# St Albans City and District Council
# Annual Status Report 2016

Bureau Veritas

*December 2016*

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## Document Control Sheet

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# 2016 Air Quality Annual Status Report (ASR)

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

December, 2016

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|---|---|
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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 billion[3].

The main source of air pollution within St Albans City and District is vehicle emissions, the main pollutants of concern being Nitrogen Dioxide ($NO_2$,) and airborne particulate matter ($PM_{10}$ 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 $NO_2$ 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 $NO_2$. 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 $NO_2$ monitoring network within St Albans City and District is in place to constantly monitor $NO_2$ 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 $NO_2$ 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/carsharing.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 $NO_2$ and $PM_{10}$ 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 $CO_2$ 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 where 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 $NO_2$ 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 $NO_2$ 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 $NO_x$ concentrations at various locations in the AQMA.

A Freight Management Plan (FMP) has been proposed to be completed to target reductions in $NO_x$ / $NO_2$ 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 $NO_2$ 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 $NO_2$ 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, $NO_2$ diffusion tubes are used to monitor annual mean $NO_2$ concentrations. This methodology predicts the $NO_2$ 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 $NO_2$ 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 $NO_2$, $PM_{10}$ 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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## List of Tables

# 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 $NO_2$ 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 $NO_2$ 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.<br><br>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 |

| 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 DfTs 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 |

| 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.<br><br>Some projects implemented by the Partnership include:<br>• Creation of Abbey Line trail.<br>• Development of walking maps and information leaflets.<br>• Implementing the Abbey Line Gateway feature project at St Albans Abbey Station.<br>• Improvements to lighting of path along public footpath to Garston Station.<br>• 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 |

| 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 |

| 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;<br>• Implementation of the St Albans Green Ring route project.<br>• Production of revised St Albans Cycling maps.<br>• Construction of cycle and walking paths in Verulamium Park.<br>• Provision of secure cycle parking racks within the city centre and at rail stations.<br>• Upgrading and resurfacing of the Alban Way Leisure path.<br>• Installation of Trixie mirrors at key junctions within the city centre.<br>• Improved access to Nickey Line in Harpenden.<br>• New link from Alban Way to St Albans City Rail station.<br>• Provision of way finding monoliths within the city centre. | Continuous |

| 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.<br><br>The frequency of checks is dependent upon the age of the vehicles;<br>1 – 5 years old; annually<br>5 – 7 years old; every 6 months<br>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 $NO_2$ also impact the emissions of $PM_{10}$ 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 $NO_2$ 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 $NO_x$ / $NO_2$ 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 $NO_2$ 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 ($NO_2$)

Table A.3 in Appendix A compares the ratified and adjusted monitored $NO_2$ annual mean concentrations for the past 8 years with the air quality objective of 40µg/m$^3$.

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 exceeedences (annualised and bias adjusted) that were recorded for 2015. During 2015 there were two exceedances of the AQS annual mean objective for $NO_2$, 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 $NO_2$ 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 $NO_2$ 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 meteological conditions experienced within the monitoring period (especially wind speed and direction).

Defra guidance states that exceedances of the $NO_2$ 1-hour objective are unlikely to occur where the annual mean concentration is below 60µg/m$^3$. All of the 2015 annual mean $NO_2$ concentrations recorded are below 60µg/m$^3$ therefore it can be considered as per Defra guidance that there were no exceedances of the AQS 1-hour objective for $NO_2$. In previous years at location SA136 the annual mean $NO_2$ concentration has been recorded at 60µg/m$^3$ 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 $NO_2$ at the individual monitoring locations (not distance corrected). All monitoring sites except from SA139 have shown an overall decrease in annual mean $NO_2$ 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

locations are outside of the existing AQMAs. It is recommended that the current $NO_2$ 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 $NO_2$. The predominant source of $NO_2$ 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 $NO_2$ concentrations.

Monitoring of $NO_2$ 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 $NO_2$ (40 µg/m$^3$) 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/m$^3$ at any of the monitoring locations, therefore as per Defra guidance it is unlikely that the $NO_2$ 1-hour objective of 200µg/m$^3$ was exceeded at any location.

$NO_2$ 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 $NO_2$ 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/m$^3$) at

this location and there has been an increase in concentration both in 2014 (26 µg/m$^3$), and 2015 (28.5 µg/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 |

| 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 |

| 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 $NO_2$ Monitoring Results

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2015 (%) (2) | $NO_2$ Annual Mean Concentration ($\mu g/m^3$) (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 ($\mu g/m^3$) (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 $NO_2$ 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) 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 $NO_2$ 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 ($\mu g/m^3$) | Distance Corrected 2015 Annual Mean Concentration ($\mu g/m^3$) |
|---|---|---|---|---|---|---|
| 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 $NO_2$ Distance from Road Calculator for SA137

This calculator allows you to predict the annual mean $NO_2$ 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.

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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 $\mu g/m^3$)? | (Note 2) | 19.43 | $\mu g/m^3$ |
| Step 4 | What is your measured annual mean $NO_2$ concentration (in $\mu g/m^3$)? | (Note 2) | 40.24 | $\mu g/m^3$ |
| Result | The predicted annual mean $NO_2$ concentration (in $\mu g/m^3$) at your receptor | (Note 3) | 35.1 | $\mu g/m^3$ |

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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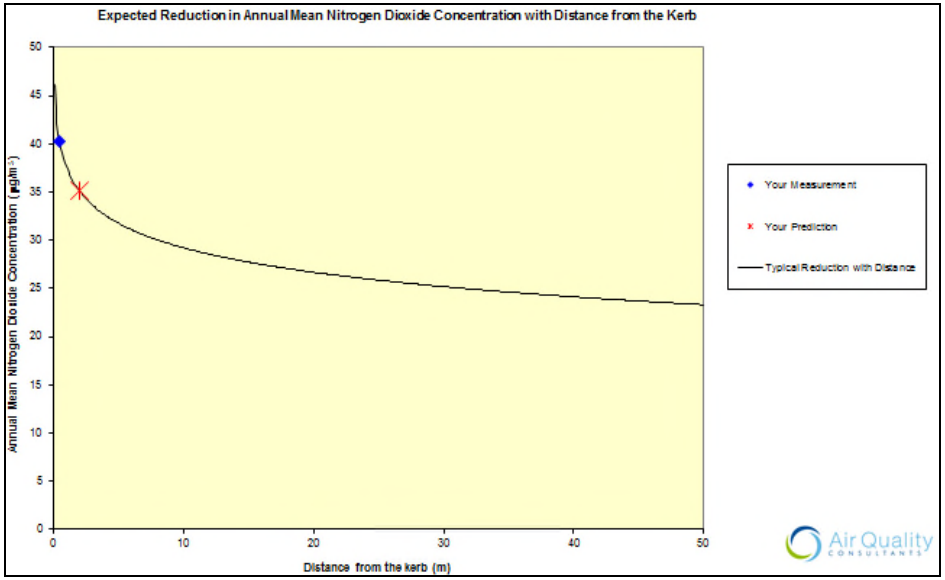

## Figure A.2 – Outputs from the $NO_2$ Distance from Road Calculator for SA138

This calculator allows you to predict the annual mean $NO_2$ 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.

Air Quality CONSULTANTS

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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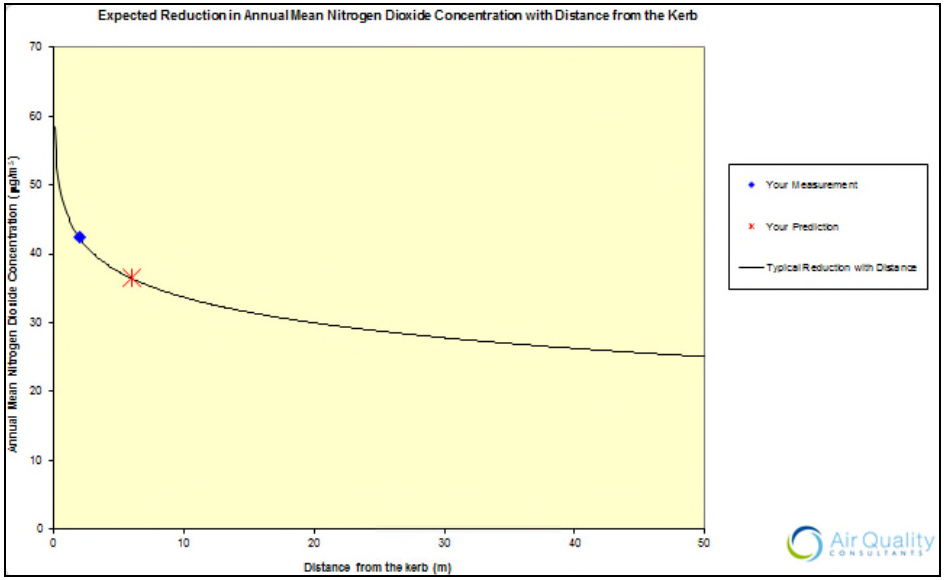


**Figure A.3 – Trends in Annual Mean $NO_2$ Concentrations Measured at Diffusion Tube Monitoring Sites 1**

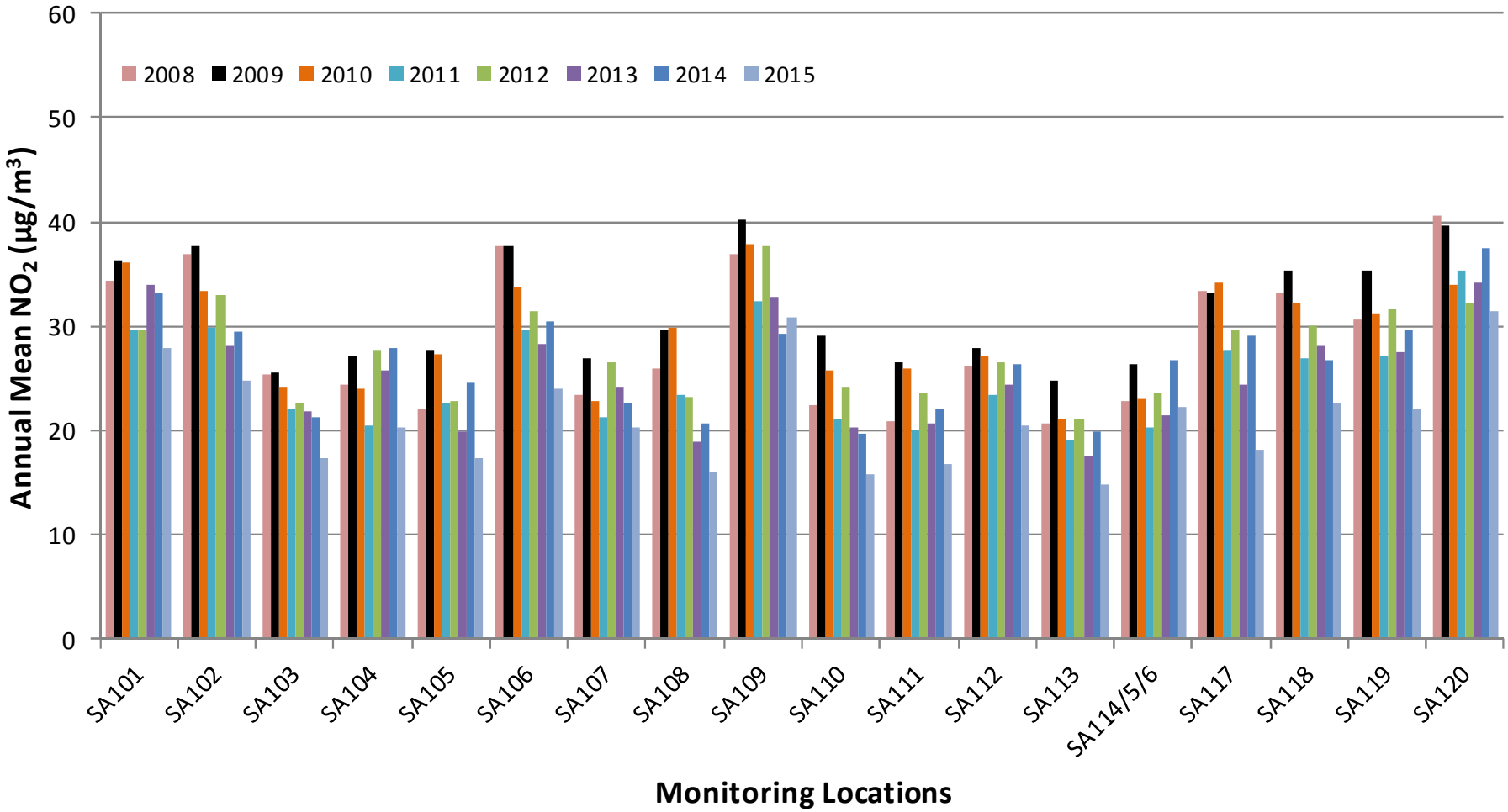
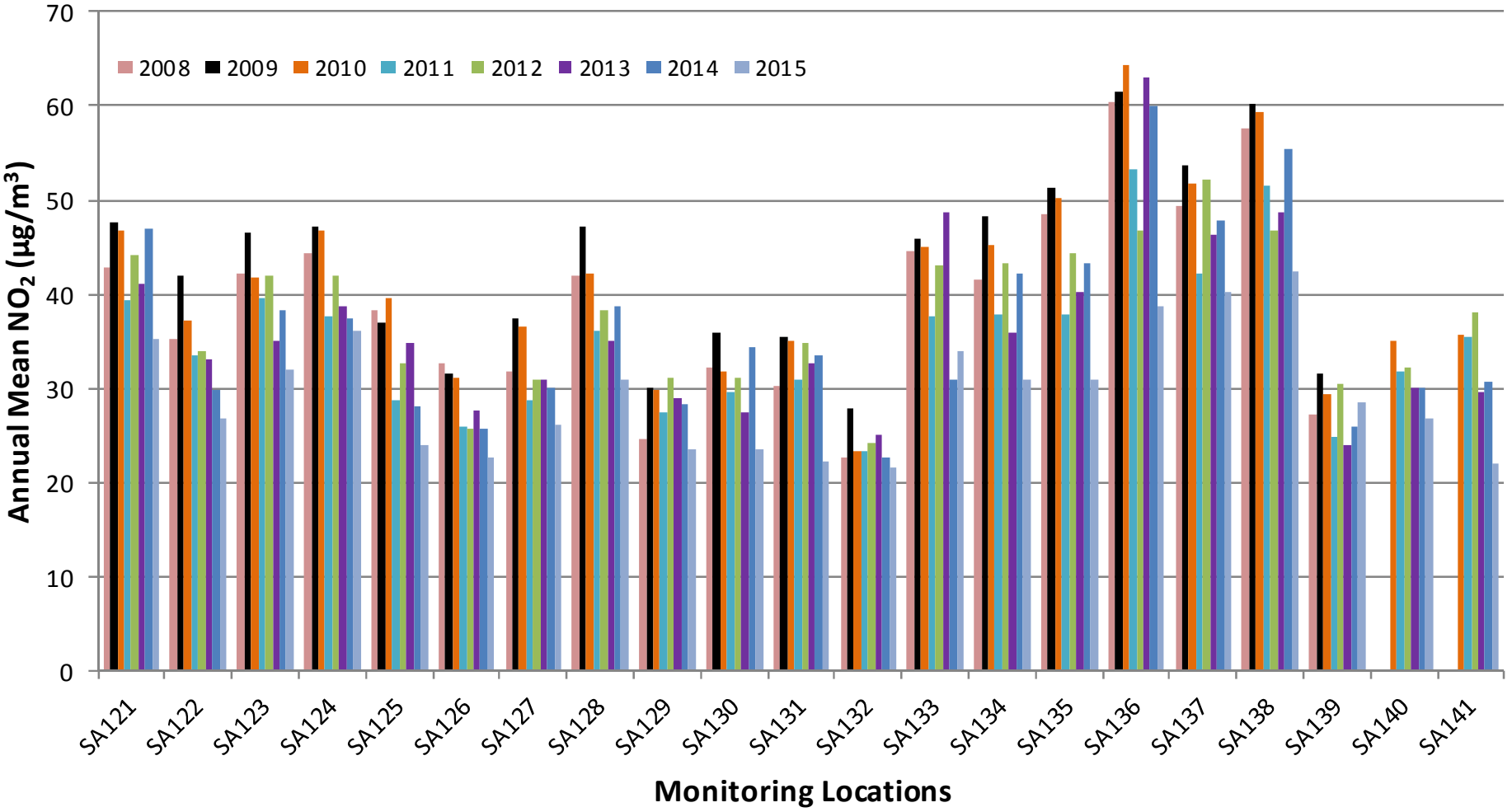


**Figure A.4 – Trends in Annual Mean $NO_2$ Concentrations Measured at Diffusion Tube Monitoring Sites 2**



# Appendix B: Full Monthly Diffusion Tube Results for 2015

## Table B.1 – $NO_2$ Monthly Diffusion Tube Results 2015

| Site ID | $NO_2$ Mean Concentrations ($\mu g/m^3$) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean | |
| | | | | | | | | | | | | | Raw Data | Bias Adjusted (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 $NO_2$ annual mean objective of 40µg/m$^3$ 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 – $NO_2$ 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 ($\mu g/m^3$) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | **60.0** |
| 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 $NO_2$ annual mean objective of $40\mu g/m^3$ are shown in **bold**.

$NO_2$ annual means exceeding $60\mu g/m^3$, indicating a potential exceedance of the $NO_2$ 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 – $NO_2$ 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 | **<u>62.9</u>**[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 $NO_2$ annual mean objective of 40µg/m$^3$ are shown in **bold**.

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

(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 – $NO_2$ Monthly Diffusion Tube Results 2012

| Site ID | $NO_2$ Mean Concentrations ($\mu g/m^3$) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 $NO_2$ annual mean objective of 40µg/m$^3$ 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 – $NO_2$ 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 $NO_2$ annual mean objective of 40µg/m$^3$ 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 (µg/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 (µg/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 (µg/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 (µg/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 (µg/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 (µg/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 (µg/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 (µg/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 Sectary 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 $NO_x$ / $NO_2$ 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 Helpdesk[4] 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 spreadsheet[5] 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 $NO_2$ 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 $NO_2$ 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 ≤ ± 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 ≤ ± 2. In 2015, the tube precision for $NO_2$ 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


Legend

AQMA Boundary



Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

| | |
|---|---|
| **Location** | **St Albans and City and District Council** |
| **Title** | **St Albans AQMA No. 1** |
| **By** PB | **Approved** JC |
| **Scale** Not To Scale | **Job Ref** 6366491 |
| **Date** December 2016 | **Figure No.** **D.1** |

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


Legend

AQMA Boundary



Air Quality
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London, E1 8HG

| | |
|---|---|
| **Location** | **St Albans and City and District Council** |
| **Title** | **St Albans AQMA No. 2** |
| **By** PB | **Approved** JC |
| **Scale** Not To Scale | **Job Ref** 6366491 |
| **Date** May 2016 | **Figure No.** **D.2** |

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


Legend

AQMA Boundary



Air Quality
Bureau Veritas
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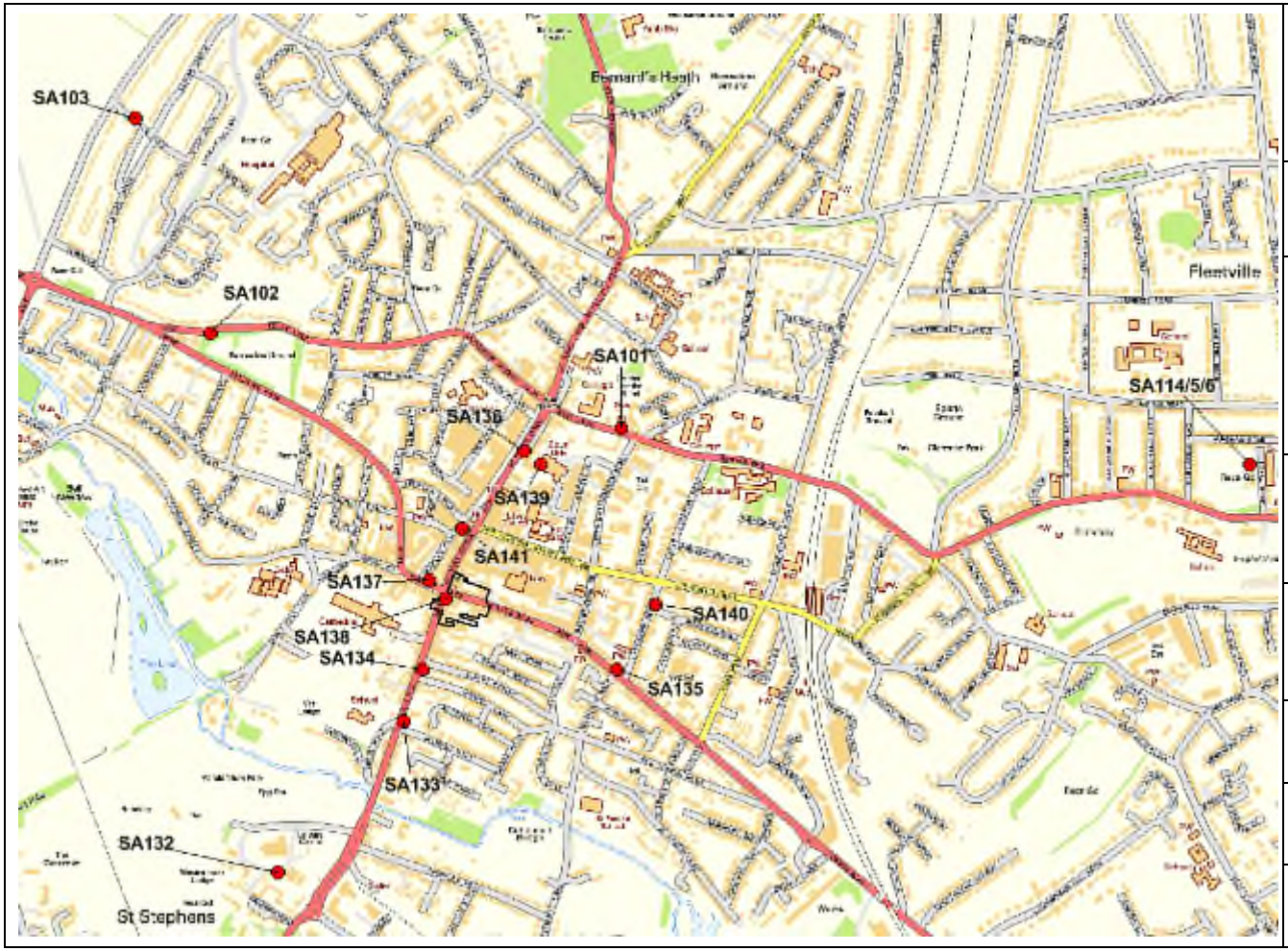
66 Prescott Street
London, E1 8HG

| | |
|---|---|
| **Location** | **St Albans and City and District Council** |
| **Title** | **St Albans AQMA No. 7** |
| **By** PB | **Approved** JC |
| **Scale** Not To Scale | **Job Ref** 6366491 |
| **Date** May 2016 | **Figure No.** **D.3** |

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




Legend

Diffusion Tube Locations

AQMA Boundary



Air Quality
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66 Prescott Street
London, E1 8HG

**Location**

**St Albans City and District Council**

**Title**

**Diffusion Tube Locations – St Albans**

| By | Approved |
|---|---|
| PB | JC |
| **Scale** | **Job Ref** |
| Not To Scale | 6366491 |
| **Date** | **Figure No.** |
| December 2016 | **D.4** |

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


Legend

Diffusion Tube Locations



Air Quality
Bureau Veritas
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66 Prescott Street
London, E1 8HG

**Location**

**St Albans City and District Council**

**Title**

**Diffusion Tube Locations - Redbourne**

| By | Approved |
|---|---|
| PB | JC |
| **Scale** | **Job Ref** |
| Not To Scale | 6366491 |
| **Date** | **Figure No.** |
| May 2016 | **D.5** |

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


Legend

Diffusion Tube Locations



Air Quality
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66 Prescott Street
London, E1 8HG

**Location**

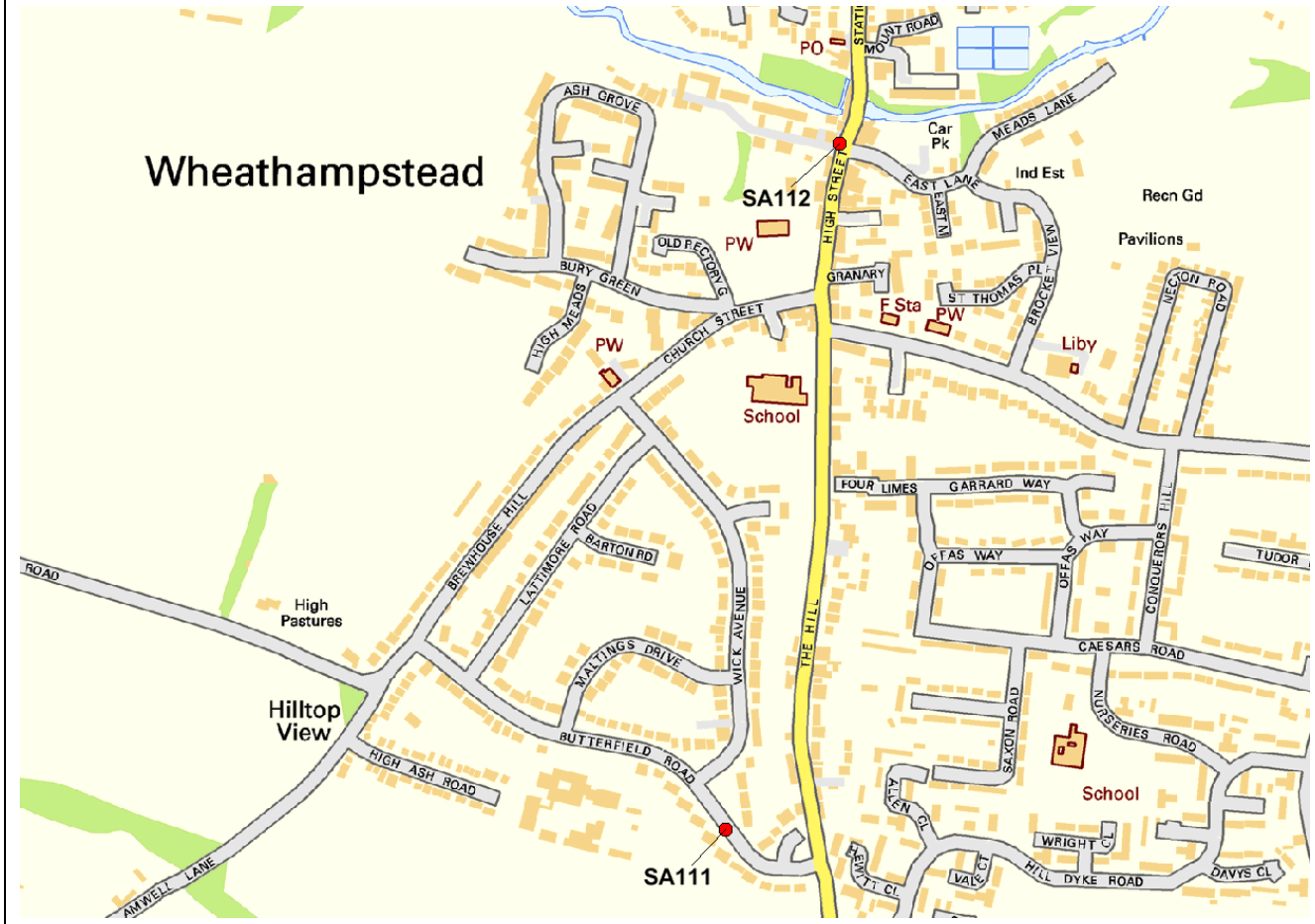
**St Albans City and District Council**

**Title**

**Diffusion Tube Locations – Harpenden**

| By | Approved |
|---|---|
| PB | JC |
| **Scale** | **Job Ref** |
| Not To Scale | 6366491 |
| **Date** | **Figure No.** |
| May 2016 | **D.6** |

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




Legend

Diffusion Tube Locations



Air Quality
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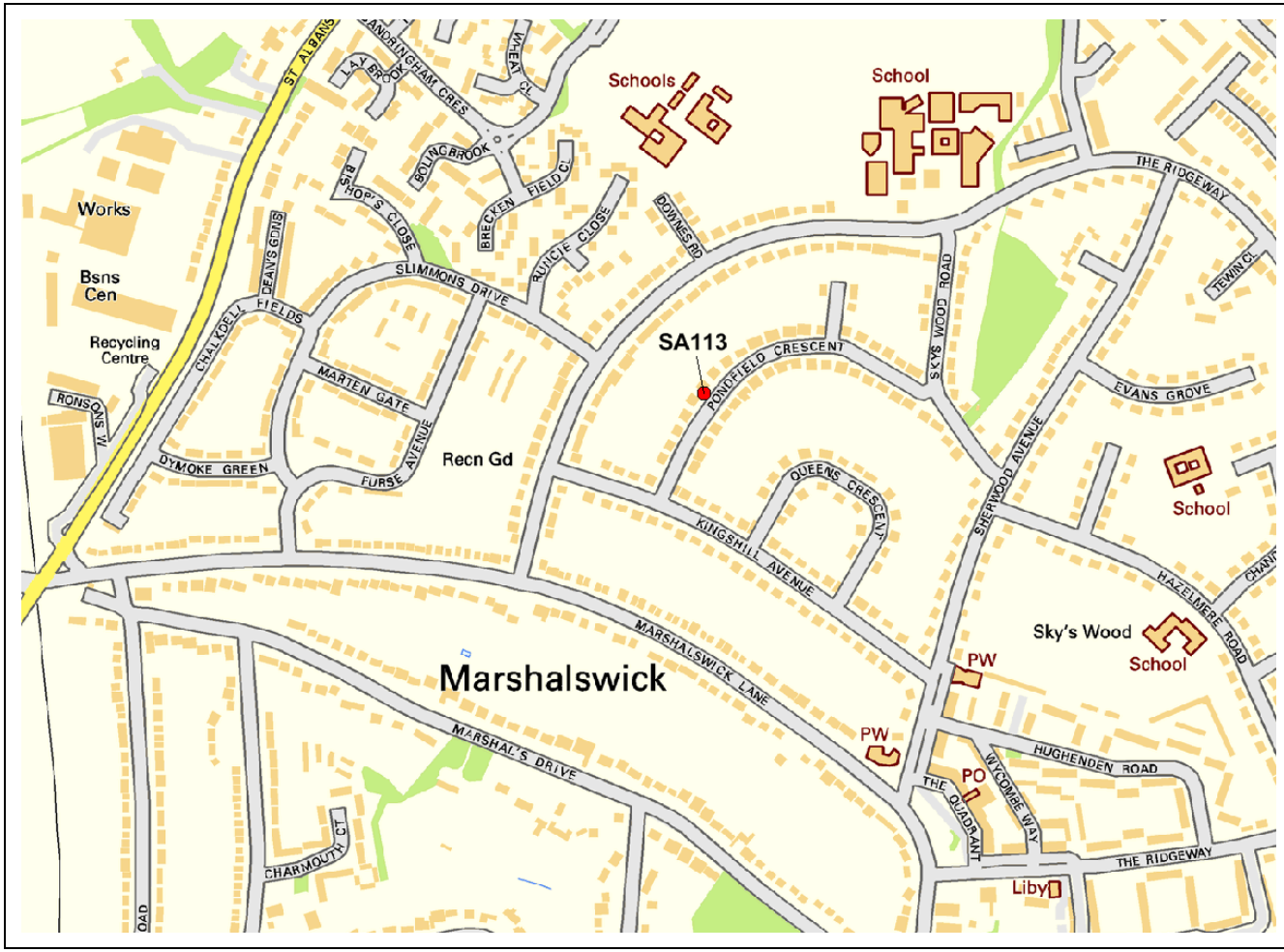
London, E1 8HG

| | |
|---|---|
| **Location** | **St Albans City and District Council** |
| **Title** | **Diffusion Tube Locations – Wheathampstead** |
| **By** PB | **Approved** JC |
| **Scale** Not To Scale | **Job Ref** 6366491 |
| **Date** May 2016 | **Figure No.** **D.7** |

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




Legend

Diffusion Tube Locations



Air Quality
Bureau Veritas
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London, E1 8HG

| | |
|---|---|
| **Location** | **St Albans City and District Council** |
| **Title** | **Diffusion Tube Locations – Marshalswick** |
| **By** PB | **Approved** JC |
| **Scale** Not To Scale | **Job Ref** 6366491 |
| **Date** May 2016 | **Figure No.** **D.8** |

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


Legend

Diffusion Tube Locations



Air Quality
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66 Prescott Street
London, E1 8HG

| | |
|---|---|
| **Location** | **St Albans City and District Council** |
| **Title** | **Diffusion Tube Locations – London Colney** |
| **By** PB | **Approved** JC |
| **Scale** Not To Scale | **Job Ref** 6366491 |
| **Date** May 2016 | **Figure No.** **D.9** |

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


Legend

Diffusion Tube Locations



Air Quality
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66 Prescott Street
London, E1 8HG

| | |
|---|---|
| **Location** | **St Albans City and District Council** |
| **Title** | **Diffusion Tube Locations – Chiswell Green/Park Street** |
| **By** PB | **Approved** JC |
| **Scale** Not To Scale | **Job Ref** 6366491 |
| **Date** May 2016 | **Figure No.** **D.10** |

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


Legend

Diffusion Tube Locations

AQMA Boundary



Air Quality
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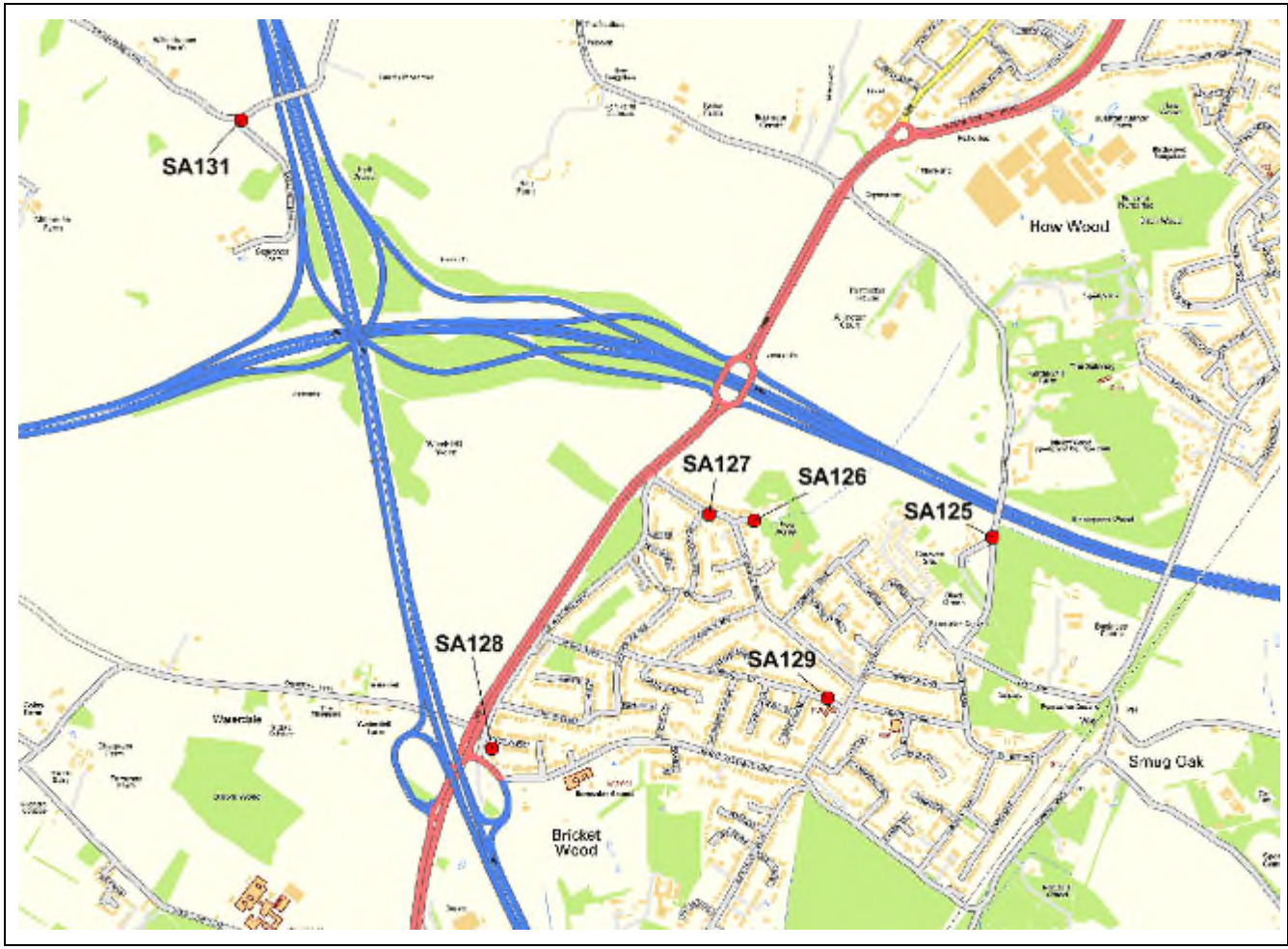
5th Floor
66 Prescott Street
London, E1 8HG

| | |
|---|---|
| **Location** | **St Albans City and District Council** |
| **Title** | **Diffusion Tube Locations – Frogmore** |
| **By** PB | **Approved** JC |
| **Scale** Not To Scale | **Job Ref** 6366491 |
| **Date** May 2016 | **Figure No.** **D.11** |

## 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/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 |
| 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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- $NO_2$ Fall off With Distance Tool, available at http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html
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