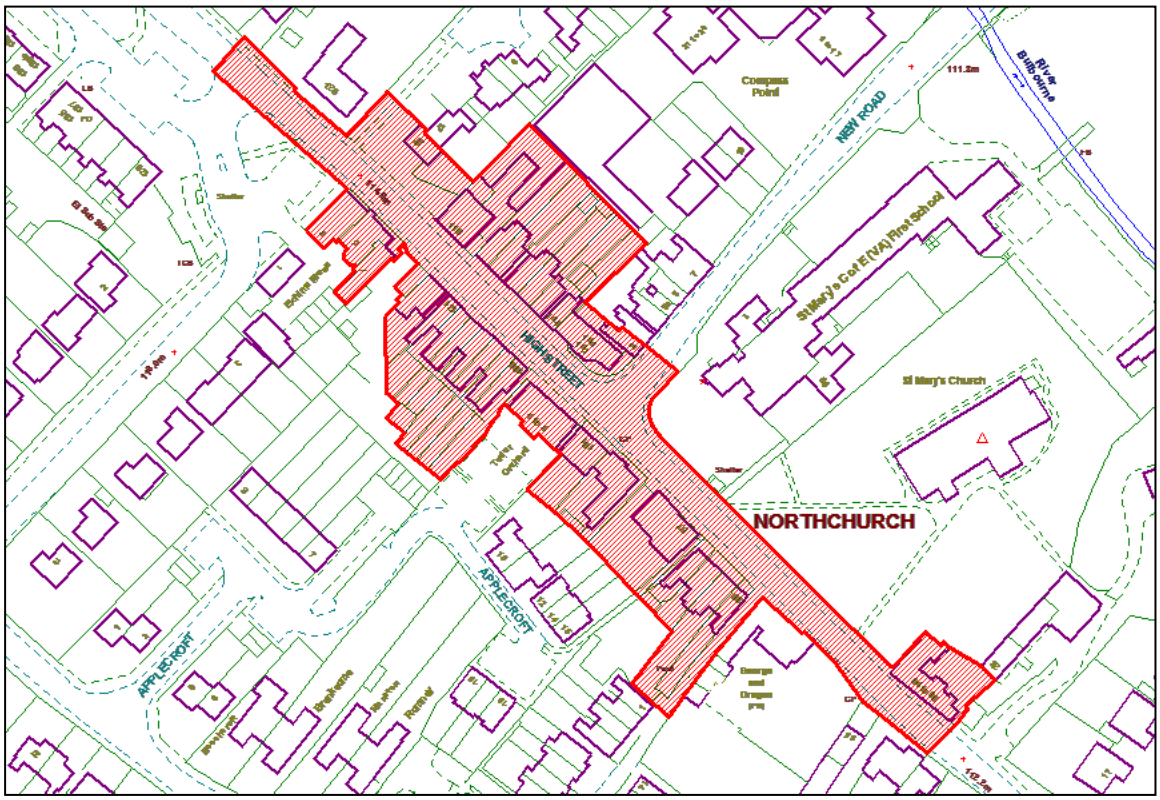




**AQMA Order No. 1 - Lawn Lane, Hemel Hempstead**


**AQMA Order No. 2 - London Road, Apsley**




**AQMA Order No. 3 - High Street, Northchurch**




**AQMA Order No. 3a - High Street, Northchurch**

# Appendix E: Summary of Air Quality Objectives in England

## Table E.1 – Air Quality Objectives in England

| Pollutant | Air Quality Objective[4] | |
|---|---|---|
| | Concentration | Measured as |
| Nitrogen Dioxide ($NO_2$) | 200 µg/$m^3$ not to be exceeded more than 18 times a year | 1-hour mean |
| | 40 µg/$m^3$ | Annual mean |
| Particulate Matter ($PM_{10}$) | 50 µg/$m^3$, not to be exceeded more than 35 times a year | 24-hour mean |
| | 40 µg/$m^3$ | Annual mean |
| Sulphur Dioxide ($SO_2$) | 350 µg/$m^3$, not to be exceeded more than 24 times a year | 1-hour mean |
| | 125 µg/$m^3$, not to be exceeded more than 3 times a year | 24-hour mean |
| | 266 µg/$m^3$, not to be exceeded more than 35 times a year | 15-minute mean |

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

# 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 |
| FDMS | Filter Dynamics Measurement System |
| LAQM | Local Air Quality Management |
| $NO_2$ | Nitrogen Dioxide |
| $NO_x$ | Nitrogen Oxides |
| $PM_{10}$ | Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less |
| $PM_{2.5}$ | Airborne particulate matter with an aerodynamic diameter of 2.5µm or less |
| QA/QC | Quality Assurance and Quality Control |
| $SO_2$ | Sulphur Dioxide |

# References


- Dacorum Borough Council (2015) Updating and Screening Assessment Report
- Dacorum Borough Council (2014b) Air Quality Action Plan 2015 – 2018
- AQDM Herts and Beds Annual Report 2014
- Air Quality Consultants Ltd (2013) Further Assessment of Air Quality in Dacorum
- Dacorum Borough Council (2012) 2012 Air Quality Updating and Screening Assessment for Dacorum Borough Council
- Dacorum Borough Council (2011) 2011 Air Quality Progress Report for Dacorum Borough Council
- Dacorum Borough Council (2010). 2010 Air Quality Progress Report for Dacorum Borough Council
- Dacorum Borough Council (2009). 2009 Air Quality Updating and Screening Assessment for Dacorum Borough Council
- RSK Group (2009) Detailed Air Dispersion Modelling Assessment for $PM_{10}$ Road Traffic Emissions in Dacorum Borough
- Air Quality Consultants Ltd (2007) Detailed Assessment of Air Quality in Dacorum
- Dacorum Borough Council (2006). 2006 Air Quality Updating and Screening Assessment for Dacorum Borough Council
- Dacorum Borough Council (2003). 2003 Air Quality Updating and Screening Assessment for Dacorum Borough Council
- DEFRA (2009). Part IV of the Environment Act 1995 Environment (Northern Ireland) Order 2002 Part III Local Air Quality Management Technical Guidance LAQM.TG(09)
- DEFRA UK Air Information Resource website: http://uk-air.defra.gov.uk
- Hertfordshire and Bedfordshire Air Quality Network: www.hertsandbedsair.net
- Local Air Quality Management, Policy Guidance LAQM. PG (09) (2009) Department for Environment, Food and Rural Affairs
- Local Air Quality Management, Technical Guidance LAQM. TG (09) (2009) Department for Environment, Food and Rural Affairs
- The Environment Act 1995, HMSO
- The Environmental Permitting (England and Wales) Regulations 2010 (as amended)
- https://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html