



St Albans City and District Council Annual Status Report 2016

Bureau Veritas

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St Albans
City & District Council

2016 Air Quality Annual Status Report (ASR)

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

December, 2016

St Albans City and District Council

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Executive Summary: Air Quality in Our Area

Air pollution is an issue that affects everyone within the District with varying levels of severity. The air that we breathe is essential for health and wellbeing and it shouldn't have to be a cause of detrimental health effects. Where we live, where we work, our travel choices and journeys we make can affect the concentrations of certain air pollutants that we are exposed to.

Local authorities have an obligation through the Local Air Quality Management (LAQM) regime to review and assess the air quality within their regions. If there are identified areas of poor air quality, specific measures are implemented by way of Air Quality Action Plans. In addition action by community engagement through education and promotion helps to benefit air quality at a local level. Good air quality begins at a local level, with actions replicated on regional and national scales benefitting wider scale air quality and helping to meet the Air Quality Strategy (AQS) objectives that are set out in European and UK law.

Air Quality in St Albans City and District

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equality 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 billion³.

The main source of air pollution within St Albans City and District is vehicle emissions, the main pollutants of concern being Nitrogen Dioxide (NO₂) and airborne particulate matter (PM₁₀ and PM_{2.5}). A number of main roads pass through the District in addition to smaller roads serving the main population centres. There are three designated Air Quality Management Areas (AQMAs) currently in force, these

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

have been declared due to exceedances of the NO₂ annual mean AQS objective and all the AQMA boundaries are either close to, or have busy roads within them.

The three AQMAs can be seen online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=254. Details of the AQMAs are also provided in Table 2.1 and boundary maps are presented in Figures D.1 – D.3.

An Air Quality Action Plan (AQAP) was completed in 2003 and subsequently updated in 2010. Within the AQAP, measures in progress and to be completed are outlined. The AQAP aim is to design and implement measures that have a positive effect on Air Quality (AQ), such that we do not exceed the annual mean objective for NO₂. The AQAP seeks to improve AQ in the AQMAs and therefore the District as a whole. The AQAP is in the process of being updated. There are a number of current projects that, once completed, will help inform our choice of new projects.

Actions to Improve Air Quality

The NO₂ monitoring network within St Albans City and District is in place to constantly monitor NO₂ throughout the year to identify any increases at identified locations throughout the district. Due to the current AQMAs being designated as a result of elevated NO₂ emissions, the monitoring network is an essential part of LAQM that aids decision making on air quality issues and identifies where actions are required.

Real-time and historic air quality data across Hertfordshire and Bedfordshire can be viewed on the Herts and Beds Air Quality website; www.airqualityhertsbeds.co.uk. This allows the public to view current air quality concentrations, historical data and previously completed LAQM reports. Although there are no real-time automatic monitoring stations within St Albans City, a database of raw diffusion tube concentrations for St Albans is available for download at http://www.airqualityengland.co.uk/local-authority/data?la_id=408

Due to the main source of air pollutant emissions arising from vehicular sources within the District, alternative modes of transport to private internal combustion engine vehicles are being promoted. These 'Green Travel' alternatives are as follows:

- Cycling – A District wide cycling map is available to help plan routes across the District, a free copy has been made available through a number of outlets and by e-mail request. The Green Ring that encircles the city centre is a new continuous 9 kms cycling and walking route that will help reduce congestion, pollution and provides a valuable and easy way to exercise;
- Public Transport – A well connected bus route serves St Albans city centre and aims to reduce the use of private vehicles. There are services from North London, Welwyn Garden City, Hatfield, Luton and Watford in addition to routes to city suburbs and outlying shopping areas;
- Car Sharing & Eco-Driving Tips – A number of car sharing websites are promoted on <http://www.stalbans.gov.uk/environmentandwaste/greenerliving/greentravel/carssharing.aspx> helping drivers link up with others who are willing to car share. Reducing the number of cars helps alleviate problems such as congestion as well as reducing NO₂ and PM₁₀ emissions. Eco-Driving Tips are also provided on the same website to not only reduce pollutant emissions but also to reduce fuel consumption and save the driver money; and
- Electric Vehicles – There are a growing number of electrical vehicle (EV) charging points within the District to promote the use of both pure EVs and plug-in hybrid EVs. Details of these points in addition to available grants and subsidies available for EVs are given on <http://www.stalbans.gov.uk/transport-and-streets/electricvehicles.aspx>.

Figure 0.1 – Example of an Electric Charging Point



Clean Bus Technology

A grant from the Department for Transport's Clean Bus Technology Fund, received in 2013 has allowed for 40 buses within St Albans to be retrofitted with newer technologies, mitigating against increased vehicle emissions. The Clean Bus Technology completion report concluded that from idle testing, emission reductions of 5% in NO_x and 3% in CO₂ can be achieved with the retrofitted technology installed. This has helped reduce emissions from transport and in particular from older buses serving the St Albans District.

In addition, two diesel hybrid buses are now in operation within St Albans, the new buses have improved fuel consumption, lower emissions than standard buses and qualify for a Low Emission Certificate. The buses were purchased with the assistance of Green Bus Funding from the DfT and support from Hertfordshire County Council.

Figure 0.2 – Hybrid Buses Introduced to St Albans City and District Council



There are currently two Defra funded projects ongoing that are related to improving air quality within St Albans City and District; an Instantaneous Emissions Modelling Project and a Freight Management Plan.

Instantaneous Emissions Modelling for LAQM Purposes

The Instantaneous Emissions modelling project is aiming to use new, more detailed vehicle emission modelling approaches to assess NO₂ levels within St Albans city centre. It is planned to include many events and processes that effect vehicle emissions such as gear changing, thermal behaviour of engines / catalysts and average speed emission factors. In theory the emission factors derived from this process will improve the accuracy of results obtained from dispersion modelling enabling improved quantification of the impact of traffic intervention measures.

The impact of two traffic management scenarios that are under consideration within St Albans will be tested to compare the emission information obtained from the traffic-vehicle emission modelling approach and from the prevalent average speed emission factors. The possibility of developing a protocol for adjusting the standard average speed emission factors used within dispersion modelling when traffic flow is congested, will be considered.

The two key aims of the project are:

- Advanced quantitative appraisal of the impact of two traffic intervention measures to inform the St Albans Action Plan and
- Assessment of the applicability and benefits of instantaneous emissions modelling to the wider LAQM process.

Freight Management Plan

St Albans Air Quality Management Area (AQMA) No.1 within St Albans city centre has been designated due to exceedances of the NO₂ annual mean AQS objective. The area within and around the AQMA has residential properties present and the main shopping area close by. The shopping area and frequently held markets are served by a significant number of freight deliveries, Heavy Goods Vehicles (HGVs) and other traffic. The main issues resulting in excessive traffic emissions include stationary / queuing / idling / slow moving traffic and inappropriate routing of HGVs (freight lorries). A Further Assessment completed in 2007 showed that HDVs (HGVs and buses) made up between 3.3% and 6.9% at the AQMA junction, but the

contribution of HDVs varied between 32% and 45% of total ambient NO concentrations at various locations in the AQMA.

A Freight Management Plan (FMP) has been proposed to be completed to target reductions in NO_x / NO₂ emissions from freight movements within the city centre. A number of stakeholders are to be consulted throughout the design of the FMP to comment on suitability and feasibility of measures, perceived air quality and wider beneficial and adverse impacts. The baseline scenario will be compared against the new FMP scenario using dispersion modelling to determine the impact of the proposed measures and the significance of the changes.

Local Priorities and Challenges

St Albans City and District is predominately rural in nature and the main source of air pollution within the District is from road traffic emissions. The city centre has a number of busy streets where canyon effects of pollution are apparent due to buildings being in close proximity to the road. In addition there are a number of main roads with a high volume of traffic that passes through the District including the M1, the M25 and the A414. The three AQMAs that are currently designated reflect these road conditions as two of the AQMAs are close to the areas of the M25 and the M1, and the third is located within a congested central road in St Albans that is representative of street canyon conditions.

The priorities for the coming year include continuing to work with colleagues and partners on Air Quality Action Plan (AQAP) measures to benefit AQ in the District. Other key plans, relevant to this work are the District's Climate Change Action Plan 2016, Green Travel Plan and the Hertfordshire County Council Local Transport Plan 2011 – 2031.

The 2015 monitoring network showed no exceedances of the NO₂ annual mean Air Quality Strategy (AQS) objective following bias adjustment and distance correction of the results. For 2015 a national bias factor of 0.91 has been applied to the raw data from the NO₂ diffusion tubes. A bias adjustment factor is applied to raw data to improve the overall accuracy of the data set; this factor is either from a local factor or a national factor. More information on bias adjustment is provided in Appendix C. For comparison, the raw monthly diffusion tube data and bias adjusted annual means are presented in Table B.1.

Distance correction of raw data is completed for diffusion tubes that are not located at points of public exposure relevant to the AQS objectives. Examples of where the AQS objectives should apply is given within Box 1.1 of Defra Technical Guidance LAQM.TG16. For reference, NO₂ diffusion tubes are used to monitor annual mean NO₂ concentrations. This methodology predicts the NO₂ concentrations at the relevant exposure location based upon the concentration recorded, the distance from the monitoring location to the nearest kerb and the distance to the relevant exposure. The NO₂ concentration fall off with distance data for the relevant monitoring locations is presented in Table A.3.

A challenge for the coming year would be for these results to remain below the AQS annual mean objective at all locations. Actions within the AQAP and those listed below will help this target to be reached.

How to Get Involved

At an individual level there are a number of ways the public are able to get involved and help improve air quality on a local level. The main source of air pollution within the District is vehicle emissions, changing the method of transport used can help reduce the amount of pollutant emissions released from vehicle sources. This is apparent from the reduction in number of vehicles being used and also through the type of vehicles being used.

Changes in transport use such as the following help in reducing emissions of NO_x, PM₁₀ and PM_{2.5} from vehicle sources;

- Use public transport where available – This reduces the number of private vehicles in operation reducing pollutant concentration through the number of vehicles and reducing congestion;
- Walk or cycle if your journey allows – From choosing to walk or cycle for your journey the number of vehicles is reduced and also there is the added benefit of keeping fit and healthy. In addition many of the cycle routes are off-road meaning you are not in close proximity to emissions from road traffic sources;
- Reduce time of idling vehicles – If using a car for a journey avoid idling for any long periods of time. When it is apparent there will be no movement required

then switch the engine off to reduce the amount of pollutant emissions released;

- Car / lift sharing – Where a number of individuals are making similar journeys, such as travelling to work or to school car sharing reduces the number of vehicles on the road and therefore the amount of emissions being released. This can be promoted via travel plans through the workplace and within schools; and
- Alternative fuel / more efficient vehicles – Choosing a vehicle that meets the specific needs of the owner, fully electric, hybrid fuel and more fuel efficient cars are available and all have different levels benefits by reducing the amount of emissions being released.

Real time and historical air quality data for Hertfordshire and Bedfordshire is presented at www.airqualityhertsbeds.co.uk, an index related legend is provided so users can follow the current air quality. Also there are a number of links providing further information including the legislation of air quality within the UK, diffusion tube data, previous LAQM reports and graphical representations of data across the region.

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1 Local Air Quality Management

This report provides an overview of air quality in St Albans City and District Council during 2015. 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 St Albans City and District 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 the objectives.

A summary of AQMAs declared by St Albans City and District 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=254, the full list of AQMAs is available at <http://uk-air.defra.gov.uk/aqma/list>.

We propose to keep the current three designated AQMAs in St Albans City and District Council (see monitoring section) and to review the NO₂ monitoring network surrounding these AQMAs.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
St Albans AQMA No. 1	NO ₂ annual mean	St Albans	The area comprising of odd numbers 1-7 London Road, 1-11c Holywell Hill and even numbers 2-38 London Road, St Albans.	Air Quality Action Plan for St Albans City and District Council http://aqma.defra.gov.uk/action-plans/StADC%20AQAP%202003.pdf
St Albans AQMA No. 2			The area comprising of Beechtree Cottages, Hemel Hempstead Road, St Albans (adjacent to junction of M1 (J7) and M10).	
St Albans AQMA No. 7			An area encompassing a number of domestic properties in Frogmore on Radlett Road and Colney Street in the vicinity of the M25.	

2.2 Progress and Impact of Measures to address Air Quality in St Albans City and District Council

St Albans City and District Council has taken forward a number of measures during the current reporting year of 2016 in pursuit of improving local air quality. More detail

on these measures can be found in our Action Plan: August 2010 Update to the 2003 Air Quality Action Plan.

Key completed measures from the AQAP are:

- Loading and parking restrictions implemented on Victoria Street, Holywell Hill now restricted to residents only and 1-hour no return. This has eased congestion and made more road space making it easier for buses to pass;
- From the DfT grant received, retrofitting a portion of the existing bus fleet with cleaner technologies to reduce emissions was completed:
- New signage erected for pedestrians, making walking routes more clear and providing directions for all users.

Key actions and priorities for the coming year are:

- Completion of the Freight Management Plan and the Instantaneous Emissions Modelling to help to inform and update the current AQAP. The aim of this work is to reduce air pollutant concentrations within the city centre: working towards revoking St Albans AQMA No.1:
- Continue to monitor NO₂ using passive diffusion tubes across the District to measure concentrations. Review the current monitoring network tube locations, possibly relocating existing tubes to within the designated AQMAs:
- To complete a review of existing parking restrictions scheduled in 2017:
- Continue to investigate any nuisance complaints received relating to air quality across the District:
- Complete inspections of permitted processes:
- Work to reduce the number of trips taken by car by promotion of the green travel initiatives shown online at <http://www.stalbans.gov.uk/environmentandwaste/greenerliving/greentravel/default.aspx> :
- Campaign to raise awareness of the impact on air quality of idling engines (when parked).

Longer term actions include the following:

- Increase the number of electric vehicle charging points within the District through inclusion within residential developments and continual promotion of the grants available small and medium-sized enterprises:
- Monitor the progress and uptake of: District Travel Plans, Traffic Management Schemes, Cycling and Walking Strategy, Business Travel Plans, and the Council Green Travel Plan.

The current AQAP measures have been included within Table 2.2. Measures that have been completed or have been discontinued due to being unfeasible will be removed from the table in the next ASR. In addition measures 33, 34 and 35 have been added relating to current projects that are ongoing within the District.

The AQAP is currently being reviewed and new measures are being established, to improve local air quality within the existing AQMAs and throughout St Albans as a whole. The outcomes from the Instantaneous Emissions Modelling and Freight Management Plan will be used as steer for the updated AQAP.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
2	Investigate the status of on-street parking in the AQMA and determine if parking is contributing to traffic congestion at each junction. Investigate the provision of on-street loading facilities and co-ordinated timings of deliveries.	Traffic Management	Other	SADC / HCC	2017	2018	Parking restrictions in place	See note 1 at end of table	Review of existing parking restrictions scheduled in 2017 in line with current work program.	2018
3	SADC will assert comprehensive control over Part B/Part A2 processes for smaller scale industries under the environmental permitting (England & Wales) regulations 2007.	Environmental Permits	Other	SADC	NA	Annually	Number of inspections	See note 1 at end of table	All processes are risk rated annually and inspection frequency determined based upon risk. Programmed annual inspections to April 20016, are currently up to date. Processes operating without a permit are identified and appropriate enforcement action taken.	Continuous
4	SADC will investigate complaints about nuisance (domestic and industrial emissions).	Public Information	Other	SADC	NA	On receipt	Time taken to resolve complaints	See note 1 at end of table	Complaints are investigated as and when received.	Continuous
5	Continue to monitor air quality within the district and as necessary review the suitability of monitoring locations.	Policy Guidance and Development Control	Other	SADC	2017	Continuous – REVIEW September 2017	Data capture	NA	The details of diffusion tubes and continuous monitoring are recorded on http://www.airqualityengland.co.uk/	Continuous

St Albans City and District Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
6	To initiate further discussions with Intalink Quality Partnership to improve the reliability of bus services and increase patronage and encourage modal shift from the car to public transport.	Transport Planning and Infrastructure	Bus route improvements	SADC / HCC	2017	2017-2019	Service numbers	See note 1 at end of table	Quality Network Partnership (QNP) has been working at improving public transport services. Through the QNP improvements have been made to bus stop signage, bus route signage and real time information. Funding (formerly from the DfT's Local Sustainable Fund) has now ceased to the group but the group now meets again under the branding of the Intalink Quality Partnership.	Ongoing (two buses purchased)
7	To investigate the creation of a 'Low Emission Zone'.	Promoting Low Emission Transport	Low Emission Zone (LEZ)	SADC / HCC	2010	NA	Vehicle counts	NA	No current plans to initiate LEZ at this time due to financial constraints.	Discontinued
9	Pilot the Station Travel Plan.	Promoting Travel Alternatives	Other	HCC	2010	2012	Usage figures	See note 1 at end of table	The County and District councils, together with the rail and bus operators were part of the DfT's pilot programme of station travel plans. The Station Travel Plan will remain ongoing within Hertfordshire County Council. The plan helps to co-ordinate the efforts of the Urban Transport Plans for Hatfield and St Albans, the St Albans Abbey Community Rail Partnership and Quality Network Partnership in St Albans.	Completed in previous years

St Albans City and District Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
10	Community Rail Partnership The Abbey Line.	Promoting Travel Alternatives	Promote use of rail	SADC / HCC	2010	2011-2016	Usage figures	See note 1 at end of table	This covers the line from St Albans Abbey to Watford Junction. The possibility for a half-hourly service was found to be too expensive. Some projects implemented by the Partnership include: • Creation of Abbey Line trail. • Development of walking maps and information leaflets. • Implementing the Abbey Line Gateway feature project at St Albans Abbey Station. • Improvements to lighting of path along public footpath to Garston Station. • Commissioning of periodic passenger counts.	Completed in previous years
14	Investigate possibility of road signs to discourage through traffic.	Traffic Management	Other	HCC	2016/17	2017/18	Traffic counts	See note 1 at end of table	New signage and routeings are planned for installation at the junction and the approach to the city.	Continuous

St Albans City and District Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
18	Investigate introduction of additional charging points for electric vehicles at NCP car parks within St Albans.	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	SADC	2016/17	2017/18	Usage figures	See note 1 at end of table	Electric charging posts have been installed to 5 locations in the District. A further rapid charger has been installed for electric taxi charging only. Proposals in hand to convert existing chargers to rapid charging facilities and also to provide additional new rapid charging posts within the District.	Continuous
20	Consider requiring developers to install electric charging points in new developments under S106 agreements.	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	SADC	2017/18	Subject to discussions with Planning Dept. & inclusion in the detailed Local Plan	Installation figures	See note 1 at end of table	Matter raised. Subject to further discussion with Planning Department and formulation of St Albans AQ Planning Policy Guidance to provide consistency of advice to developers across Herts & Beds.	2017/18
21	The use of electric vehicles for staff including bikes.	Promoting Low Emission Transport	Company Vehicle Procurement	SADC	2010	2011	Usage figures	See note 1 at end of table	Use of pool cars / electric cars was dependent upon sufficient demand & funding. Council not currently funding electric staff vehicles beyond two electric bicycles.	Complete in previous years
22	Consider an increase in car parking charges with the view to making bus travel a more attractive alternative.	Promoting Travel Alternatives	Other	SADC	2017/18	2017/18	Car Park volume figures.	See note 1 at end of table	Annual review undertaken with NCP Limited.	Continuous
23	Continue the Trees Against Pollution project.	Transport Planning and Infrastructure	Other	SADC	2017/18	2017/18	Number of trees planted	See note 1 at end of table	Large number of trees planted in the Wheathampstead forest.	Continuous

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Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
26	Cycling and walking strategy	Promoting Travel Alternatives	Promotion of cycling and walking	SADC / HCC	2016/17	2017/18	Usage figures	See note 1 at end of table	Cycling (2008) and Walking (2009) strategies in place. SADC Green Travel Plan sets out a range of actions to reduce emissions from staff travel. Improvements and investments in cycling and walking infrastructure include; • Implementation of the St Albans Green Ring route project. • Production of revised St Albans Cycling maps. • Construction of cycle and walking paths in Verulamium Park. • Provision of secure cycle parking racks within the city centre and at rail stations. • Upgrading and resurfacing of the Alban Way Leisure path. • Installation of Trixie mirrors at key junctions within the city centre. • Improved access to Nickey Line in Harpenden. • New link from Alban Way to St Albans City Rail station. • Provision of way finding monoliths within the city centre.	Continuous

St Albans City and District Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
29	Taxi emissions.	Promoting Low Emission Transport	Taxi licensing conditions	SADC	2016/17	2017/18	Certificate of Compliance data	See note 1 at end of table	Emissions controlled through Certificate of Compliance at garage check. The frequency of checks is dependent upon the age of the vehicles; 1 – 5 years old; annually 5 – 7 years old; every 6 months Over 7 years old; every 4 months	Continuous
32	Campaign to raise awareness of the impact on air quality of idling engines (when parked)	Public Information	Other	SADC	2016/17	2017	Media coverage	See note 1 at end of table	Artwork prepared and campaign being planned.	2017
33	Retrofitting of existing bus fleet to lower pollutant emissions	Promoting Low Emission Transport	Other	SADC / HCC	2013	2015/16	Number of buses retrofitted	See note 1 at end of table	Funding received from the DfT to retrofit a number of buses to reduction the emissions from bus travel.	Completed last year
34	Instantaneous Emissions Modelling	Policy Guidance and Development Control	Other	SADC	2014/17	2017	Updated NO ₂ modelling within St Albans	TBC	Project is currently ongoing.	Ongoing
35	Freight Management Plan	Freight and Delivery Management	Other	SADC	2014/17	2017	Numbers of vehicles and routes taken	TBC	Project is currently ongoing.	Ongoing

NOTE 1 - It is not possible to quantify specifically the impact of small scale projects that the Council is working on with partners. Individual and cumulative air quality measures that reduce emissions, however, are beneficial to improving pollutant levels both within AQMA's and the District generally.

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.

St Albans City and District Council are working to reduce emissions of air pollutants across the District, many of the measures used to reduce emissions of NO_x also impact the emissions of PM₁₀ and PM_{2.5} due to the pollutants originating from the same sources. The main source of local air pollution concentrations within St Albans is from vehicle emissions, both NO₂ and particulates are released through vehicular sources, therefore measures focussing on changing the number of vehicles on the roads, and the type of vehicles being used will help reduce emissions of both pollutants.

The following measures to reduce pollutant emissions within St Albans including emissions of PM_{2.5} are included within the existing AQAP:

- Traffic management improvements, changes in parking restrictions, co-ordinating timing of goods deliveries and possible re-routing of HGVs;
- Changes to Public Transport, introduction of two new hybrid buses and retrofitting of 40 buses with new technology to produce less NO_x / NO₂ emissions;
- Promotion of Green Travel, reducing the number of journeys taken by car and using public transport, car-sharing, cycling or electric vehicles; and
- Promotion of energy efficiency measures across the District.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

There is currently no continuous monitoring undertaken within St Albans City and District Council.

3.1.2 Non-Automatic Monitoring Sites

St Albans City and District Council undertook non-automatic (passive) monitoring of NO₂ at 39 separate locations during 2015, 38 single tube locations and 1 triplicate location. 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) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 8 years with the air quality objective of 40µg/m³.

For diffusion tubes, the full datasets of monthly mean values between 2011 and 2015 are provided in Appendix B.

Table 3.1 below provides a summary of measured exceedences (annualised and bias adjusted) that were recorded for 2015. During 2015 there were two exceedences of the AQS annual mean objective for NO₂, sites SA137 and SA138. Both sites have been distance corrected in Table 3.1 due to relevant exposure being at a greater distance from the kerb than where the monitoring sites are located. After distance correction both monitoring sites fall below the AQS annual mean objective.

Table 3.1 – Summary of Measured Annual Mean NO₂ Exceedances

Site ID	Within AQMA Y/N	2015 Bias Adjusted Annual Mean Concentration (µg/m ³)
SA137	N	40.2 (35.1)
SA138	Y – St Albans AQMA No. 1	42.3 (36.5)

* Distance from road calculated concentration shown in brackets

The results from 2015 generally show a reduction in concentration compared to those presented in 2014, all but three monitoring locations experienced a decrease in concentration from 2014 to 2015 (SA109, SA133 and SA139). Following distance correction of results there were no exceedances of the AQS annual mean objective for NO₂ at any of the existing monitoring locations. Table A.3, Figure A.1 and Figure A.2 present the data used for the distance correction and the outputs from the correction calculator.

This general trend in concentration reduction from 2014 to 2015 could be due to a number of factors such as changing traffic patterns (traffic numbers and journey routes) within the St Albans area, an increase in sustainable modes of travel including cycling and walking, the continual improvements currently being made to the bus fleet, and also the meteorological conditions experienced within the monitoring period (especially wind speed and direction).

Defra guidance states that exceedances of the NO₂ 1-hour objective are unlikely to occur where the annual mean concentration is below 60µg/m³. All of the 2015 annual mean NO₂ concentrations recorded are below 60µg/m³ therefore it can be considered as per Defra guidance that there were no exceedances of the AQS 1-hour objective for NO₂. In previous years at location SA136 the annual mean NO₂ concentration has been recorded at 60µg/m³ or above (2008, 2009, 2013 and 2014), in line with Defra guidance there may have been exceedances of the 1-hour objective during these yearly periods.

The trend charts presented in Figure A.3 and Figure A.4 display the changing concentrations of NO₂ at the individual monitoring locations (not distance corrected). All monitoring sites except from SA139 have shown an overall decrease in annual mean NO₂ concentrations between 2008 and 2015, SA139 has shown a marginal increase within the same time duration.

There is currently one diffusion tube monitoring within an existing AQMA (SA138). Although some are close to the boundaries of AQMAs, currently all other monitoring

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locations are outside of the existing AQMAs. It is recommended that the current NQ monitoring is reviewed, with either additional locations established within the designated AQMAs or with the relocation of existing monitoring locations to within the designated AQMAs.

4 Conclusion

Currently there are three Air Quality Management Areas (AQMAS) designated within St Albans, these have all been declared for exceedances of the annual mean AQS objective for NO₂. The predominant source of NO₂ within the District is traffic emissions from vehicles travelling on the road network, and it has been due to these emissions that the current AQMAS have been designated. There are a number of major roads that pass through the District and also areas within St Albans where roads become congested due to the volume of traffic. The traffic congestion coupled with the tight, building lined roads within St Albans city centre leads to the build-up of NO₂ concentrations.

Monitoring of NO₂ is completed within St Albans using a network of passive diffusion tubes. There are currently 39 separate monitoring locations within the network, 26 of these locations are kerbside sites, 2 are roadside sites, 7 are urban background sites and 4 are rural sites.

Results from monitoring completed in 2015 indicate that the annual mean AQS objective for NO₂ (40 µg/m³) was exceeded at two locations, SA137 and SA138. Following distance correction of the concentrations both fell to below the annual mean objective. Distance correction is completed to estimate the concentration at the closest relevant receptor to the monitoring site.

Annual mean concentrations were not above 60µg/m³ at any of the monitoring locations, therefore as per Defra guidance it is unlikely that the NQ 1-hour objective of 200µg/m³ was exceeded at any location.

NO₂ monitoring data for St Albans is presented from 2008 to 2015 (where available), a number of sites have been added since 2008 therefore their data does not go back to this date. The majority of the monitoring sites present an overall downward trend of annual mean NO₂ concentration with peak concentrations experienced predominately in 2009 or 2010.

The only exception from this downward trend is the urban background monitoring site SA139. The lowest annual mean concentrations was recorded in 2013 (24 µg/m³) at

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this location and there has been an increase in concentration both in 2014 (26 $\mu\text{g}/\text{m}^3$), and 2015 (28.5 $\mu\text{g}/\text{m}^3$). The concentration still remains far below the annual mean AQS objective.

In response to the designation of the existing AQMAs an Air Quality Action Plan (AQAP) was completed by St Albans City and District Council originally in 2003 and subsequently updated in 2010. The AQAP documents a number of objectives and measures that have been designed with the overall aim to minimise the effects of air pollution on human health. The measures presented within the AQAP range from short term initiatives such as developing cycling and walking strategies to longer term initiatives such as the potential change of road networks where exceedances have been identified.

The AQAP is designed to be flexible and open to continual updates as new information or new techniques for pollution control become available. Currently the AQAP is going through a period of review with the outcomes of a number of projects being completed within the District to be fed into the revision.

Appendix A: Monitoring Results

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

Site ID	Location	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)
SA101	Museum, Hatfield Road, St Albans	Ro	515105	207476	NO ₂	N	19m	2.5m	No	2.35
SA102	Folly Lane, St Albans	K	514160	207694	NO ₂	N	20m	2m	No	2.33
SA103	Links View, St Albans	K	513988	208188	NO ₂	N	12m	1m	No	2.40
SA104	Ben Austin, Redbourn	Ro	509993	211744	NO ₂	N	12.5m	6m	No	2.37
SA105	St Agnells, Lybury Lane, Redbourn	Ru	509012	213678	NO ₂	N	N/A	0.5m	No	2.40
SA106	Lybury Lane, Redbourn	Ru	509668	212987	NO ₂	N	N/A	5m	No	1.20
SA107	Redbourn JMI, Long Cutt, Redbourn	B	510194	212526	NO ₂	N	N/A	28m	No	2.23
SA108	Redding Lane, Redbourn	Ru	509099	214068	NO ₂	N	N/A	2m	No	2.24
SA109	High Street, Harpenden	K	513345	214409	NO ₂	N	22m	3m	No	2.40
SA110	Crabtree JMI, Crabtree Lane, Harpenden	K	514498	214382	NO ₂	N	21m	2m	No	2.70
SA111	Butterfield Road, Wheathampstead	K	517604	213349	NO ₂	N	15m	1m	No	2.40
SA112	High Street, Wheathampstead	K	517732	214117	NO ₂	N	18m	3m	No	2.65
SA113	Pondfield Crescent, St Albans	B	516634	209085	NO ₂	N	N/A	9m	No	2.22
SA114 /5/6	Fleetville, 1 Royal Road, St Albans	B	516549	207391	NO ₂	N	N/A	20m	No	2.45

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Site ID	Location	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)
SA117	Five Acres, London Colney	K	517666	204828	NO ₂	N	24m	1m	No	2.46
SA118	Ridgeview Hostel, Barnet Rd, London Colney	B	518645	203435	NO ₂	N	N/A	40m	No	2.45
SA119	Bowmans JMI, Telford Rd, London Colney	K	517482	203881	NO ₂	N	24m	1m	No	2.40
SA120	Sleapcross Gardens, Smallford	K	520053	206618	NO ₂	N	23m	1m	No	2.30
SA121	Mount Drive, Park Street	K	514654	204546	NO ₂	N	31m	1m	No	2.45
SA122	Sycamore Drive, Park Street	K	514899	203857	NO ₂	N	12m	2m	No	2.52
SA123	Radlett Road, Park Street	K	515295	202765	NO ₂	N	4m	1m	No	2.45
SA124	Smug Oak Lane, Bricket Wood	K	515383	202528	NO ₂	N	10m	1m	No	2.50
SA125	Lye Lane, Bricket Wood	K	513308	202655	NO ₂	N	33m	2m	No	2.40
SA126	Five Acres Avenue, Bricket Wood	K	512689	202700	NO ₂	N	5.5m	2m	No	2.57
SA127	Oakwood Road, Bricket Wood	K	512570	202716	NO ₂	N	8m	2m	No	2.37
SA128	Waterdale, Old Watford Rd	K	512004	202105	NO ₂	N	0m	18m	No	2.40
SA129	Ashridge Drive, Bricket Wood	K	512880	202238	NO ₂	N	9m	1m	No	2.35
SA130	Tippendell Lane, Chiswell Green	K	513569	204537	NO ₂	N	13.5m	2.5m	No	2.67
SA131	Farm Searches Lane, Bedmond	Ru	511351	203740	NO ₂	N	N/A	1m	No	2.40
SA132	Westminster Lodge, Holywell Hill, St Albans	B	514317	206453	NO ₂	N	N/A	1m	No	2.27

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Site ID	Location	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)
SA133	Belmont Hill, St Albans	K	514606	206801	NO ₂	N	22m	2.5m	No	2.40
SA134	Albert Street, St Albans	K	514648	206919	NO ₂	N	11.5m	2m	No	2.60
SA135	Watsons Walk, St Albans	K	515096	206921	NO ₂	N	18m	3.5m	No	2.65
SA136	St Peters Street, St Albans	K	514883	207422	NO ₂	N	55m	2m	No	2.34
SA137	High Street, St Albans	K	514664	207125	NO ₂	N	2m	0.5m	No	2.77
SA138	Peahen PH, Holywell Hill, St Albans	K	514701	207082	NO ₂	Y	6m	2m	No	2.62
SA139	Civic Centre, St Peters Street, St Albans	B	514921	207391	NO ₂	N	N/A	25m	No	>3
SA140	Lattimore Road, St Albans	K	515185	207070	NO ₂	N	5m	3m	No	2.48
SA141	Town Hall, St Albans	B	514741	207245	NO ₂	N	N/A	2m	No	2.26

Notes: Site classifications; K – Kerbside, Ro – Roadside, B – Background, Ru - Rural

(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.2 – Diffusion Tube Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾							
				2008	2009	2010	2011	2012	2013	2014	2015
SA101	Ro	91.67	91.67	34.3	36.4	36.2	29.6	29.6	34.0	33.2	27.9
SA102	K	100	100	37.0	37.7	33.3	29.9	33.0	28.0	29.4	24.8
SA103	K	91.67	91.67	25.3	25.5	24.3	22.0	22.6	21.9	21.2	17.4
SA104	Ro	100	100	24.4	27.1	24.1	20.5	27.7	25.7	28.0	20.3
SA105	Ru	83.33	83.33	22.1	27.8	27.4	22.6	22.9	20.0	24.6	17.4
SA106	Ru	100	100	37.7	37.7	33.8	29.6	31.5	28.3	30.5	24.0
SA107	B	91.67	91.67	23.4	26.9	22.9	21.3	26.5	24.2	22.6	20.3
SA108	Ru	100	100	25.9	29.6	29.8	23.5	23.2	19.0	20.7	16.1
SA109	K	100	100	36.9	40.2	37.8	32.4	37.6	32.8	29.3	30.9
SA110	K	100	100	22.4	29.0	25.7	21.1	24.1	20.2	19.7	15.7
SA111	K	91.67	91.67	20.8	26.6	25.9	20.1	23.5	20.7	22.0	16.8
SA112	K	83.33	83.33	26.2	28.0	27.1	23.5	26.5	24.4	26.3	20.4
SA113	B	83.33	83.33	20.7	24.7	21.0	19.0	21.1	17.6	20.0	14.8
SA114/5/6	B	88.89	88.89	22.8 ⁽⁴⁾	26.3 ⁽⁴⁾	23.1 ⁽⁴⁾	20.2 ⁽⁴⁾	23.6 ⁽⁴⁾	21.5 ⁽⁴⁾	26.7 ⁽⁴⁾	22.3 ⁽⁴⁾
SA117	K	41.67	41.67	33.4	33.2	34.1	27.7	29.7	24.5	29.1	18.1
SA118	B	100	100	33.2	35.3	32.3	27.0	30.1	28.1	26.8	22.6
SA119	K	100	100	30.6	35.3	31.3	27.1	31.6	27.5	29.6	22.1
SA120	K	91.67	91.67	40.6	39.7	34.0	35.4	32.1	34.2	37.4	31.5
SA121	K	100	100	42.8	47.6	46.8	39.5	44.2	41.1	47.0	35.3
SA122	K	100	100	35.2	41.9	37.2	33.5	33.9	33.1	29.9	26.9
SA123	K	100	100	42.2	46.6	41.8	39.7	42.0	35.1	38.4	32.0
SA124	K	91.67	91.67	44.3	47.3	46.8	37.5	42.0	38.8	37.4	36.2
SA125	K	83.33	83.33	38.4	37.0	39.7	28.7	32.6	34.8	28.2	23.9
SA126	K	100	100	32.6	31.6	31.2	25.8	25.7	27.8	25.7	22.6
SA127	K	100	100	31.9	37.5	36.6	28.8	31.0	31.0	30.0	26.2
SA128	K	100	100	42.1	47.1	42.2	36.2	38.4	35.2	38.8	31.0
SA129	K	100	100	24.7	30.0	29.8	27.4	31.1	29.1	28.3	23.5
SA130	K	100	100	32.3	36.0	31.7	29.7	31.3	27.6	34.4	23.6
SA131	Ru	91.67	91.67	30.3	35.4	35.1	31.0	34.8	32.6	33.5	22.3
SA132	B	83.33	83.33	22.6	27.9	23.3	23.4	24.2	25.0	22.7	21.5
SA133	K	100	100	44.7	45.9	45.0	37.7	43.1	48.8	30.9	33.9

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾							
				2008	2009	2010	2011	2012	2013	2014	2015
SA134	K	100	100	41.5	48.3	45.3	37.9	43.4	36.0	42.3	30.9
SA135	K	91.67	91.67	48.6	51.4	50.3	38.0	44.4	40.2	43.2	30.9
SA136	K	100	100	60.4	61.5	64.4	53.2	46.7	62.9	60.0	38.8
SA137	K	100	100	49.4	53.8	51.8	42.1	52.2	46.3	47.9	40.2
SA138	K	91.67	91.67	57.6	60.1	59.3	51.5	46.7	48.8	55.5	42.4
SA139	B	100	100	27.3	31.6	29.5	24.9	30.5	24.0	26.0	28.5
SA140	K	100	100	-	-	35.1	31.9	32.1	30.0	30.0	26.8
SA141	B	83.33	83.33	-	-	35.6	35.5	38.0	29.6	30.8	22.1

Notes: Exceedance of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 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) All means have been “annualised” as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. Means for diffusion tubes have been corrected for bias. See Appendix C for details.

(4) Results are triplicate averages.

Table A.3 – Fall off with Distance Correction of Relevant Sites Exceeding the NQ Annual Mean AQS Objective

Site ID	Site Type	Within AQMA	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	2015 Annual Mean Concentration (µg/m ³)	Distance Corrected 2015 Annual Mean Concentration (µg/m ³)
SA137	Kerbside	No	2m	0.5m	40.2	35.1
SA138	Kerbside	Yes	6m	2m	42.4	36.5

Figure A.1 – Outputs from the NO₂ Distance from Road Calculator for SA137

This calculator allows you to predict the annual mean NO₂ concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.



Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	0.5	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	2	metres
Step 3	What is the local annual mean background NO ₂ concentration (in µg/m ³)?	(Note 2)	19.43	µg/m ³
Step 4	What is your measured annual mean NO ₂ concentration (in µg/m ³)?	(Note 2)	40.24	µg/m ³
Result	The predicted annual mean NO ₂ concentration (in µg/m ³) at your receptor			(Note 3) 35.1 µg/m ³

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road – see the FAQ at <http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm> for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (in practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

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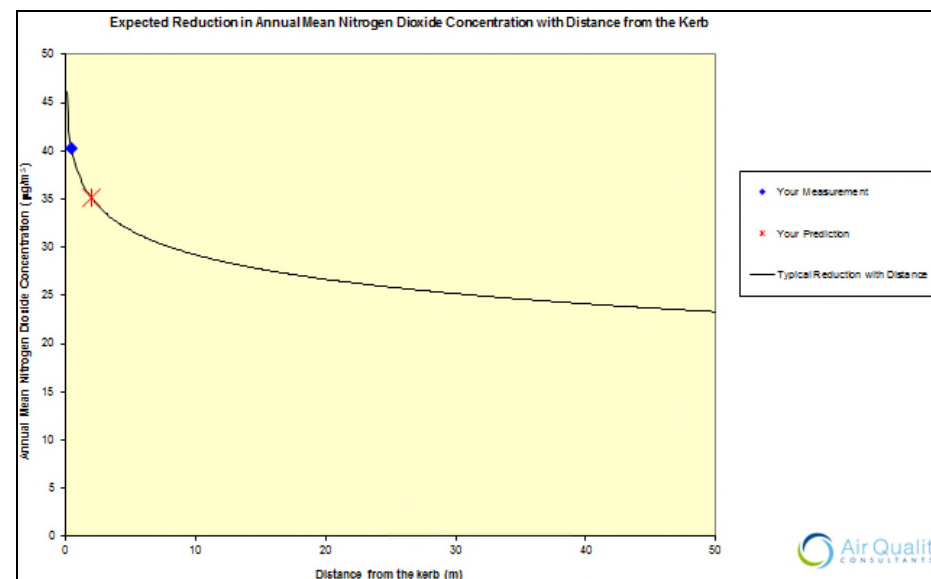


Figure A.2 – Outputs from the NO₂ Distance from Road Calculator for SA138

This calculator allows you to predict the annual mean NO₂ concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	2	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	6	metres
Step 3	What is the local annual mean background NO ₂ concentration (in µg/m ³)?	(Note 2)	19.43	µg/m ³
Step 4	What is your measured annual mean NO ₂ concentration (in µg/m ³)?	(Note 2)	42.35	µg/m ³
Result	The predicted annual mean NO ₂ concentration (in µg/m ³) at your receptor	(Note 3)	36.5	µg/m ³

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road – see the FAQ at <http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm> for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (in practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

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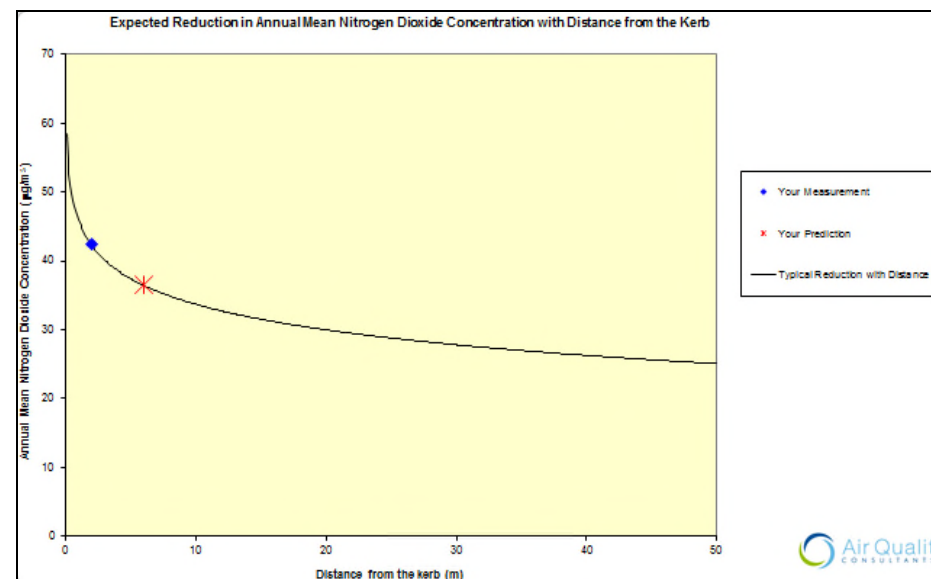


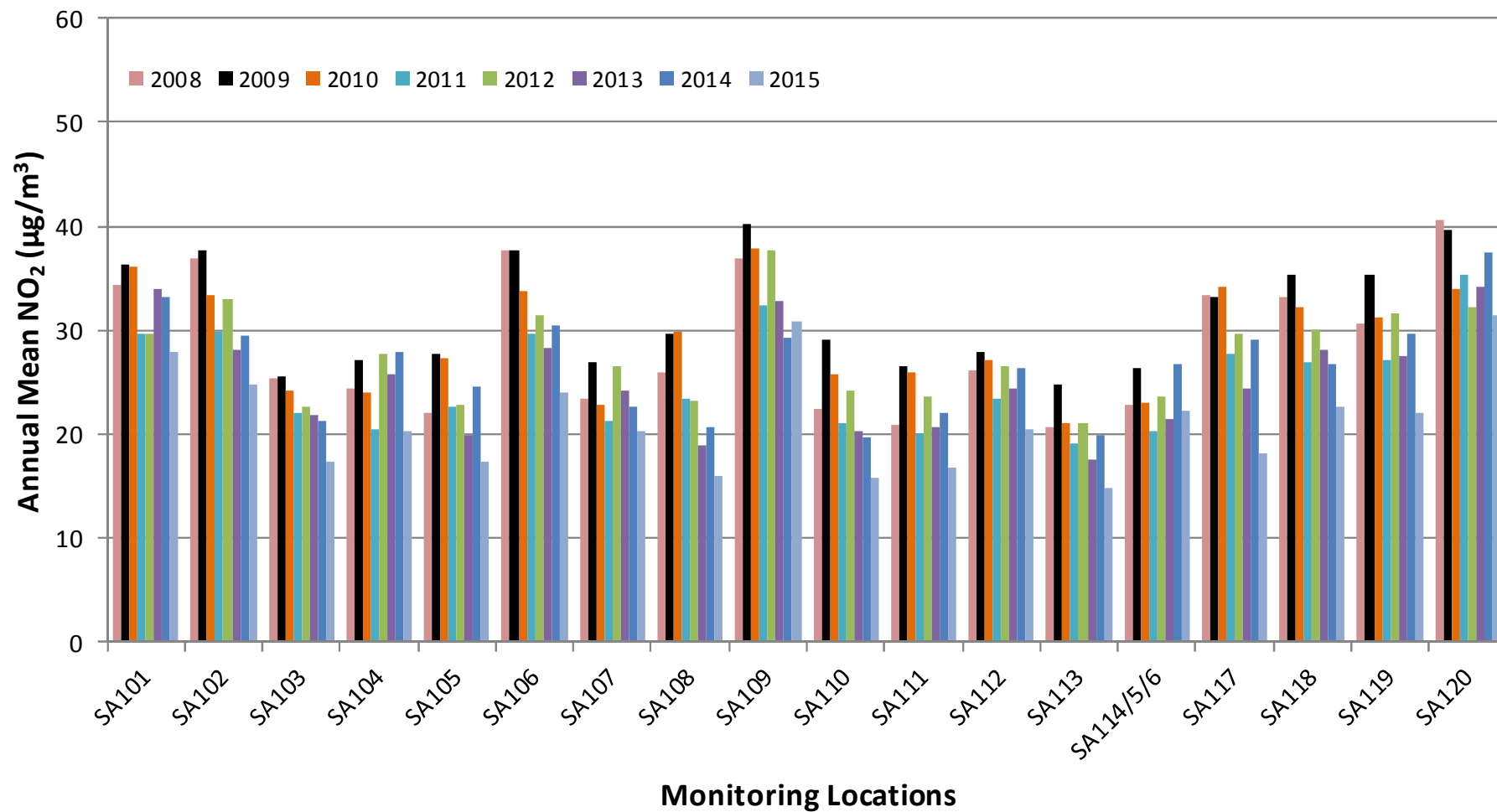
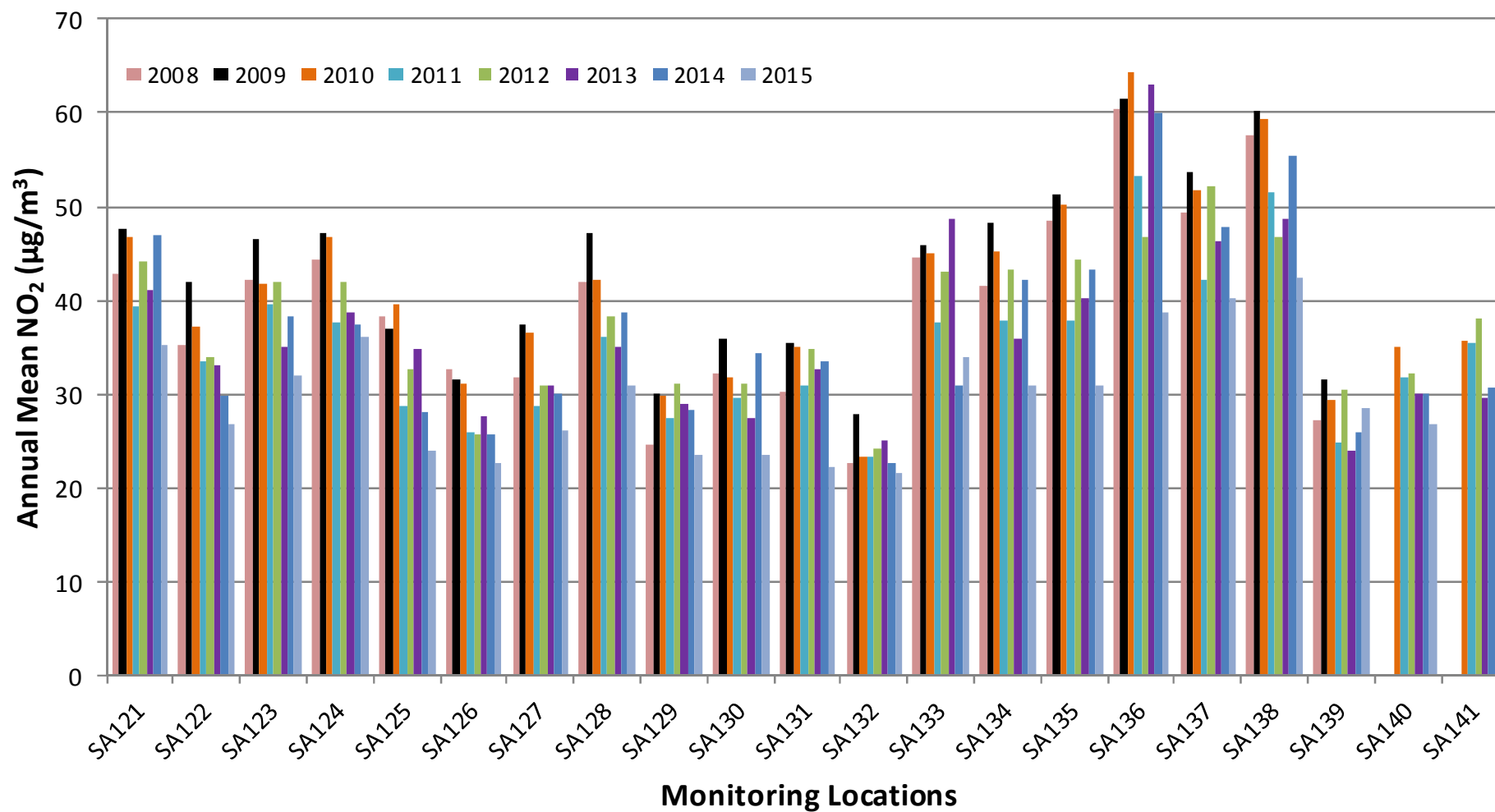
Figure A.3 – Trends in Annual Mean NO₂ Concentrations Measured at Diffusion Tube Monitoring Sites 1

Figure A.4 – Trends in Annual Mean NO₂ Concentrations Measured at Diffusion Tube Monitoring Sites 2

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO₂ Monthly Diffusion Tube Results 2015

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjuste (0.91) ^(a)
SA101	37	36	37	34	26	33	33	35	31	-	15	19	30.6	27.9
SA102	37	37	29	26	24	29	26	29	30	33	16	12	27.3	24.8
SA103	26	26	25	19	18	17	16	12	-	21	13	16	19.1	17.4
SA104	28	25	29	23	14	21	23	26	19	28	15	16	22.3	20.3
SA105	23	28	21	26	11	15	15	19	23	-	9	-	19.1	17.4
SA106	39	38	30	25	23	27	19	29	18	29	16	23	26.3	24.0
SA107	30	32	28	-	17	19	25	21	21	26	10	16	22.3	20.3
SA108	18	24	24	25	11	16	11	18	22	27	8	8	17.7	16.1
SA109	41	41	39	36	25	36	31	37	39	45	16	20	34.0	30.9
SA110	24	28	23	17	12	13	14	14	19	24	8	11	17.3	15.7
SA111	25	25	23	19	12	14	12	20	20	21	-	12	18.5	16.8
SA112	-	28	32	23	18	23	21	26	-	28	11	15	22.4	20.4
SA113	24	25	-	-	12	12	14	17	15	18	11	14	16.3	14.8
SA114		37	29	26	17	20	13	24	22	30	18	22	23.5	21.4
SA115	40	34	31	24	18	22	-	22	20	28	16	20	24.9	22.6
SA116	39	35	29	25	-	22	12	23	19	3	-	22	25.2	22.9
SA117	-	-	-	-	-	4	20	-	24	27	14	15	20.1	18.1
SA118	30	30	29	28	19	23	24	26	27	30	14	17	24.9	22.6
SA119	33	33	26	24	18	23	25	25	16	32	21	15	24.3	22.1
SA120	38	35	31	33	25	30	38	41	33	54	-	22	34.6	31.5
SA121	53	46	48	46	32	44	40	45	42	35	16	20	38.8	35.3
SA122	38	37	31	28	23	28	27	32	27	43	22	19	29.5	26.9
SA123	41	47	36	36	31	36	36	39	39	41	19	22	35.2	32.0
SA124	43	44	45	45	29	42	36	41	53	40	-	19	39.8	36.2

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (0.91) ^(a)
SA125	36	33	28	-	-	28	23	27	34	30	13	10	26.3	23.9
SA126	30	31	38	26	17	24	22	25	27	32	13	12	24.9	22.6
SA127	35	34	33	31	25	27	24	28	29	44	19	16	28.8	26.2
SA128	48	48	38	36	30	35	35	37	36	35	11	22	34.1	31.0
SA129	37	34	29	29	18	23	22	26	27	34	16	14	25.8	23.5
SA130	33	31	32	24	21	23	24	29	25	37	14	18	25.9	23.6
SA131	30	33	29	35	19	22	2	19	30	26	12	15	24.6	22.3
SA132	-	32	-	24	15	18	20	24	21	50	17	16	23.7	21.5
SA133	37	51	49	51	29	37	32	42	40	43	17	19	37.3	33.9
SA134	44	42	38	42	26	34	33	40	33	36	16	23	33.9	30.9
SA135	47	43	45	40	31	37	24	29	27	28	-	21	33.9	30.9
SA136	46	49	61	73	39	51	46	22	23	57	18	28	42.6	38.8
SA137	83	35	52	54	31	39	37	48	43	62	22	24	44.2	40.2
SA138	52	53	58	59	36	51	48	52	-	62	13	28	46.5	42.4
SA139	44	22	25	23	18	17	24	70	55	47	15	14	31.3	28.5
SA140	35	35	36	29	21	25	31	40	39	33	12	18	29.5	26.8
SA141	26	31	29	27	18	22	21	26	26	-	-	16	24.3	22.1

Notes: Exceedance of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

(a) See Appendix C for details on bias adjustment

(b) Results have been annualised due to data capture below 75%

- No results received for period or data received was corrupt

Table B 2 – NO₂ Monthly Diffusion Tube Results 2014

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (0.92) ^(a)
SA101	43	50	41	38	-	-	-	-	-	34	40	40	41.0	33.2 ^(b)
SA102	35	-	-	32	23	27	-	-	-	33	40	43	33.4	29.4 ^(b)
SA103	29	-	-	21	17	18	20	-	16	25	33	29	23.1	21.2
SA104	44	35	31	29	20	20	23	-	18	37	44	33	30.4	28.0
SA105	30	19	30	22	18	-	-	-	29	28	43	21	26.8	24.6
SA106	40	36	33	34	25	21	29	-	26	40	39	42	33.2	30.5
SA107	-	32	23	24	19	19	19	-	20	26	35	29	24.6	22.6
SA108	-	-	-	24	21	20	17	-	18	21	39	15	21.9	20.7 ^(b)
SA109	44	42	35	32	28	28	27	-	17	33	-	-	31.8	29.3
SA110	26	28	22	19	15	17	18	-	14	23	27	27	21.4	19.7
SA111	35	16	25	21	18	18	21	-	16	28	39	27	23.9	22.0
SA112	33	30	32	30	24	23	23	-	-	27	35	28	28.5	26.3
SA113	28	31	21	16	16	14	14	-	14	25	32	28	21.7	20.0
SA114	33	-	-	-	19	-	29	-	-	23	32	55	31.7	28.0 ^(b)
SA115	32	-	-	-	-	-	-	-	-	23	29	43	31.8	25.1 ^(b)
SA116	30	-	-	-	-	-	28	-	-	25	29	45	31.5	27.0 ^(b)
SA117	-	-	-	-	27	-	-	-	-	-	-	-	26.9	29.1 ^{(b)(c)}
SA118	33	-	-	27	27	25	23	-	24	34	38	31	29.1	26.8
SA119	44	42	38	27	25	25	23	-	23	31	37	37	32.2	29.6
SA120	51	47	42	-	-	32	29	-	29	46	47	42	40.7	37.4
SA121	65	51	69	50	48	49	46	-	42	39	65	39	51.1	47.0
SA122	39	-	-	29	33	27	29	-	23	-	-	38	31.2	29.9 ^(b)
SA123	51	45	49	40	39	32	37	-	-	38	-	45	41.7	38.4
SA124	37	-	26	39	40	50	45	-	40	36	52	41	40.6	37.4
SA125	31	26	42	32	29	33	35	-	16	-	35	28	30.6	28.2
SA126	35	-	-	26	22	23	26	-	23	29	35	32	27.9	25.7
SA127	35	-	41	33	29	30	29	-	29	29	39	-	32.7	30.0

Site ID	NO ₂ Mean Concentrations (µg/m³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (0.92) ^(a)
SA128	43	43	-	46	36	35	44	-	37	41	52	45	42.1	38.8
SA129	37	32	35	34	24	25	25	-	22	30	44	30	30.8	28.3
SA130	45	41	41	39	28	27	-	-	25	40	50	37	37.4	34.4
SA131	-	-	35	38	31	35	-	-	33	34	58	-	37.8	33.5 ^(b)
SA132	30	-	-	27	20	21	-	-	18	28	-	-	24.0	22.7 ^(b)
SA133	36	36	-	31	29	-	-	-	38	20	60	39	36.0	30.9 ^(b)
SA134	48	53	50	45	39	47	34	-	38	46	65	40	46.0	42.3
SA135	45	49	49	-	-	50	39	-	42	40	57	52	47.0	43.2
SA136	57	72	69	82	58	68	65	-	-	57	73	50	65.2	<u>60.0</u>
SA137	50	58	56	52	46	50	46	-	48	48	66	-	52.0	47.9
SA138	64	71	62	61	54	62	60	-	49	59	77	46	60.3	55.5
SA139	30	36	27	25	-	25	-	-	20	29	32	30	28.3	26.0
SA140	36	41	39	32	23	26	20	-	23	36	46	36	32.6	30.0
SA141	35	39	38	35	23	29	23	-	29	40	45	32	33.5	30.8

Notes: Exceedance of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(a) See Appendix C for details on bias adjustment

(b) Results have been annualised due to data capture below 75%

(c) Only 3 months or less raw data, results to be treated with caution

- No results received for period or data received was corrupt

Table B.3 – NO₂ Monthly Diffusion Tube Results 2013

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (0.95) ^(a)
SA101	-	-	19	-	-	-	-	33	47	15	74	39	37.9	34.0 ^(b)
SA102	-	-	16	-	-	19	24	32	32	28	40	39	28.7	28.0 ^(b)
SA103	-	-		-	-	11	18	20	20	20	29	32	21.6	21.9 ^(b)
SA104	-	27	26	-	-	13	24	24	26	28	35	40	27.1	25.7
SA105	-		29	-	-	-	20	15	21	16	23	25	21.3	20.0 ^(b)
SA106	-	29	25	-	-	16	23	30	30	30	43	41	29.8	28.3
SA107	-	-	-	-	-	13	19	24	23	21	38	28	23.7	24.2 ^(b)
SA108	-	-	-	-	-	8	23	17	21	18	24	-	18.2	19.0 ^(b)
SA109	-	-	-	-	-	-	32	32	28	29	46	35	33.6	32.8 ^(b)
SA110	-	-	-	-	-	12	15	17	20	19	29	27	19.9	20.2 ^(b)
SA111	-	17	25	-	-	12	18	18	-	23	28	31	21.5	20.7 ^(b)
SA112	-	20	31	-	-	21	-	-	-	23	-	35	26.0	24.4 ^(b)
SA113	-	13	20	-	-	-	15	-	-	-	28	28	20.8	17.6 ^(b)
SA114	-	-	25	-	-	11	16	20	19	20	32	28	21.4	20.9 ^(b)
SA115	-	-	24	-	-	10	16	20	17	21	32	34	21.8	21.3 ^(b)
SA116	-	-	24	-	-	10	17	23	21	20	33	35	22.9	22.4 ^(b)
SA117	-	-	-	-	-	17	-	-	-	-	-	-	16.8	24.5 ^{(b)(c)}
SA118	-	34	27	-	-	20	32	24	24	30	39	37	29.6	28.2
SA119	-	31	27	-	-	23	14	28	23	32	44	39	29.0	27.5
SA120	-	-	29	-	-	-	38	-	27	42	44	49	38.2	34.2 ^(b)
SA121	-	51	46	-	-	-	-	-	39	46	62	51	49.2	41.1 ^(b)
SA122	-	36	-	-	-	22	30	-	-	35	46	38	34.6	33.1 ^(b)
SA123	-	39	41	-	-	15	-	34	-	-	56	48	38.9	35.1 ^(b)
SA124	-	-	38	-	-	32	45	35	35	37	54	41	39.7	38.8 ^(b)
SA125	-	49	45	-	-	-	42	26	-	-	40	30	38.7	34.8 ^(b)
SA126	-	35	40	-	-	11	31	21	24	26	42	34	29.3	27.78
SA127	-	43	31	-	-	-	33	26	26	31	46	34	33.7	31.0 ^(b)

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (0.95) ^(a)
SA128	-	33	34	-	-	21	39	41	33	41	44	47	37.0	35.2
SA129	-	39	37	-	-	13	29	30	25	32	36	35	30.6	29.1
SA130	-	31	28	-	-	-	31	-	-	-	-	6	24.2	27.6 ^(b)
SA131	-	37	70	-	-	13	41	22	33	25	35	32	34.3	32.6
SA132	-	39	33	-	-	-	-	-	-	-	29	-	33.6	25.0 ^{(b)(c)}
SA133	-	112	40	-	-	-	49	36	65	-	36	41	54.2	48.8^(b)
SA134	-	17	35	-	-	19	43	32	58	34	45	58	37.9	36.0
SA135	-	-	-	-	-	21	40	38	53	31	47	47	39.6	40.3^(b)
SA136	-	117	-	-	-	31	73	47	84	40	69	49	63.8	62.9^(b)
SA137	-	77	36	-	-	24	52	38	77	31	44	59	48.8	46.3
SA138	-	74	35	-	-	29	54	45	-	40	63	68	50.8	48.8^(b)
SA139	-	27	25	-	-	23	-	-	31	18	37	30	27.2	24.0 ^(b)
SA140	-	-	38	-	-	13	27	24	41	22	39	43	30.7	30.0 ^(b)
SA141	-	-	27	-	-	12	-	-	45	-	42	45	34.0	29.6 ^(b)

Notes: Exceedance of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(a) See Appendix C for details on bias adjustment

(b) Results have been annualised due to data capture below 75%

(c) Only 3 months or less raw data, results to be treated with caution

- No results received for period or data received was corrupt

Table B.4 – NO₂ Monthly Diffusion Tube Results 2012

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (0.96) ^(a)
SA101	-	-	-	28	29	-	-	-	31	-	30	-	29.6	29.6 ^(b)
SA102	46	46	42	27	24	-	-	-	-	44	35	-	37.9	33.0 ^(b)
SA103	31	31	29	18	15	-	-	-	-	30	27	-	25.9	22.6 ^(b)
SA104	34	34	35	21	16	-	-	25	23	31	41	-	28.9	27.7
SA105	26	26	30	21	19	-	-	17	15	25	36	-	23.9	22.9
SA106	42	42	40		19	-	-	26	31	31	46	-	34.6	31.5 ^(b)
SA107	33	33	33	22	17	-	-	19	23	27	42	-	27.6	26.5
SA108	26	26	30	21	23	-	-	12	34	25		-	24.3	23.2 ^(b)
SA109	45	45	42	30	43	-	-	31	22	38	57	-	39.2	37.6
SA110	30	30	33	18	15	-	-	16	22	27	35	-	25.1	24.1
SA111	32	32	33	19	14	-	-	20	21	26		-	24.7	23.5 ^(b)
SA112	29	29	34	23	24	-	-	20	21	30	39	-	27.6	26.5
SA113	27	27	27	15	12	-	-			25	36	-	24.2	21.1 ^(b)
SA114	29	29	32	18	15	-	-	23	20	28	24	-	24.2	23.3
SA115	28	28	33	17	15	-	-	26	21	27	27	-	24.6	23.7
SA116	29	29	31	18	15	-	-	25	21	24	32	-	24.8	23.8
SA117	41	41	43	27		-	-	24	27	33	35	-	33.7	29.7 ^(b)
SA118	38	38	37	27	24	-	-	27	27	31	33	-	31.4	30.1
SA119	39	39	41	23	20	-	-	29	29	26	50	-	32.9	31.6
SA120	41	41	45	35	28	-	-		14	33	52	-	36.1	32.1 ^(b)
SA121	53	53	54	40	26	-	-	40	43	54	51	-	46.1	44.2
SA122	43	43	43	27	24	-	-	31	35	33	38	-	35.3	33.9
SA123	53	53	54	37	31	-	-	38	42	32	52	-	43.7	42.0
SA124	52	52	55	48	38	-	-	33		44	48	-	46.3	42.0^(b)
SA125	43	43	36	30	24	-	-	25	28	35	42	-	33.9	32.6
SA126	21	21	36	25	22	-	-	22	26	30	38	-	26.8	25.7
SA127	44	44	44	29		-	-	25	26	31	40	-	35.2	31.0 ^(b)

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (0.96) ^(a)
SA128	52	52	54	16	27	-	-	34	29	45	51	-	40.0	38.4
SA129	42	42	43	25	18	-	-	22	27	33	40	-	32.4	31.1
SA130	43	43	45	28	22	-	-	24	26	33	-	-	32.8	31.3 ^(b)
SA131	48	48	51	36	20	-	-	26	23	34	40	-	36.3	34.8
SA132	34	34	32	21	17	-	-	-	21	26	-	-	26.3	24.2 ^(b)
SA133	54	54	58	39	37	-	-	-	42	46	-	-	47.0	43.1 ^(b)
SA134	53	53	57	45	49	-	-	-	34	41	-	-	47.3	43.4 ^(b)
SA135	31	31	68	48	43	-	-	40	37	70	47	-	46.2	44.4
SA136	32	32	78	57	50	-	-	48	40	55	-	-	49.1	46.7 ^(b)
SA137	64	64	74	55	46	-	-	50	38	47	-	-	54.9	52.2 ^(b)
SA138	35	35	74	59	55	-	-	53	36	47	-	-	49.1	46.7 ^(b)
SA139	43	43	36	23	20	-	-	17	25	45	35	-	31.7	30.5
SA140	48	48	46	29	25	-	-	-	24	35	34	-	36.1	32.1 ^(b)
SA141	48	48		35	30	-	-	38	28	-	-	-	37.7	38.0 ^(b)

Notes: Exceedance of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

(a) See Appendix C for details on bias adjustment

(b) Results have been annualised due to data capture below 75%

- No results received for period or data received was corrupt

Table B.5 – NO₂ Monthly Diffusion Tube Results 2011

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (0.90) ^(a)
SA101	33	39	33	28	28	32	24	28	28	39	49	-	32.9	29.6
SA102	39	34	29	28	-	33	27	30	30	40	34	40	33.2	29.9
SA103	36	30	25	19	17	-	19	19	16	28	34	25	24.4	22.0
SA104	27	29	19	23	20	19	19	20	17	23	33	24	22.7	20.5
SA105	28	35	29	20	18	17	20	16	16	35	52	15	25.1	22.6
SA106	39	42	27	27	30	33	26	28	25	34	43	41	32.9	29.6
SA107	27	26	22	17	16	20	18	-	20	30	38	26	23.6	21.3
SA108	35	29	31	25	21	20	22	-	16	31	44	13	26.1	23.5
SA109	43	40	38	32	28	36	34	30	29	45	39	39	36.0	32.4
SA110	33	30	24	21	15	19	19	16	18	29	36	22	23.4	21.1
SA111	32	29	26	21	15	15	18	16	18	29	26	-	22.3	20.1
SA112	35	30	27	28	20	23	23	-	18	29	30	24	26.1	23.5
SA113	29	25	22	18	13	15	14	15	17	27	35	24	21.2	19.0
SA114	27	27	25	21	16	17	16	16	16	29	32	24	22.2	19.9
SA115	30	28	26	25	16	16	16	16	18	29	28	23	22.6	20.3
SA116	25	31	24	22	16	17	15	16	18	32	32	25	22.7	20.5
SA117	38	38	30	33	21	25	28	25	23	40	40	29	30.8	27.7
SA118	36	35	32	30	27	28	26	28	28	21	40	29	30.0	27.0
SA119	37	37	32	22	26	24	24	24	26	38	36	35	30.1	27.1
SA120	41	46	43	33	32	40	32	33	36	46	50	40	39.4	35.4
SA121	48	41	32	41	34	46	40	38	40	71	57	38	43.8	39.5
SA122	59	42	33	34	-	33	30	28	30	40	44	36	37.2	33.5
SA123	58	44	40	39	34	41	38	37	43	50	60	45	44.1	39.7
SA124	54	41	44	35	38	40	44	35	36	47	52	35	41.7	37.5
SA125	39	32	41	39	20	27	34	26	20	35	42	27	31.9	28.7
SA126	37	30	33	31	22	24	24	22	22	31	37	32	28.7	25.8

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (0.90) ^(a)
SA127	42	35	32	38	26	28	30	24	25	-	37	35	32.0	28.8
SA128	46	38	40	34	36	39	40	35	39	47	48	41	40.2	36.2
SA129	42	34	34	32	21	21	27	22	26	30	47	29	30.4	27.4
SA130	45	35	33	30	26	27	26	23	30	40	47	34	33.0	29.7
SA131	43	34	35	44	26	25	34	28	29	38	49	29	34.5	31.0
SA132	33	32	27	22	18	21	18	17	21	44	36	24	26.0	23.4
SA133	52	48	32	44	38	36	43	34	36	49	51	39	41.8	37.7
SA134	40	49	28	46	36	42	41	36	-	43	62	40	42.1	37.9
SA135	72	38	46	20	33	46	47	38	32	43	47	43	42.2	38.0
SA136	56	59	54	61	48	73	55	-	-	67	74	45	59.1	53.2
SA137	48	47	63	54	42	46	50	40	35	47	48	41	46.8	42.1
SA138	58	54	68	54	50	59	56	47	46	80	67	48	57.2	51.5
SA139	35	31	31	27	22	26	22	23	22	34	32	26	27.7	24.9
SA140	45	44	38	37	26	28	28	28	29	41	45	37	35.4	31.9
SA141	43	41	40	37	-	35	35	30	35	48	48	40	39.4	35.5

Notes: Exceedance of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

(a) See Appendix C for details on bias adjustment

- No results received for period or data received was corrupt

Table B.6– Short-Term to Long-Term Monitoring Data Adjustment (2015)

Site ID	Unadjusted Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$)	Annualisation Factor Reading New Town	Annualisation Factor Oxford St Ebbes	Annualisation Factor Hertsmere Borehamwood	Average Annualisation Factor	Annualised & Bias Adjusted (0.91) Concentration ($\mu\text{g}/\text{m}^3$)
SA117	20.1	0.977	1.010	0.994	0.994	18.1

Table B.7 – Short-Term to Long-Term Monitoring Data Adjustment (2014)

Site ID	Unadjusted Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$)	Annualisation Factor Reading New Town	Annualisation Factor Oxford St Ebbes	Annualisation Factor Hertsmere Borehamwood	Average Annualisation Factor	Annualised & Bias Adjusted (0.92) Concentration ($\mu\text{g}/\text{m}^3$)
SA101	41.0	0.916	0.878	0.846	0.880	33.2
SA102	33.4	0.990	0.955	0.932	0.959	29.4
SA108	21.9	1.008	1.007	1.057	1.024	20.7
SA114	31.7	1.002	0.947	0.939	0.963	28.0
SA115	31.8	0.917	0.844	0.821	0.861	25.1
SA116	31.5	0.974	0.909	0.914	0.932	27.0
SA117	26.9	1.189	1.228	1.108	1.175	29.1
SA122	31.2	1.022	1.041	1.065	1.043	29.9
SA131	37.8	0.959	0.960	0.977	0.965	33.5
SA132	24.0	1.032	1.049	1.004	1.028	22.7
SA133	36.0	0.956	0.931	0.909	0.932	30.9

Table B.8 – Short-Term to Long-Term Monitoring Data Adjustment (2013)

Site ID	Unadjusted Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$)	Annualisation Factor Reading New Town	Annualisation Factor Oxford St Ebbes	Annualisation Factor Haringey Priory Park South	Average Annualisation Factor	Annualised & Bias Adjusted (0.95) Concentration ($\mu\text{g}/\text{m}^3$)
SA101	37.9	0.970	0.944	0.922	0.945	34.0
SA102	28.7	1.035	1.038	1.014	1.029	28.0
SA103	21.6	1.087	1.100	1.026	1.071	21.9
SA105	21.3	1.004	0.992	0.971	0.989	20.0
SA107	23.7	1.087	1.100	1.026	1.071	24.2
SA108	18.2	1.104	1.113	1.085	1.101	19.0
SA109	33.6	1.056	1.051	0.978	1.028	32.8
SA110	19.9	1.087	1.100	1.026	1.071	20.2
SA111	21.5	1.013	1.003	1.017	1.011	20.7
SA112	26.0	0.993	0.990	0.981	0.988	24.4
SA113	20.8	0.896	0.868	0.908	0.890	17.6
SA114	21.4	1.035	1.038	1.014	1.029	20.9
SA115	21.8	1.035	1.038	1.014	1.029	21.3
SA116	22.9	1.035	1.038	1.014	1.029	22.4
SA117	16.8	1.365	1.632	1.591	1.529	24.5
SA120	38.2	0.967	0.943	0.921	0.944	34.2
SA121	49.2	0.904	0.865	0.866	0.878	41.1
SA122	34.6	1.029	1.013	0.983	1.009	33.1
SA123	38.9	0.947	0.934	0.969	0.950	35.1
SA124	39.7	1.035	1.038	1.014	1.029	38.8
SA125	38.7	0.945	0.929	0.966	0.947	34.8
SA127	33.7	0.980	0.964	0.964	0.969	31.0
SA130	30.3	0.910	0.906	1.052	0.956	27.6
SA132	33.6	0.779	0.722	0.845	0.782	25.0
SA133	54.2	0.948	0.939	0.956	0.948	48.8
SA135	39.5	1.087	1.100	1.026	1.071	40.2
SA136	63.8	1.050	1.054	1.012	1.038	62.9
SA138	50.8	1.013	1.003	1.017	1.011	48.8
SA139	27.2	0.947	0.923	0.920	0.930	24.0
SA140	30.7	1.035	1.038	1.014	1.029	30.0
SA141	34.0	0.925	0.912	0.905	0.914	29.6

Table B.9 – Short-Term to Long-Term Monitoring Data Adjustment (2012)

Site ID	Unadjusted Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$)	Annualisation Factor Reading New Town	Annualisation Factor Harrow Stanmore	Annualisation Factor Brentwood Town Hall	Average Annualisation Factor	Annualised & Bias Adjusted (0.96) Concentration ($\mu\text{g}/\text{m}^3$)
SA101	29.6	1.046	1.074	1.006	1.042	29.6
SA102	37.9	0.887	0.900	0.938	0.908	33.0
SA103	25.9	0.887	0.900	0.938	0.908	22.6
SA106	34.6	0.942	0.936	0.966	0.948	31.5
SA108	24.3	0.965	1.002	1.006	0.991	23.2
SA111	24.7	0.965	1.002	1.006	0.991	23.5
SA113	24.2	0.887	0.900	0.938	0.908	21.1
SA117	33.7	0.916	0.902	0.934	0.917	29.7
SA120	36.1	0.911	0.922	0.947	0.926	32.1
SA124	46.3	0.930	0.940	0.968	0.946	42.0
SA127	35.2	0.916	0.902	0.934	0.917	31.0
SA130	32.8	0.965	1.002	1.006	0.991	31.3
SA132	26.3	0.923	0.964	0.979	0.956	24.2
SA133	47.0	0.923	0.964	0.979	0.956	43.1
SA134	47.3	0.923	0.964	0.979	0.956	43.4
SA136	49.1	0.965	1.002	1.006	0.991	46.7
SA137	54.9	0.965	1.002	1.006	0.991	52.2
SA138	49.1	0.965	1.002	1.006	0.991	46.7
SA140	36.1	0.911	0.922	0.947	0.926	32.1
SA141	37.7	1.026	1.074	1.053	1.051	38.0

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

Sources of Pollution

St Albans City and District Council have identified the following new or significant changes to sources as described in Chapter 7, Section 1 of the Technical Guidance LAQM.TG(16).

In 2014 the Secretary of State granted outline planning permission for a Strategic Rail Freight Interchange (SRFI) on the Radlett Airfield site, Park Street, St Albans. As part of the application (5/2009/0708) an Environmental Impact Assessment was completed with Chapter 6 assessing the impact of the proposed scheme upon local air quality. The Design Manual for Roads and Bridges (DMRB) model was used within the EIA to assess the impact of development upon the local road network. The conclusions of the assessment stated that all AQS objectives for NO_2 and PM_{10} would be met with or without the proposed scheme, the impact of emissions from construction vehicles would be negligible and it would be necessary to implement a number of mitigation measures to minimise the impact from construction activities.

In response to the EIA Chapter, a modelling study was commissioned by the Council to assess the impact of changing volumes of traffic upon the local area. The DMRB was again used within this assessment, and a slight increase in NO_2 concentrations was predicted from the proposed development. A number of mitigation measures are presented within the assessment to reduce the impact of vehicle pollutants arising due to the proposed development upon the local area.

There was one planning application received within 2015 that was identified as having the potential to effect local air quality within the District, a development for 100 new dwellings with associated access and facilities located at the Building Research Establishment (BRE), Bucknalls Lane (5/2013/0406). An Air Quality Assessment has been completed for the proposed development using dispersion modelling to quantify the overall impacts upon NO_2 and PM_{10} concentrations. From the completed modelling it was concluded that concentrations of both NO_2 and PM_{10} would remain well below the AQS objectives across the entire area outlined for development.

Diffusion Tube Bias Adjustment Factors

It is stated within the LAQM section of <https://uk-air.defra.gov.uk/> that diffusion tubes are affected by several sources of interference which can cause substantial under or overestimation (bias) compared to the chemiluminescent analyser (the reference method). This can prove to be a problem in any situation where diffusion tube results are compared with the AQS objectives. As a result, local authorities are required to quantify the bias of their diffusion tube measurements and apply an appropriate bias adjustment factor if required.

The bias adjustment factor, which is an estimate of the difference between diffusion tube concentration and continuous monitoring, the latter assumed to be a more accurate method of monitoring has been used to factor the results. LAQM.TG(16) provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x / NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

With regard to the application of a bias adjustment factor for diffusion tubes, the Defra Technical Guidance LAQM.TG(16) and the LAQM Helpdesk⁴ recommend the use of a local bias adjustment factor where available and relevant to diffusion tube sites.

St Albans City and District Council does not operate any continuous monitors within the District and therefore a co-location study is not available to derive a local bias factor, thus the national bias adjustment factor spreadsheet⁵ has been used.

Diffusion tube data for St Albans City and District Council is supplied and analysed by Gradko International Ltd, the tubes were prepared using the 20% TEA in water preparation method. The 2015 national bias adjustment factor for Gradko 20% TEA in water is 0.91 (based on 29 studies, version 03/16) as derived from the national bias adjustment factor spreadsheet.

⁴ Laqm.defra.gov.uk

⁵ National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/16 published in March 2016

For previous years data (2008 to 2014) presented in Table A.2 the bias adjustment factors have been taken from previous LAQM reports completed by St Albans City and District Council and the national bias adjustment factor spreadsheet. The bias adjustment factors used for 2011 to 2015 are shown in Table C.1.

Table C.1 – Bias Adjustment Factors

Year of Data	Bias Adjustment Factor
2011	0.90 – National factor
2012	0.96 – National factor
2013	0.95 – National factor
2014	0.92 – National factor
2015	0.91 – National factor

Short-term to Long-term Data Adjustment

For the diffusion tube data 2011 – 2015, annualisation was required at a number of sites; 1 site in 2015, 11 sites in 2014, 31 sites in 2013 and 20 in 2012. This has been completed in line with Defra Technical Guidance LAQM.TG(16) Box 7.8 and full working details are provided in Tables B.6, 7, 8 and 9.

In completing the annualisation procedure, data has been taken from a number of automatic monitoring stations that are within 50 miles of St Albans; Reading New Town, Oxford St Ebbes, Hertsmere Borehamwood, Haringey Priory Park South, Harrow Stanmore and Brentwood Town Hall. These sites form part of the national Automatic Urban and Rural Network (AURN) network and are background monitoring sites, as such they are not subjected to localised concentration effects that may occur at roadside monitoring sites.

QA / QC of Diffusion Tube Monitoring

The diffusion tubes for the years 2011 - 2015 were supplied and analysed by Gradko International Ltd, the tubes were prepared using the 20% TEA in water preparation method. All results have been bias adjusted before being presented in Table A.2. Annualisation was required at a number of monitoring locations between 2011 – 2015 due to there being data capture being lower than 75%.

Gradko International Ltd is a UKAS accredited laboratory and participates in laboratory performance and proficiency testing schemes. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NQ concentrations reported are of a high calibre. The laboratory follows the procedures set out in the Harmonisation Practical Guidance and participates in the AIR

proficiency-testing (AIR-PT) scheme. Previously to the Air-PT scheme, Gradko participated in the Workplace Analysis Scheme for Proficiency (WASP) for NO₂ diffusion tube analysis.

Defra and the Devolved Administrations advise that diffusion tubes used for LAQM should be obtained from laboratories that have demonstrated satisfactory performance in the AIR-PT scheme. Laboratory performance in the AIR-PT is also assessed, this is completed by the National Physical Laboratory (NPL), alongside laboratory data from the monthly NPL Field Inter-Comparison Exercise carried out at for Gradko at Marylebone Road, central London. A laboratory is assessed and given a 'z' score, a score of $\leq \pm 2$ or less indicates satisfactory laboratory performance.

Gradko International Ltd's performance for 2015 is covered by rounds AR006, AR007, AR009 and AR010 of the AIR-PT scheme, for each round 100% of the laboratories results were deemed to be satisfactory based upon a z score of $\leq \pm 2$. In 2015, the tube precision for NO₂ Annual Field Inter-Comparison for Gradko International using the 20% TEA in water method was 'good' for the results of 24 out of 29 participating local authorities.

For the years 2011 – 2015 Gradko has had 100% of their laboratory results deemed satisfactory except in WASP R115 where the results were 37.5%.

Appendix D: Maps of Monitoring Locations

Figure D.1 – Map of Current Air Quality Management Area Boundaries – St Albans



Figure D.2 – Map of Current Air Quality Management Area Boundaries – Beechtree Cottages

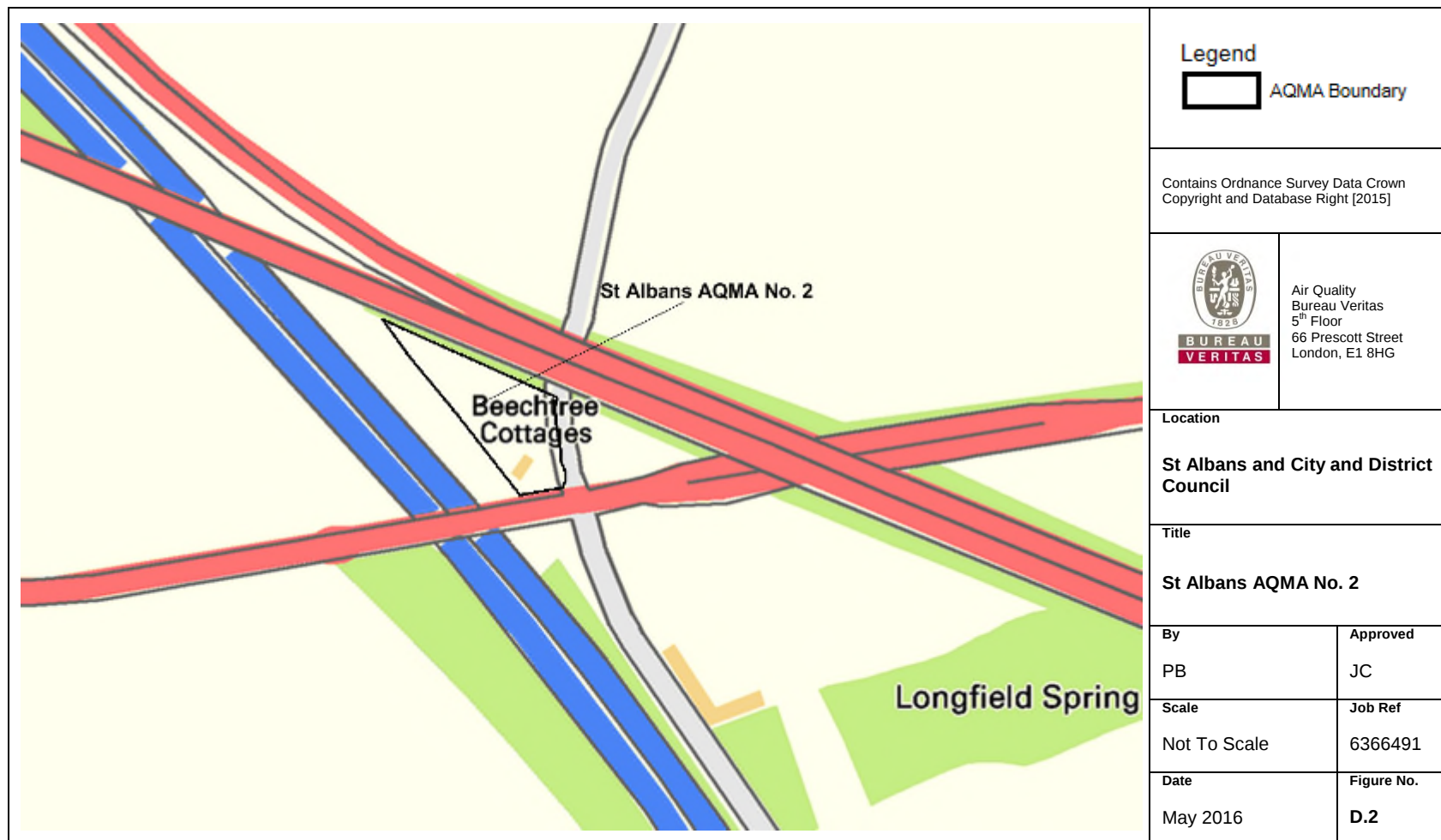


Figure D.3 – Map of Current Air Quality Management Area Boundaries - Frogmore



Figure D.4 – Map of Diffusion Tube Locations – St Albans



Figure D.5 – Map of Diffusion Tube Locations – Redbourne

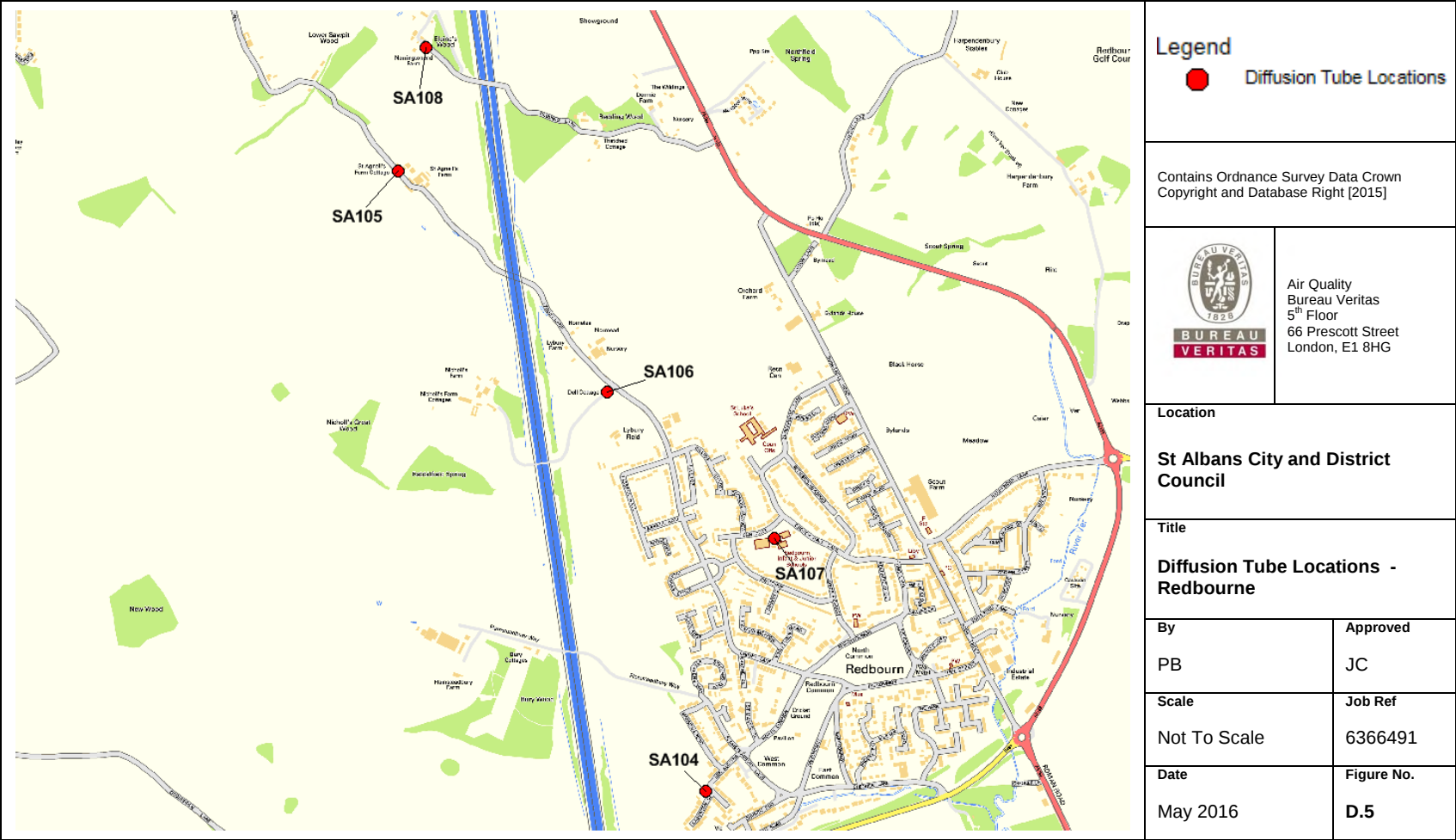


Figure D.6 – Map of Diffusion Tube Locations – Harpenden

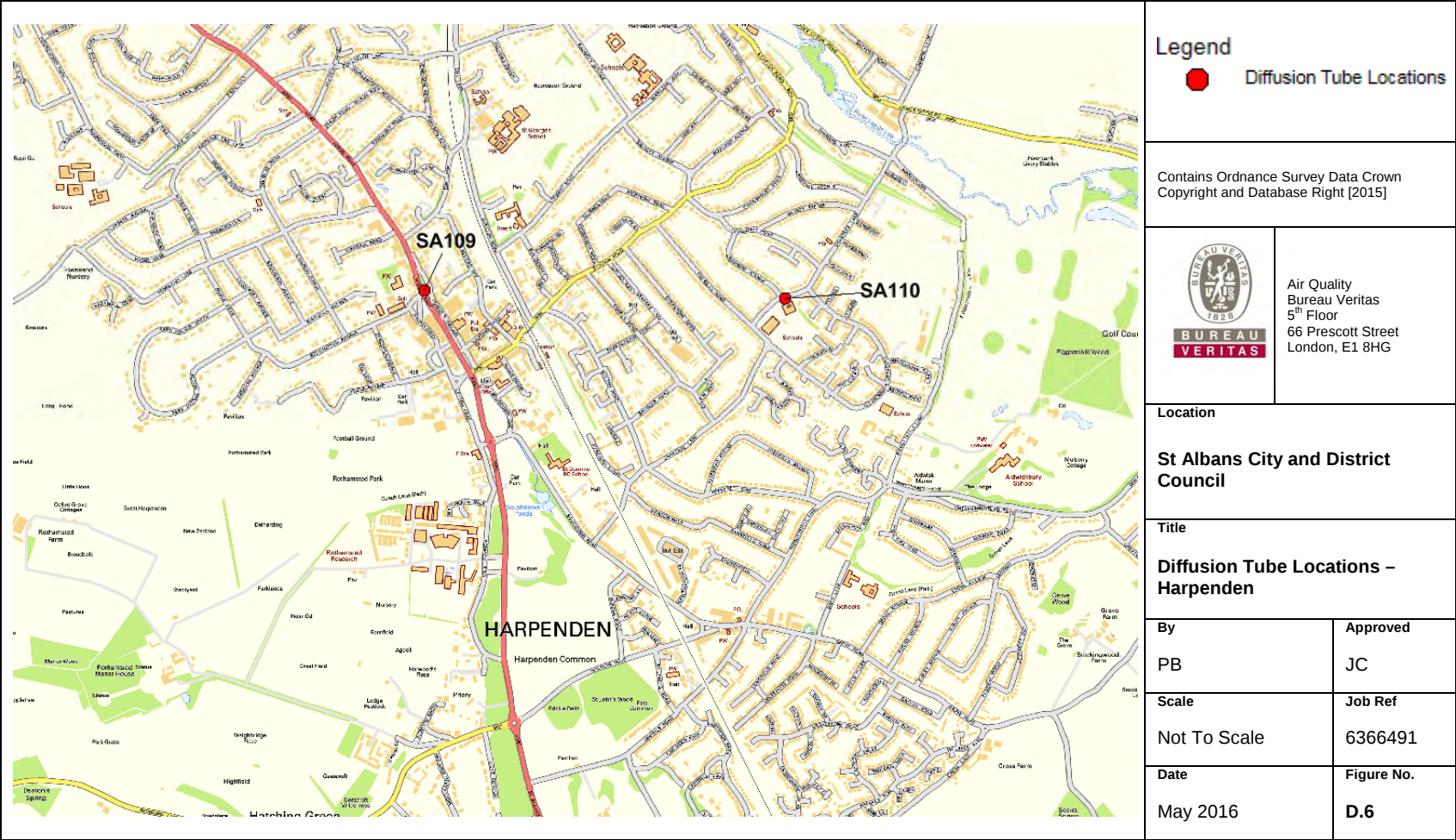


Figure D.7 – Map of Diffusion Tube Locations – Wheathampstead



Figure D.8 – Map of Diffusion Tube Locations – Marshalswick



Figure D.9 – Map of Diffusion Tube Locations – London Colney

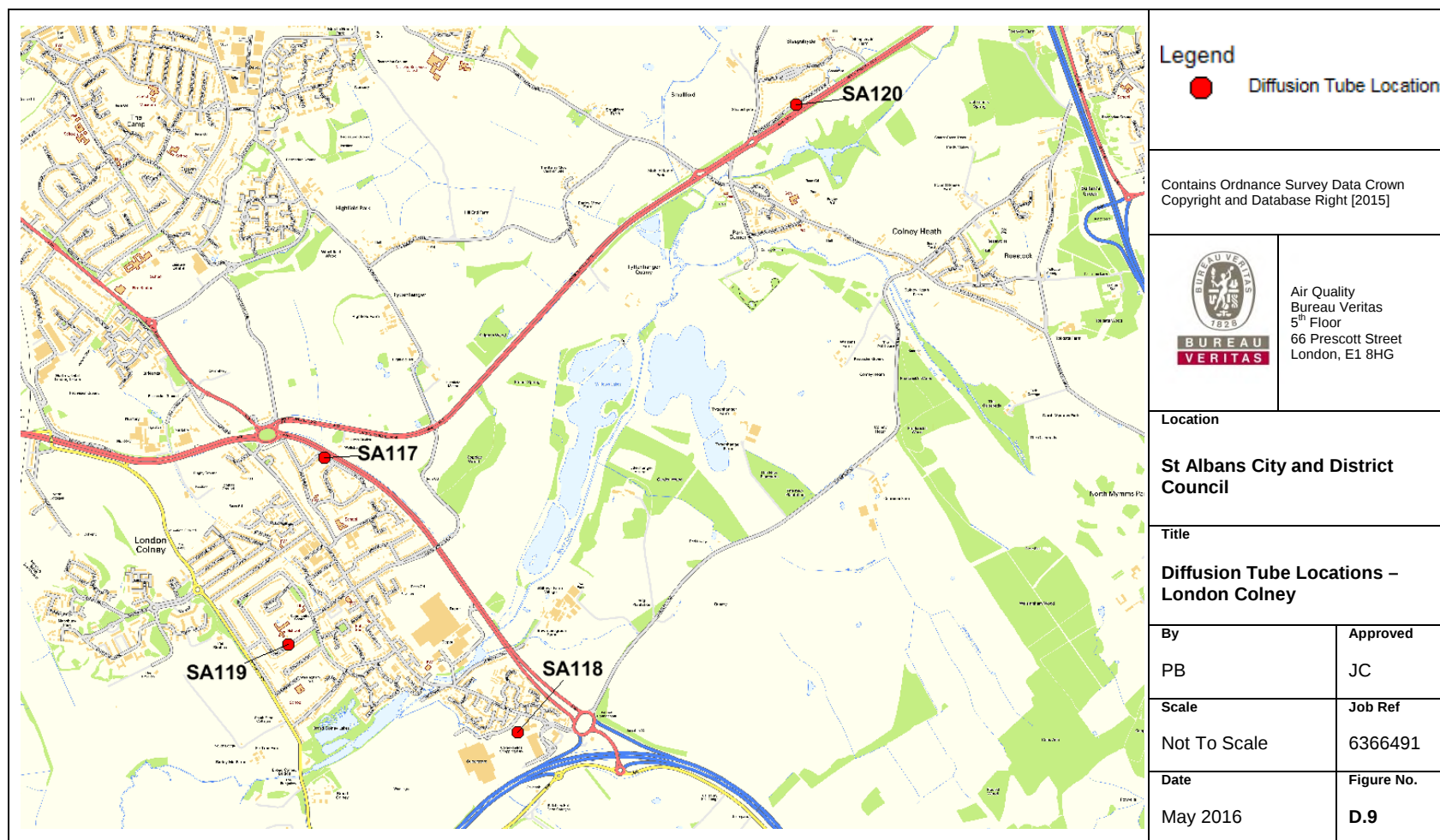


Figure D.10 – Map of Diffusion Tube Locations – Chiswell Green/Park Street

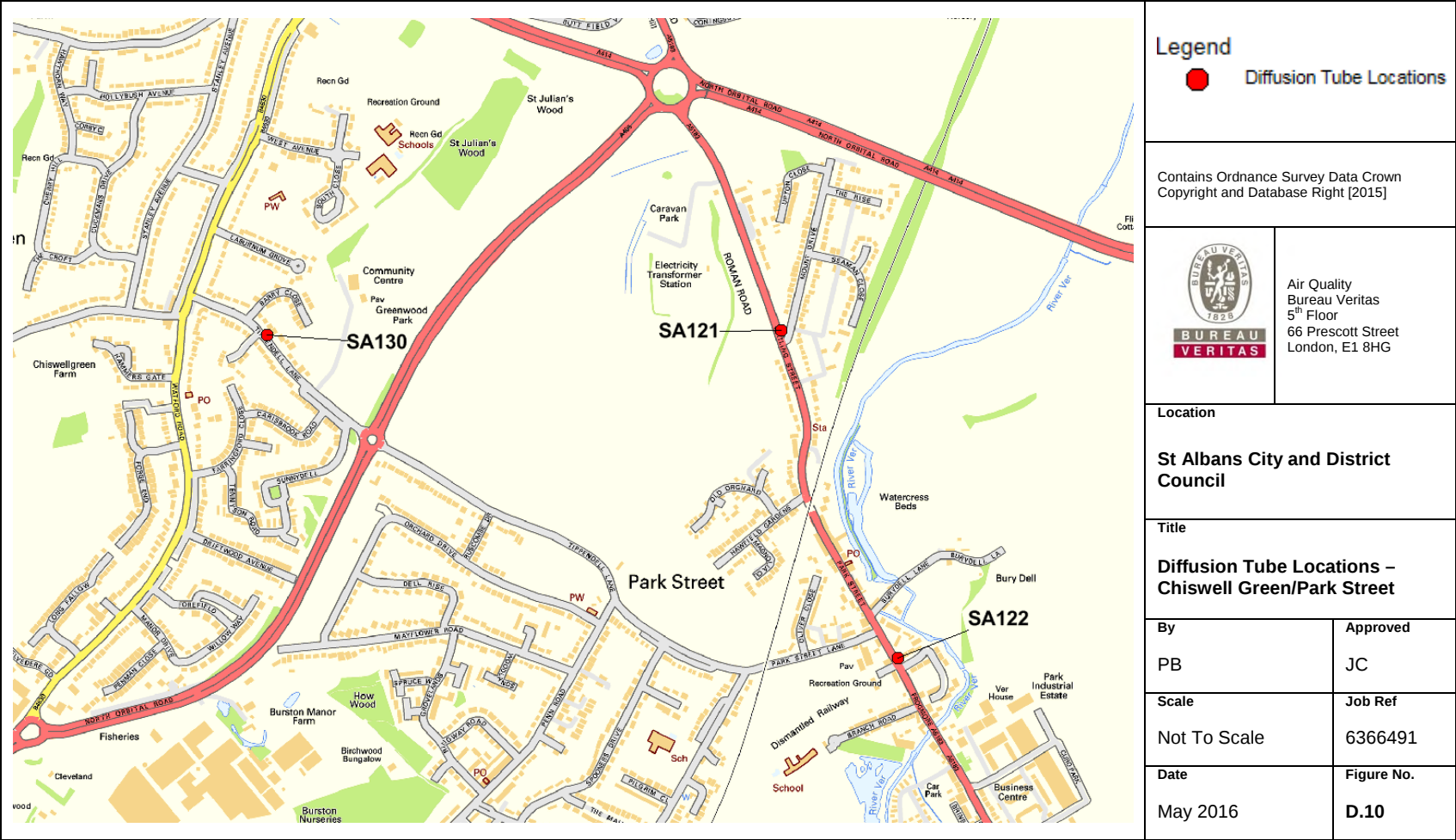


Figure D.11 – Map of Diffusion Tube Locations – Frogmore



Figure D.12 – Map of Diffusion Tube Locations – Bricket Wood



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁶	
	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

⁶ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

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
AQS	Air Quality Standards
ASR	Air Quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
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

References

- Local Air Quality Management Technical Guidance LAQM.TG(16). 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.PG(16). Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- NO₂ Fall off With Distance Tool, available at <http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>
- National Diffusion Tube Bias Adjustment Spreadsheet, version 03/16 published in March 2016.
- [http://laqm.defra.gov.uk/documents/LAQM-AIR-PT-Rounds-1-12-\(April-2014-February-2016\)-NO2-report.pdf](http://laqm.defra.gov.uk/documents/LAQM-AIR-PT-Rounds-1-12-(April-2014-February-2016)-NO2-report.pdf)
- St Albans City and District Council 2011 Progress Report.
- Air Quality Action Plan for St Albans City and District Council, 2003.
- Action Plan for the St Albans City and District Council Air Quality Management Area Orders 2004/2009, Update following meeting – July 2010.
- Hertfordshire County Council, Local Transport Plan 3, 2011-2031.
- St Albans City and District Council Climate Change Action Plan 2016.
- St Albans City and District Council Green Travel Plan, July 2012.
- Land at Radlett Aerodrome, Helioslough Ltd. Environmental Statement Chapter III, Chapter 6 Air Quality. Air Quality Consultants Ltd, March 2009.
- St Albans Rail Freight Air Quality Assessment: Briefing Note. Bureau Veritas, September 2009.