



2017 Air Quality Annual Status Report (ASR)

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

June 2017

Rugby Borough Council

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Executive Summary: Air Quality in Our Area

Air Quality in Rugby

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

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

The main pollutants of concern in Rugby, as in most areas of the UK, are associated with road traffic, in particular NO₂ and particulate matter (PM) at locations close to busy, congested roads where people may live, work or shop. Previous Review and Assessment reports and local knowledge have identified areas where UK air quality objectives may be exceeded. Rugby Borough Council declared an Air Quality Management Area (AQMA) in 2004 for exceedances of the annual mean NO₂ objective. This area covers the whole urban area of Rugby bounded by the southern boundary with Daventry District Council, A5, M6, minor roads to the west of Long Lawford, A45 and M45.

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

Actions to Improve Air Quality

A major road improvement scheme for the A45/A46 Tollbar End roundabout in southern Coventry has been completed in December 2016. This scheme reduced the volume of traffic using the roundabout by providing a dual-carriageway underpass, and reduced congestion. It is likely to have a net-beneficial impact on local air quality, which could be observed during 2017. Monitoring results (S5 and S16) in this area show that NO₂ concentrations are currently well within the air quality objective.

Rugby Borough Council has developed a new Health Protection Strategy on the reduction of NO₂ and PM_{2.5} emissions, together with the Coventry and Warwickshire Air Quality Alliance, a partnership comprising Environmental Health, Public Health, Planning and Transport officers from the Coventry and Warwickshire local authorities. The Strategy provides:

- Practical solutions to promote behaviour shifts and initiatives that reduce car journeys and promote physical activity, including in school and workplace environments
- More 'active' travel infrastructure solutions with increased cycle ways, and improved public transport infrastructure
- Evidence of designing in health through planning processes
- Exploration of wider opportunities for improving fleet vehicles, and green procurement opportunities.

Rugby Borough Council and Warwickshire County Council have also produced a Healthy Travel Choices Guide to reduce the frequency of ill health and death due to poor air quality. The guide sets 6 core priorities:

1. Take an evidence based approach using best practice to embed physical activity into people's everyday life through healthy travel choices; making active travel easy, convenient, cost effective and enjoyable to ensure long term sustainability.
2. Focus County Council travel strategy priorities towards supporting healthy travel choices including walking, cycling, public transport and car sharing.

3. Help create an active society which will deliver a wide range of associated health benefits, safer and more pleasant streets, better air quality, lower carbon emissions, reduced congestion, and improvements in the local economy, and make economic health cost savings across Warwickshire.
4. Deliver a sustainable, healthy and green travel network where walking and cycling are the modes of travel to be encouraged.
5. Active children perform better in school and in later life. Building active travel choices into our children's daily lives will make healthy travel choices more likely in the future. Develop safer routes to schools and cycle/pedestrian safety education.
6. Active workplaces; encouraging employers to support their employees to make healthy travel choices, through investment in infrastructure, facilities and incentive schemes.

Conclusions and Priorities

The main priorities for addressing air quality set out by Rugby Borough Council are:

- Maintain existing AQMA declaration for NO₂.
- Continue to monitor NO₂ concentrations at existing long-term locations, and supplement these with additional sites at pollution hotspots and narrow roads to gain better understanding of spatial variation of pollutant concentrations.

In addition, the key high-priority measures listed in the draft Air Quality Action Plan to be addressed in the coming year include:

- Public awareness campaigns for active travel – the promotion of walking and cycling, and in particular at schools and workplaces
- Greater provision of cycle infrastructure to encourage greater uptake of cycling
- Road improvement works to remove bottlenecks and alleviate congestion
- Green procurement for promotion of low emission transport, and vehicle fleet efficiency improvements.
- Coventry and Warwickshire Air Quality Alliance are starting a 12 month campaign on Active Transport starting in August 2017. It will cover Coventry and Warwickshire and will involve apps and a website. The aim is to

encourage more active and sustainable ways of transport, e.g. cycle routes, car sharing, integration of public transport. Its success will be monitored via use of the apps and website.

One of the key challenges to improving air quality in Rugby is predominantly in the form of planning applications for developments that may impact negatively on existing air quality, as is the case for most local authorities. There have been several recently completed major developments in Rugby, along with a considerable number of large-scale developments in the pipeline and numerous smaller developments.

The most significant planning applications are listed below:

1. A new secondary school development at Rokeby Estate, Rugby.
2. Cotton Park East – Anticipated submission for up to 855 dwellings.
3. Gala & Cemex House, Evreux Way – Outline application for redevelopment of the site for up to 7040 m^2 .
4. Mill Road (former ALBA Site) – Mixed use development including offices, employment and 29 residential houses with 103 apartments.
5. Land to the North of Ashlawn Road – Currently awaiting appeal decision for proposed development of up to 1,000 dwellings and associated school Planning Inspectorate APP/E3715/W/16/3147448.
6. Lodge Farm Development – New settlement comprising of up to 1,500 dwellings, potential extra care provision, a new Local Centre, employment, education and open space. Currently outlined in new Local Plan, which is currently being considered by the Secretary of State.
7. Urban Expansion South West of Rugby – Up to 5,000 residential dwellings with associated infrastructure comprising of link road, health/community services facilities, employment zone. Local Centres and Schools. NB – This site also covers the development proposal for Ashlawn Road, currently awaiting a decision from the Planning Inspectorate. Allocation of this site is outlined in the new Local Plan, which is currently being considered by the Secretary of State.

The following developments are either under construction or are completed / occupied:

1. Rugby Radio Station (SUE) – Urban extension to Rugby providing up to 6,200 dwellings, up to 130,000 M^2 of space for various land uses, including mixed use district centres, 3 primary schools and 1 senior school. Phase 2 is currently under construction.
2. Rugby Gateway (Eden Park) – Outline application for up to 1,300 residential units and employment zone. Phase I and the employment zone has been completed. Phase II (230 dwellings) is pending.
3. Leicester Road/ Technology Drive – Permission granted for 635 dwellings, with all but phase 4 being constructed.
4. Elliot's Retail Park (Phase I) – 27,000 m^2 retail development now fully constructed and occupied.
5. Elliots Retail Park (Phase II) – bulky goods Retail Park under construction.
6. Junction 1 Retail Park – 5,670 m^2 retail park completed and partly occupied.
7. Coton House (R12/1353) – Hybrid application of 76 residential properties - construction nearing completion.
8. Cawston Extension – Up to 600 plus homes. First phases are started to be constructed.

Local Engagement and How to get Involved

The general public can take simple measures to help improve air quality, the main ones being, where possible, making short trips and journeys on foot or by bike instead of by car, or using public transport. Car sharing with colleagues, or with other parents on the school run, are some other examples of ways to reduce traffic congestion, for example. Other measures are listed below:

- Purchasing low-emission electric and/or hybrid vehicles, with government funding and grants available.
- Upgrading boilers to newest and most efficient gas condensing boilers with lowest NO_x (and carbon) emissions.

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- Renewable energy generation via solar photovoltaics or wind turbine installation (although individual effect on air quality is minor and non-local)

Further information can be found on the Council's website⁴, and Defra's Local Air Quality Management (LAQM) website⁵.

⁴ Rugby Borough Council Air Pollution website: https://www.rugby.gov.uk/info/20021/pollution/217/air_pollution

⁵ Defra LAQM website: <http://laqm.defra.gov.uk/>

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1 Local Air Quality Management

This report provides an overview of air quality in Rugby Borough Council during 2016. 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 Rugby Borough Council to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Rugby Borough Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=214. The full list of AQMAs can be found at <http://uk-air.defra.gov.uk/aqma/list>.

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

Table 2.1 – Declared Air Quality Management Areas

| AQMA Name | Date of Declaration | Pollutants and Air Quality Objectives | City / Town | One Line Description | Is air quality in the AQMA influenced by roads controlled by Highways England? | Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure) | | Action Plan (inc. date of publication) |
|------------|---------------------|---------------------------------------|-------------|--|--|---|---|--|
| | | | | | | At Declaration | Now | |
| Rugby AQMA | 16/12/2004 | NO ₂ | Rugby | The area covers the whole urban area of Rugby bounded by the southern boundary with Daventry District Council, A5, M6, minor roads to the west of Long Lawford, A45 and M45. | YES | Annual average levels of NO ₂ identified as at risk of exceeding 40µg/m ³ on a number of major roads in the centre of Rugby town and in Dunchurch | Predicted to be exceedances of annual mean NO ₂ at various locations with relevant exposure in Rugby town centre (within the AQMA) | Rugby Borough Council Air Quality Action Plan (2010), http://aqma.defra.gov.uk/action-plans/RugbyBC%20AQAP%202010.pdf |

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

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

Defra's appraisal of last year's ASR (reference ASR16-076) considered the AQAP and Health Protection Strategy and concluded on the basis of the evidence provided by the Local Authority the conclusions reached are acceptable for all sources of pollution.

Rugby Borough Council has taken forward a number of direct measures during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on these measures can be found in the Council's respective Air Quality Action Plan⁶. Key completed measures are:

- Leicester Road Viaduct Connect2 and A428 Lawford Road cycleway cycle infrastructure schemes – completed in 2014. Additionally, cycle proficiency courses have been rolled out in schools and other facilities.
- Warwick Street Gyratory Road Improvements – addressed an existing pinch point and supports significant proposed growth. Completed in May 2015.
- Improving Borough Council Vehicle Fleet – several Euro 5 vehicles added or used as replacements between 2007 and 2015, with Euro 6 to follow.
- Workplace Travel Planning / Promoting Travel Alternatives – promoting higher occupancy vehicle trips by Council officers. Implemented April 2016.

Progress on the following measures has been slower than expected:

- Rugby Town Centre 20:20 vision – Promoting Travel Alternatives, on hold due to lack of available funds from WCC, has been superseded by Rugby Town Centre Action Plan 2016 - 2020.
- Control of Bonfires – due to low number of complaints, this measure has low priority and will be dropped from Air Quality Action Plan.

Rugby Borough Council expects the following measures to be completed or implemented over the course of the next reporting year:

⁶ Rugby Borough Council is currently updating the Air Quality Action Plan. The AQAP is available from the council on request

- Improvements to Church Street / North Street – Superseded by Rugby Town Centre Action Plan 2016 - 2020. A Feasibility Assessment for a public realm enhancement scheme in the heart of the town centre is planned for September 2017.

Rugby Borough Council shall also look at developing new AQAP measures that reflect the current situation and take account of the future growth and development that is planned within the borough.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Rugby Borough Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Rugby AQMA.

Planning policy

The Rugby Borough Local Plan 2011 – 2031 draft⁷ gives reference to air quality in several policies: ED2 (Employment development within Rugby urban area), HS5 (Traffic Generation and Air Quality), SDC1 (Sustainable Design) and D1 (Transport). As stated in the Consultation Response Summary⁸, an Air Quality Supplementary Planning Document will be released to facilitate the understanding of air quality considerations for developers and planners.

Warwickshire County Council is the highways authority for Rugby. The Warwickshire Local Transport Plan⁹ sets out the transport policies and strategies for the 2011-2026 period. The Plan also includes an Air Quality Strategy comprising 6 key policies, directed at tackling air quality issues.

⁷ Rugby Borough Council, Local Plan – 2011-2031. Publication Draft September 2016

⁸ Rugby Borough Council, Local Plan Preferred Options. Consultation Responses Summary. September 2016

⁹ Warwickshire Local Transport Plan 2011-2016. Available at <http://www.warwickshire.gov.uk/ltp3>

Table 2.2 – Progress on Measures to Improve Air Quality

| Measure No. | Measure | EU Category | EU Classification | Organisations involved and Funding Source | Planning Phase | Implementation Phase | Key Performance Indicator | Reduction in Pollutant / Emission from Measure | Progress to Date | Estimated / Actual Completion Date | Comments / Barriers to implementation |
|-------------|---|---------------------------------------|-------------------|---|----------------|----------------------|--------------------------------------|--|---|------------------------------------|---|
| A | Rugby Western Relief Road (RWRR) | Transport Planning and Infrastructure | Other | WCC | 1996-2007 | 2007-2011 | Implementation of the scheme in full | 12% | The road was fully opened to traffic in September 2010. | Completed September 2010 | N/A |
| B | Warwick Street Gyratory Improvements | Transport Planning and Infrastructure | Other | WCC | 2007-2014 | 2014/15 | Implementation of the scheme in full | N/A | The major improvement to the Gyratory was completed in May 2015. | Completed May 2015 | Funding |
| C | Improvements to Church Street/ North Street | Transport Planning and Infrastructure | Other | WCC | 2007-2016 | Post 2016/17 | Implementation of the scheme in full | N/A | A scheme to extend the pedestrianised area of the town centre on Church Street/North Street was previously developed and consulted upon, however it was jointly agreed by Warwickshire County Council and Rugby Borough Council not to implement the scheme at that time. The Borough Council is now considering a number of public realm improvements as part of a wider strategy for the town centre, which for this area would supersede the previously developed proposals for Church Street/North Street | TBC | The timescales for implementation of the scheme have changed as a result of the further consultation, which has been carried out on the revised proposal. |

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| D | Decriminalisation of Parking Enforcement within Rugby Borough | Traffic Management | Other | WCC | 2000-2005 | 2005-2006 | Implementation of the scheme in full | N/A | Scheme fully implemented in 2006 | 2006 | Since the commencement of Decriminalisation of Parking (now referred to as Civil Parking Enforcement CPE) on 02/10/06 in Rugby, the introduction of parking charges on some town centre streets together with a high level of enforcement has resulted in less vehicles being parked on the streets and less congestion, and therefore emissions, due to inconsiderate parking. |
| E | Rugby Town Centre 20:20 Vision | Promoting Travel Alternatives | Other | RBC/ Rugby Town Centre Company | Ongoing | N/A | Initiative superseded by Rugby Town Centre Action Plan 2016 - 2020 (see AQAP Measures B) Implementation of Action Plan in full. | N/A | N/A | Various Target Dates | No progression. WCC has limited financial resources at the moment to support implementation. Measure may be removed from AQAP |
| F | Re-routing traffic - Lorry Route Maps and agreements | Traffic Management | UTC, Congestion management, traffic reduction | WCC | Ongoing | N/A | Reduction in complaints regarding inappropriate lorry movements | N/A | An initial Advisory Lorry Route Map for the County was produced in 2005. This was subsequently revised and reissued in 2009. HGV routing maps are stipulated through the planning regime with WCC | N/A | |

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| G | Variable Message Signing | Traffic Management | UTC, Congestion management, traffic reduction | WCC | 2006-2008 | 2009 | Implementation of the scheme in full | N/A | Scheme fully implemented in 2009 | Completed in 2009 | Evidence from other towns in Warwickshire that Variable Message Signing reduces the unnecessary distance travelled by vehicles looking for parking spaces. In Rugby town centre the impact of Variable Message Signing may have been masked by overall reductions in road traffic brought about by the opening of RWRR and road infrastructure improvements to the Warwick Street Gyratory. |
| H | Enforcement of Idling Vehicle Legislation | Traffic Management | Anti-idling enforcement | RBC/WCC | Current | N/A | N/A | N/A | Feasibility of scheme investigated. Decision taken not to proceed with the scheme due to the restrictions in enforcement actions that can be carried out by Civil Enforcement Officers | N/A | Investigation found limitations in the Traffic Management Act which means that Civil Enforcement Officers will be unable to fully enforce Implementation currently under review. |

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| I | Improve the Borough Council Fleet (interims of emissions) | Promoting Low Emission Transport | Company Vehicle Procurement - Prioritising uptake of low emission vehicles | RBC | Ongoing | Ongoing | N/A | N/A | Euro 6 is now the latest technology with no further advancement on the horizon. 6 vehicles added in 2014/15, further 6 LGVs planned for 2016/17. Euro 6 has now been introduced to vehicles 3.5 tons and below. The plan was to replace 17 of this type of vehicle in 2016/17. 10 vehicles replaced with Euro 5 up to April 2013. 3 vehicles replaced with Euro V vehicles in 2007/8 and 2008/9 2 replaced during 2009/10. A further 5 Refuse Vehicles using Euro v technology added in 2012/2013. | Ongoing | Euro 6 is the most advanced technology available and is anticipated to deliver NOx emissions reductions |
| J | Improve Bus Emissions | Vehicle Fleet Efficiency | Promoting Low Emission Public Transport | RBC/WCC | Ongoing | Ongoing | N/A | N/A | Urban Quality Bus Corridor improvements have been made on routes between the Town Centre and Lower Hillmorton/Long Lawford, between Woodlands and the Town Centre, and on the Inter-Urban route between Rugby and Coventry. Finance has been provided through developers of committed planning developments | Ongoing | A lack of resources by the bus operators. However the update older public service vehicles with those of the latest technologies should result in measureable emissions reductions of NOx and PM10 |

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| K | Cycling | Promoting Travel Alternatives | Promotion of cycling | WCC | Ongoing | Ongoing | Increase in cycling as a result of individual scheme implementation | N/A | <p>The basis of a cycle network has been delivered in phases over the last 15 years, using a combination of on and off-carriageway routes. Additional routes will come forward as resources permit and in conjunction with new development.</p> <p>WCC and RBC provide cycle training for young people and adults who are keen to improve their cycle skills.</p> <p>Cycle facilities have been provided as part of RWRR.</p> <p>The Leicester Road viaduct Connect2 scheme opened in 2014.</p> <p>The A428 Lawford Road cycleway between Long Lawford and the RWRR was completed in 2014. A bid to the DfT's Cycle Safety fund was successful for a scheme to extend this cycleway from the RWRR to the Town Centre. The extension was completed in 2015.</p> | Ongoing | |
| L | Walking | Promoting Travel Alternatives | Promotion of walking | WCC | Ongoing | Ongoing | Increase in walking (footfall) as a result of individual scheme implementation | N/A | <p>The LTP Walking Strategy sets out a series of improvements for pedestrians, including new or upgraded pedestrian crossings, new/widened footways, improved street lighting, provision of new dropped kerbs, and footway resurfacing/ reconstruction.</p> | Ongoing | |
| M | Workplace Travel Plans | Promoting Travel Alternatives | Workplace Travel Planning | WCC | Ongoing | Ongoing | Number of Travel Plans agreed with existing employers and as part of new development | N/A | <p>Workplace Travel Plans are secured through a S106 agreement as part of new development.</p> | N/A | |

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| N | School Travel Plans and Safer Routes to School | Promoting Travel Alternatives | School Travel Plans | WCC | Ongoing | Ongoing | Reduction in the number of car-based journeys to school | N/A | The majority of Local Authority run schools within the Borough now have a School Travel Plan in place. | N/A | |
| O | Public Transport Strategy, including the Bus Strategy | Promoting Travel Alternatives | Other | WCC | Ongoing | Ongoing | Increase in bus patronage | N/A | Ongoing implementation of the various strategies which make up the Public Transport Strategy, including the Bus Strategy, Passenger Rail Strategy, Community Transport Strategy, Public Transport Information Strategy and Public Transport Interchange Strategy. | N/A | |
| P | Travel Awareness Campaigns | Promoting Travel Alternatives | Personalised Travel Planning | WCC | Ongoing | Ongoing | Reduction in the number of car-based journeys being made within the Borough | N/A | Ongoing implementation of the Changing Travel Behaviour Strategy and other relevant LTP strategies. | N/A | |

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|---|--|---|------------------------|-----|---------|---------|---|-----|--|-----|--|
| Q | Energy efficiency improvements to Rugby housing & the reduction of fuel poverty. | Policy Guidance and Development Control | Low Emissions Strategy | RBC | Ongoing | Ongoing | HECA report published March 2015, and will be updated at two yearly intervals | N/A | <p>Across the borough we have provided the following services:</p> <ul style="list-style-type: none"> * Worked with our partner, Act on Energy, to provide an energy advice phone line * Organised advice sessions held at the Town Hall & library, flu clinics, Children's Centres and Older People's Drop-in session * Held training sessions for front-line staff and community and voluntary workers * Provided media coverage with Press Releases; articles in Tenant Times; twitter posts on coping with cold weather, energy savings tips, etc.; cold weather alerts issued to front-line staff and 100 community organisations * Sent mail out to 1970 households in the Benn area with information about ECO funding for energy improvements, plus support available from Act on Energy * Held presentation for local landlords about the Minimum Energy Efficiency Standards and provided information about new Carbon Monoxide legislation * Carried out initial feasibility assessment for District Heating | N/A | <p>DECC statistics show that CO₂ emissions by domestic use (Units kt CO₂) have reduced from 215.7 in 2009 to 213.3 in 2013, a per capita reduction from 21.8 to 19.8</p> <p>We aim to reduce CO₂ emissions in the housing sector to 172.6kt CO₂ of 2009 (215.7kt CO₂) levels by 2020. This will be equivalent to a 20% reduction.</p> |
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| Q (cont.) | | | | | | | | | <p>Council tenants have benefitted from these improvements and services:</p> <ul style="list-style-type: none"> * electric to gas conversions for 173 properties * new windows and doors to 980 properties with windows and doors * central heating renewals – 49 gas to gas upgrades * energy advice session held for tenants at Woodside Travellers Site * mail out to Sheltered Tenants and High Rise Residents about Warm Home Discount | | |
| R | Control Of Industrial Emissions | Environmental Permits | Measures to reduce pollution through IPPC Permits going beyond BAT | RBC | Ongoing | Ongoing | 97.5% compliance improvements | N/A | Annual inspection programme complete. | N/A | |
| S | Emissions from Domestic and Commercial Sources | Environmental Permits | Other | RBC | Ongoing | Ongoing | Reduction in complaints | N/A | Low priority. Low number of complaints. | N/a | Designated smoke Control Area (chimneys) and section 79 of the EPA 1990 actively implemented where problems are identified. |
| T | Control of Bonfires | Policy Guidance and Development Control | Other policy | RBC | Ongoing | Ongoing | Reduction in complaints | N/A | Low priority. Low number of complaints. | N/A | Section 79 of the EPA 1990 actively implemented where problems are identified |

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| U | Planning Development and Planning Applications | Policy Guidance and Development Control | Air Quality Planning and Policy Guidance | RBC | Ongoing | Ongoing | N/A | N/A | <p>Air quality assessments have been requested for land use planning developments that meet AQMA thresholds in the Rugby Borough Local Plan (July 2006).</p> <p>The requirements for future assessments have now been embodied in a new Planning Obligations Supplementary Planning Document adopted in March 2012. This is to ensure that new development does not result in a significant increase in the production of air pollutants and that opportunities are taken to improve air quality, where possible. In some instances where an AQMA threshold has not been met, officer discretionary measures have been utilised where it is felt that a proposed land use development has potential to impact on air quality and should be a material consideration.</p> <p>New local planning policies emerging. RBC is in the process of developing the Local Plan Preferred Options planning policy document with an updated AQ SPD</p> | <p style="text-align: center;">Ongoing</p> <p>Submission consultation: August-September 2016</p> <p>Submission to the Planning Inspectorate: December 2016</p> <p>Examination: April 2017</p> <p>Adoption: July 2017</p> | <p>Local Plan (July 2006) superseded with Core Strategy/ Planning Obligations Supplementary Planning Document adopted in March 2012. Section 7 covers Air Quality as well as providing an air quality guidance document for developers that has been agreed by Cabinet 4th February 2013</p> <p>Local Plan draft published in September 2016.</p> <p>Work on new Air Quality Supplementary Planning Guidance announced in September 2016.</p> |
|---|--|---|--|-----|---------|---------|-----|-----|--|--|---|

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 2.5 µm 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.

Public Health Coventry (Coventry City Council) and Public Health Warwickshire (Warwickshire County Council) have established the joint Arden Health Protection Committee. Included in the members are the Environmental Health managers in Warwickshire and Coventry comprising representatives from Public Health England, NHS, Public Health Coventry, Public Health Warwickshire and local authority Environmental Health officers.

Rugby Borough Council is currently assisting in developing a new Health Protection Strategy with an action plan, which will include actions to improve air quality. The measures of success will be demonstrated reductions in ambient concentrations of NO₂ and PM_{2.5}, reductions in the use of private cars for short journeys and increased development and use of cycle ways. The initial focus will be on areas of poorest air quality.

Identifying Areas for Actions and Measuring Success

Rugby Borough Council shall investigate the best means of measuring the effectiveness of actions to reduce PM_{2.5} emissions and concentrations.

Rugby Borough Council operated an extensive network of continuous air quality monitoring stations for almost ten years. At its largest, the network comprised four automatic monitoring stations equipped with reference method gas and particulate analysers, and nineteen Turnkey Osiris dust monitors. In 2008, the monitoring network was reduced to one automatic monitoring station (at Newbold Road) and five Turnkey Osiris dust monitors at key locations throughout the borough as concentrations of SO₂ and PM₁₀ at many of the monitoring locations had been below the relevant air quality objectives for a number of years.

At the three continuous monitoring stations, which housed PM_{2.5} analysers (TEOMs), the annual mean concentrations in 2007 ranged from 11.1 µg/m³ to 13.0 µg/m³.

In 2012, the council took the decision to decommission the entire continuous monitoring network as PM₁₀ concentrations at the remaining monitoring locations were well below the air quality objectives. Annual mean PM₁₀ concentrations between 2008 and 2012 were well below the annual mean PM₁₀ objective and showed evidence of reductions over time; exceedances of the daily PM₁₀ standard of 50 µg/m³ were also within the 35 permitted days per year (see Appendix A). The annual mean NO₂ concentrations were exceeding the objective at this time. An extensive NO₂ diffusion tube network was set up subsequent to the decommissioning of the continuous monitoring network to provide greater spatial insight.

The analysis of the historical datasets can provide useful insight into air pollutant concentrations in the Borough, and in particular, PM₁₀ and PM_{2.5} concentrations. Rugby Borough Council proposes to use the historical monitoring data to identify any potential 'hotspot' areas with respect to PM_{2.5} concentrations. The Council will also examine the Defra national background maps of PM_{2.5} concentrations for all 1-km grid squares within the administrative area. Despite the coarse scale the maps will provide an indication of where the highest PM_{2.5} concentrations are likely to be in the Borough. The broad source apportionment data contained within the maps will also assist in identifying the key sources of PM_{2.5}. Having identified the key sources and priority areas the Council will review existing actions aimed at improving air pollution, and, where appropriate, amend these actions to effectively target PM_{2.5}. A feasibility study will also be carried out to identify any new actions that may be implemented to reduce PM_{2.5} emissions and improve local air quality.

As noted above, there are presently no reference method automatic particulate monitoring stations within the Council area. However, the Council does operate a Turnkey Osiris dust monitor, located at Parkfield Road to monitor emissions from the Sita/Suez Climafuel plant. The Osiris is capable of measuring multiple particulate size fractions, including PM₁₀ and PM_{2.5}, and whilst these dust monitors are not certified as reference equivalent they can provide a general indication of PM₁₀ and PM_{2.5} concentrations. Data from this monitor will be included in determining current PM_{2.5} levels in the Rugby area.

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

3.1 Summary of Monitoring Undertaken

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

3.1.1 Automatic Monitoring Sites

Rugby Borough Council undertook automatic (continuous) monitoring at one site during 2016. The monitoring site, equipped with a Turnkey Osiris Particulate Monitor, is situated to the north-east of the Climafuel Facility. The site was set up in December 2014 to monitor dust and particulate levels around the Climafuel Facility. Table A.1 in Appendix A shows the details of the site.

There are no AURN or other automatic monitoring stations in Rugby Borough – the nearest AURN stations are located in Coventry and Leamington Spa. The Leamington Spa Rugby Road AURN station is used by Rugby Borough Council for diffusion tube co-location for calculation of local bias adjustment factors. Monitoring data from this site and other national network stations are available at <https://uk-air.defra.gov.uk/data>.

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

3.1.2 Non-Automatic Monitoring Sites

Rugby Borough Council undertook non- automatic (passive) monitoring of NO₂ at 56 sites during 2016, including one triplicate co-location at the AURN station at Leamington Spa, Stamford Gardens Rugby Road (Tubes S17-S19). In May 2016, two new monitoring locations were set up at Church Street, Shildon and at 12 Bramble Cottage, Stretton-Under-Fosse (AD1 and AD2) at the request of elected members. In addition, three diffusion tube site locations were changed in July 2016 (S27, S44 and S53) to consider the impact of specific infrastructural and residential developments were having on local air quality. The location of S27 was moved from the previous location on Avenue Road/Campbell Street to a new position on Leamington Road in Ryton on Dunsmore to assess the impact of HGV's taking a

detour through Ryton onto the A45 to avoid road improvement works at the Toll Island in Coventry. The position of S44 was moved from High Street, Hillmorton to Barby Lane/ Ashlawn Road consider the impact of the major new committed urban extension of Rugby at the site between the A426 and A5. Finally location S55 was changed from Daventry Road, West Dunchurch to a new site alongside Coventry Road, West Dunchurch to assess the impact traffic congestion in the area on a property close to the road.

In addition to the local authority's diffusion tube network, Jaguar Land Rover had financed a 12-month NO₂ and VOC diffusion tube monitoring programme, which commenced in March 2015, at 2 sensitive receptor locations (JLR1 and JLR2) around its car painting facility in Ryton-on-Dunsmore. No data for either site is available for the final two months of the survey, January to March 2016, and so the monitoring locations have not been considered further in this report.

Table A.2 in Appendix A shows the details of all of the operational sites in 2016. Maps showing the location of the monitoring sites are provided in Appendix D.

Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. "annualisation" and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B.

During 2016, the annual mean NO₂ objective was exceeded at five diffusion tube locations (S10, S24, W1, W3 and AD1). Site S10 located near the Webb Ellis Pub on Corporation Street and S24 in Dunchurch Square are the only two diffusion tube sites to have consistently exceeded the air quality objective, year on year, since 2013.

Both sites are both positioned within the existing AQMA and are considered locations of relevant exposure. At both locations, although the annual mean NO₂ concentration remained above the national air quality objective in 2016, a decrease in NO₂ concentration was observed relative to 2015, putting an end to the gradual upward trend in NO₂ concentrations that had been measured at site S10 since 2012 and at S24 since 2014 (Figure A.1 and Figure A.2).

At sites W1 and W2, both located at the roadside of the Warwick Street gyratory system near the centre of town within the existing AQMA, concentrations of 47.4µg/m³ and 45.5µg/m³ were measured. The major improvement works to the gyratory system, part of the AQAP (Measure B - Table 2.2), were completed in May 2015. Therefore, 2016 was the first year where it was possible to assess whether changes to the road layout has had the intended impact of decreasing the impact of traffic on the town centre, in particular the annual mean NO₂ concentration. At site W2 and W3, a small decrease in annual mean NO₂ concentrations were recorded during 2016, however at site W1 an increase of similar magnitude was observed (Figure A.5). Therefore, it is too early to determine the impact that the improvements to the gyratory system have had on air quality in the town centre and it is therefore recommended that monitoring is continued at the Warwick Street locations (W1 – W3).

As well as the four sites located within the current AQMA, site AD1, which was commissioned in March 2016, on Church Road in Shildon indicated an annual mean NO₂ concentration of 47.1µg/m³, after annualisation. The result is lower than the 60 µg/m³ threshold that would indicate the possibility of an exceedance of the NO₂ hourly objective and as the site is a kerbside location (within 1m of road) the result is not considered of particular concern. Continued monitoring at this location is recommended to determine whether the NO₂ concentration on Church Road is significant and needs to be acted upon.

On the basis of these results, with four sites within the current AQMA exceeding the annual mean NO₂ objective, there is no justification for amendment of the currently declared Rugby AQMA.

3.2.2 Particulate Matter (PM₁₀)

Rugby Borough Council does not currently operate any automatic monitoring stations for PM₁₀ that are equipped with reference method analysers. Prior to June 2012

Rugby Borough Council operated an extensive network of automatic monitoring stations measuring PM₁₀ concentrations throughout the Borough. Following several years of monitored PM₁₀ concentrations being well below the relevant air quality objectives, these monitoring stations were decommissioned.

However, monitoring of TSP, PM₁₀, PM_{2.5} and PM₁ has been carried out at one location since December 2014 using a Turnkey Osiris dust monitor. The Turnkey Osiris instrument is an indicative monitoring technique and therefore cannot be strictly used for demonstrating compliance with air quality objectives; however, the results from this monitoring study are reported here in the absence of any other local data. The monitoring location was chosen to be downwind of the Climafuel Facility and is situated approximately 200 metres to the north-north-east of the facility on Parkfield Road, Rugby.

Table A.5 in Appendix A compares the ratified monitored PM₁₀ annual mean concentrations for the past 2 years with the air quality objective of 40 µg/m³. The annual mean PM₁₀ concentration for 2016 was 12.5 µg/m³, which is well below the annual mean PM₁₀ objective and slightly below the 2015 annual mean concentration.

Table A.6 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 2 years with the air quality objective of 50 µg/m³, not to be exceeded more than 35 times per year. In 2016 there was only one day where PM₁₀ concentrations were greater than 50 µg/m³, which occurred in March 2016. The maximum 24-hour mean PM₁₀ concentration was 52.2 µg/m³.

3.2.3 Particulate Matter (PM_{2.5})

Table A.7 in Appendix A presents the ratified monitored PM_{2.5} annual mean concentrations for the past 2 years. In 2016, the annual mean PM_{2.5} concentration was 5.9 µg/m³. This is well below the annual mean PM_{2.5} objective value of 25 µg/m³ for the UK (excluding Scotland) and has decreased from the previous year.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Monitoring Technique | Distance to Relevant Exposure (m) ⁽¹⁾ | Distance to kerb of nearest road (m) ⁽²⁾ | Inlet Height (m) |
|---------|----------------|-----------|---------------|---------------|--|----------|-----------------------------|--|---|------------------|
| OSR1 | Parkfield Road | Roadside | 449029 | 276315 | TSP, PM ₁₀ PM _{2.5} , PM ₁ | YES | Turnkey Osiris Dust Monitor | 5 | 1 | 3.5 |

Notes:

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

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic Monitoring Sites

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) ⁽¹⁾ | Distance to kerb of nearest road (m) ⁽²⁾ | Tube collocated with a Continuous Analyser? | Height (m) |
|---------|------------------------------------|------------------|---------------|---------------|----------------------|----------|--|---|---|------------|
| S1 | 10 Newbold Road | Kerbside | 449000 | 277178 | NO ₂ | YES | 0 | 0.5 | NO | 2.5 |
| S2 | Marton A423 | Kerbside | 440830 | 269008 | NO ₂ | NO | 5 | 1 | NO | 2.5 |
| S3 | 69 School Street | Urban Background | 447316 | 276162 | NO ₂ | YES | 0 | 15 | NO | 2.5 |
| S4 | St Margaret's School, Wolston | Urban Background | 441131 | 275648 | NO ₂ | NO | 0 | 90 | NO | 2.5 |
| S5 | Ryton Village Hall, High Street | Kerbside | 438642 | 274418 | NO ₂ | NO | 25 | 0.5 | NO | 2.5 |
| S6 | 2 West Field Road | Urban Background | 449671 | 274795 | NO ₂ | YES | 0 | 10 | NO | 2.5 |
| S7 | 68 Cymbeline Way | Urban Background | 448863 | 272786 | NO ₂ | YES | 0 | 10 | NO | 2.5 |
| S8 | EHO Treatment, Newbold Road | Kerbside | 450138 | 275557 | NO ₂ | YES | 10 | 1 | NO | 2.5 |
| S9 | (Argyle Street) Cambridge Street | Roadside | 451187 | 275334 | NO ₂ | YES | 0 | 5 | NO | 2.5 |
| S10 | Webb Ellis Pub, Corporation Street | Roadside | 450069 | 275040 | NO ₂ | YES | 0 | 5 | NO | 2.5 |
| S11 | 15 Oliver | Roadside | 449787 | 275224 | NO ₂ | YES | 0 | 5 | NO | 2.5 |

| | Street | | | | | | | | | |
|---------------|--|------------------|--------|--------|-----------------|-----|-----|-----|-----|-----|
| S12 | Boughton Leigh School, Hollowell Way | Urban Background | 451445 | 277245 | NO ₂ | YES | 0 | 56 | NO | 2.5 |
| S13 | Avon Mill Pub, Newbold Road | Roadside | 450088 | 276229 | NO ₂ | YES | 15 | 3 | NO | 2.5 |
| S14 | Binley Woods, Village Hall | Urban Background | 439450 | 277523 | NO ₂ | NO | 0 | 20 | NO | 2.5 |
| S15 | Lawford Road / Jubilee Street, Arnie's Batch | Kerbside | 449168 | 275411 | NO ₂ | NO | 0 | 0.5 | NO | 2.5 |
| S16 | Hotel, London Road A45, Ryton | Roadside | 436867 | 275275 | NO ₂ | NO | 0 | 19 | NO | 2.5 |
| S17, S18, S19 | Stamford Gardens Rugby Road | Roadside | 431271 | 266404 | NO ₂ | NO | n/a | 6 | YES | 2.5 |
| S20 | Newbold Road | Roadside | 450137 | 275849 | NO ₂ | YES | 25 | 3 | NO | 2.5 |
| S21 | Corner of Percival Road and Ashlawn Road | Roadside | 451698 | 273273 | NO ₂ | YES | 15 | 2 | NO | 2.5 |
| S22 | Corner of Fisher Avenue and Ashlawn Road | Roadside | 452403 | 273567 | NO ₂ | YES | 18 | 5 | NO | 2.5 |

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|-----|---|------------------|--------|--------|-----------------|-----|----|-----|----|-----|
| S23 | Paddox Pub Corner | Roadside | 452672 | 273633 | NO ₂ | YES | 13 | 3 | NO | 2.5 |
| S24 | Dun Cow, Dunchurch Square | Kerbside | 448496 | 271244 | NO ₂ | YES | 0 | 0.5 | NO | 2.5 |
| S25 | Southam Road, 'Crystal', Dunchurch | Roadside | 448414 | 271175 | NO ₂ | YES | 0 | 2 | NO | 2.5 |
| S26 | Lawford Road, (former Simms Scrap Yard) | Roadside | 448999 | 275505 | NO ₂ | YES | 0 | 12 | NO | 2.5 |
| S27 | Leamington Road, Ryton on Dunsmore | Roadside | 449435 | 275543 | NO ₂ | NO | 7 | 2.5 | NO | 2.5 |
| S28 | 256 Parkfield Road | Roadside | 449011 | 276329 | NO ₂ | YES | 0 | 2 | NO | 2.5 |
| S29 | Avon Valley School | Urban Background | 449575 | 276540 | NO ₂ | YES | 0 | 35 | NO | 2.5 |
| S30 | Murray Road (Bus Stop Nr Rail Station) | Kerbside | 451107 | 275838 | NO ₂ | YES | 0 | 0.5 | NO | 2.5 |
| S31 | Wood Street / Park Road | Roadside | 450848 | 275849 | NO ₂ | YES | 0 | 3 | NO | 2.5 |
| S32 | Railway Terrace, Station Bar | Roadside | 450750 | 275547 | NO ₂ | YES | 0 | 3 | NO | 2.5 |
| S33 | Albert Street, Alma Lodge Hotel | Roadside | 450510 | 275355 | NO ₂ | YES | 0 | 3 | NO | 2.5 |
| S34 | Regent Street, near Oxfam | Roadside | 450405 | 275329 | NO ₂ | YES | 0 | 3 | NO | 2.5 |
| S35 | Church Street, Town | Roadside | 450444 | 275236 | NO ₂ | YES | 0 | 3 | NO | 2.5 |

| | | | | | | | | | | |
|-----|---|----------|--------|--------|-----------------|-----|----|-----|----|-----|
| | Fryer | | | | | | | | | |
| S36 | Whitehall Road junction with Clifton Road Roundabout | Roadside | 450870 | 275043 | NO ₂ | YES | 12 | 3 | NO | 2.5 |
| S37 | Lower Hillmorton Road junction with Clifton Road Roundabout | Roadside | 450897 | 275059 | NO ₂ | YES | 5 | 2 | NO | 2.5 |
| S38 | Clifton Road before railway bridge | Kerbside | 451868 | 275501 | NO ₂ | YES | 9 | 0.5 | NO | 2.5 |
| S39 | Clifton Road Roundabout Murray Road | Roadside | 450852 | 275116 | NO ₂ | YES | 0 | 5 | NO | 2.5 |
| S40 | Lawrence Sherriff Street, Drury Lane | Roadside | 450181 | 275029 | NO ₂ | YES | 0 | 5 | NO | 2.5 |
| S41 | Bilton Road, Big Yellow House | Roadside | 450010 | 274998 | NO ₂ | YES | 0 | 15 | NO | 2.5 |
| S42 | Bilton Road, near Crow Pie Pub | Roadside | 448855 | 274352 | NO ₂ | YES | 10 | 5 | NO | 2.5 |
| S43 | Dunchurch Gyrotory Residential | Roadside | 450162 | 274898 | NO ₂ | YES | 4 | 3 | NO | 2.5 |
| S44 | Barby Lane/ Ashlawn Road | Roadside | 453394 | 273633 | NO ₂ | YES | 15 | 2 | NO | 2.5 |
| S45 | Bretford-electricity | Roadside | 442963 | 277071 | NO ₂ | YES | 11 | 3 | NO | 2.5 |

| | | | | | | | | | | |
|-----|---|----------|--------|--------|-----------------|-----|----|-----|----|-----|
| | pole near 3 Avon Cottages | | | | | | | | | |
| S46 | Oxford Road, Ryton Belvedere | Kerbside | 437555 | 274561 | NO ₂ | NO | 30 | 1 | NO | 2.5 |
| S47 | Regent Place | Kerbside | 450445 | 275495 | NO ₂ | YES | 5 | 0.5 | NO | 2.5 |
| S48 | North Street, Nat. West. Bank | Roadside | 450304 | 275314 | NO ₂ | YES | 0 | 2 | NO | 2.5 |
| S49 | Lesley Suiter House, Whitehall Road, Hillmorton | Roadside | 450864 | 274896 | NO ₂ | YES | 13 | 3 | NO | 2.5 |
| S50 | Bilton Church | Roadside | 448169 | 273625 | NO ₂ | YES | 18 | 3 | NO | 2.5 |
| S51 | Brinklow, Brays Close | Roadside | 443433 | 279208 | NO ₂ | NO | 6 | 3 | NO | 2.5 |
| S52 | Davertry Road East, Dunchurch | Roadside | 448537 | 271195 | NO ₂ | YES | 1 | 3 | NO | 2.5 |
| S53 | Conventry Road West, Dunchurch | Roadside | 448361 | 271334 | NO ₂ | YES | 0 | 1.5 | NO | 2.5 |
| W1 | Rugby School Lamppost 5 | Roadside | 450226 | 275008 | NO ₂ | YES | 0 | 1.5 | NO | 2.5 |
| W2 | Rugby School Lamppost 6 | Roadside | 450269 | 274998 | NO ₂ | YES | 0 | 1.5 | NO | 2.5 |
| W3 | 57 Boughton Rd | Roadside | 451162 | 276772 | NO ₂ | YES | 8 | 2 | NO | 2.5 |
| AD1 | Church Road, Shildon | Kerbside | 440416 | 284401 | NO ₂ | NO | 0 | 0.5 | NO | 2.5 |
| AD2 | Bramble | Roadside | 445004 | 281330 | NO ₂ | NO | 5 | 2 | NO | 2.5 |

| | | | | | | | | | | |
|--|-------------------------------------|--|--|--|--|--|--|--|--|--|
| | Cottage, Stretton Under Fosse | | | | | | | | | |
|--|-------------------------------------|--|--|--|--|--|--|--|--|--|

Notes:

- (1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).
- (2) N/A if not applicable.

Table A.3 – Annual Mean NO₂ Monitoring Results

| Site ID | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) ⁽¹⁾ | Valid Data Capture 2016 (%) ⁽²⁾ | NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾ | | | | |
|---------|------------------|-----------------|---|--|---|-------------|-------------|-------------|-------------|
| | | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| S1 | Kerbside | Diffusion Tube | 92 | 92 | 20.3 | 21.6 | 19.5 | 20.4 | 18.8 |
| S2 | Kerbside | Diffusion Tube | 100 | 100 | 17.3 | 19.6 | 18.4 | 16.3 | 16.5 |
| S3 | Urban Background | Diffusion Tube | 100 | 100 | 16 | 18.3 | 15.5 | 15.6 | 15.5 |
| S4 | Urban Background | Diffusion Tube | 100 | 100 | 16.4 | 15 | 13.5 | 13.7 | 14.0 |
| S5 | Kerbside | Diffusion Tube | 100 | 100 | 30.1 | 31.5 | 29.6 | 27.9 | 28.5 |
| S6 | Urban Background | Diffusion Tube | 100 | 100 | 17.2 | 17.9 | 15.7 | 17.3 | 16.3 |
| S7 | Urban Background | Diffusion Tube | 100 | 100 | 14 | 14.3 | 13.1 | 12.7 | 13.2 |
| S8 | Kerbside | Diffusion Tube | 92 | 92 | 30.5 | 31.5 | 33.5 | 38.2 | 33.6 |
| S9 | Roadside | Diffusion Tube | 100 | 100 | 19.9 | 19.2 | 18.9 | 18.8 | 23.3 |
| S10 | Roadside | Diffusion Tube | 100 | 100 | 38.8 | 40.2 | 40.9 | 41.6 | 41.0 |
| S11 | Roadside | Diffusion Tube | 92 | 92 | 25.8 | 25.6 | 25.2 | 25.6 | 24.3 |
| S12 | Urban Background | Diffusion Tube | 100 | 100 | 22.4 | 21.1 | 21.7 | 23.9 | 25.8 |
| S13 | Roadside | Diffusion Tube | 100 | 100 | 37.4 | 35.7 | 33.4 | 38.3 | 39.5 |
| S14 | Urban Background | Diffusion Tube | 100 | 100 | 18 | 18.3 | 17.9 | 19 | 18.2 |
| S15 | Kerbside | Diffusion Tube | 92 | 92 | 28.2 | 28.9 | 28.9 | 30.9 | 28.3 |

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|-----|------------------|----------------|-----|-----|-----------------------------------|-------------|-------------|-------------|-------------|
| S16 | Roadside | Diffusion Tube | 100 | 100 | 22.1 | 24.4 | 22.1 | 21.3 | 22.8 |
| S17 | Roadside | Diffusion Tube | 92 | 92 | 22.5 | 20.2 | 20.5 | 20.2 | 21.4 |
| S18 | Roadside | Diffusion Tube | 92 | 92 | 23.7 | 21.9 | 21.3 | 20.2 | 20.7 |
| S19 | Roadside | Diffusion Tube | 92 | 92 | 23.2 | 22.3 | 20.7 | 20.5 | 20.4 |
| S20 | Roadside | Diffusion Tube | 100 | 100 | 30.8 | 31.6 | 32.6 | 30.9 | 32.4 |
| S21 | Roadside | Diffusion Tube | 92 | 92 | 24.8 | 24.4 | 24.7 | 24.2 | 24.2 |
| S22 | Roadside | Diffusion Tube | 100 | 100 | 22 | 23 | 22.9 | 23.2 | 24.4 |
| S23 | Roadside | Diffusion Tube | 83 | 83 | 24.5 | 27.6 | 24.2 | 23.1 | 25.1 |
| S24 | Kerbside | Diffusion Tube | 100 | 100 | 50 | 46.6 | 46.4 | 48.9 | 47.1 |
| S25 | Roadside | Diffusion Tube | 100 | 100 | 32.6 | 30.8 | 31.5 | 33.8 | 34.5 |
| S26 | Roadside | Diffusion Tube | 100 | 100 | 20.7 | 21.8 | 21 | 20.3 | 22.4 |
| S27 | Roadside | Diffusion Tube | 100 | 50 | Location changed July 2016 | | | | 27.5 |
| S28 | Roadside | Diffusion Tube | 100 | 100 | 19.5 | 20.3 | 19.7 | 20.9 | 19.7 |
| S29 | Urban Background | Diffusion Tube | 100 | 100 | 22.6 | 23.5 | 23 | 24.9 | 21.7 |
| S30 | Kerbside | Diffusion Tube | 100 | 100 | 37.5 | 37.2 | 36.1 | 36.6 | 36.4 |
| S31 | Roadside | Diffusion Tube | 100 | 100 | 31.9 | 30.7 | 31.6 | 32.1 | 29.7 |
| S32 | Roadside | Diffusion Tube | 92 | 92 | 30.8 | 30.8 | 29.7 | 32.6 | 30.4 |
| S33 | Roadside | Diffusion Tube | 100 | 100 | 24 | 25.2 | 25.4 | 25.6 | 25.4 |

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|-----|----------|----------------|-----|-----|-----------------------------------|-------------|------|------|------|
| S34 | Roadside | Diffusion Tube | 100 | 100 | 28.9 | 27.7 | 26.9 | 33.9 | 27.8 |
| S35 | Roadside | Diffusion Tube | 100 | 100 | 33.5 | 31.5 | 34 | 34.8 | 32.3 |
| S36 | Roadside | Diffusion Tube | 100 | 100 | 35.6 | 36.6 | 34 | 34.7 | 35.3 |
| S37 | Roadside | Diffusion Tube | 75 | 75 | 31.8 | 33.6 | 29.9 | 31.6 | 30.1 |
| S38 | Kerbside | Diffusion Tube | 100 | 100 | 29.2 | 27.4 | 27.9 | 27.8 | 29.9 |
| S39 | Roadside | Diffusion Tube | 100 | 100 | 30.6 | 32.6 | 30 | 31.9 | 30.0 |
| S40 | Roadside | Diffusion Tube | 100 | 100 | 33.4 | 32.4 | 30.1 | 32.8 | 34.7 |
| S41 | Roadside | Diffusion Tube | 100 | 100 | 26.8 | 27.5 | 25.4 | 27 | 27.4 |
| S42 | Roadside | Diffusion Tube | 100 | 100 | 25.9 | 25.8 | 26.4 | 23.7 | 24.2 |
| S43 | Roadside | Diffusion Tube | 100 | 100 | 28.7 | 29.9 | 27.7 | 28.7 | 31.1 |
| S44 | Roadside | Diffusion Tube | 100 | 50 | Location changed July 2016 | | | | 29.8 |
| S45 | Roadside | Diffusion Tube | 100 | 100 | 28 | 26.9 | 28.3 | 27.7 | 26.7 |
| S46 | Kerbside | Diffusion Tube | 100 | 100 | 38.5 | 40.9 | 39.5 | 38.1 | 39.3 |
| S47 | Kerbside | Diffusion Tube | 100 | 100 | 33.2 | 35.3 | 33 | 33.9 | 35.2 |
| S48 | Roadside | Diffusion Tube | 100 | 100 | 36.7 | 34.3 | 36.6 | 34.5 | 37.5 |
| S49 | Roadside | Diffusion Tube | 100 | 100 | 49 | 39.4 | 39.9 | 39.1 | 36.6 |
| S50 | Roadside | Diffusion Tube | 83 | 83 | 23.5 | 24.5 | 24.8 | 25.1 | 25.3 |
| S51 | Roadside | Diffusion Tube | 100 | 100 | No data | 31.4 | 32.3 | 33.6 | 32.4 |

| | | | | | | | | | |
|-----|----------|----------------|-----|-----|----------------------------|------|----|-------------|-------------|
| S52 | Roadside | Diffusion Tube | 100 | 100 | No data | 23.4 | 23 | 24.9 | 24.0 |
| S53 | Roadside | Diffusion Tube | 100 | 50 | Location changed July 2016 | | | | 24.6 |
| W1 | Roadside | Diffusion Tube | 100 | 100 | Site setup in August 2015 | | | 46.6 | 47.4 |
| W2 | Roadside | Diffusion Tube | 100 | 100 | Site setup in August 2015 | | | 46.5 | 45.5 |
| W3 | Roadside | Diffusion Tube | 92 | 92 | Site setup in August 2015 | | | 32.8 | 30.9 |
| AD1 | Kerbside | Diffusion Tube | 100 | 67 | Site setup in May 2016 | | | | 47.1 |
| AD2 | Roadside | Diffusion Tube | 100 | 67 | Site setup in May 2016 | | | | 25.3 |

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

If applicable, all data has been distance corrected for relevant exposure

Notes:

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

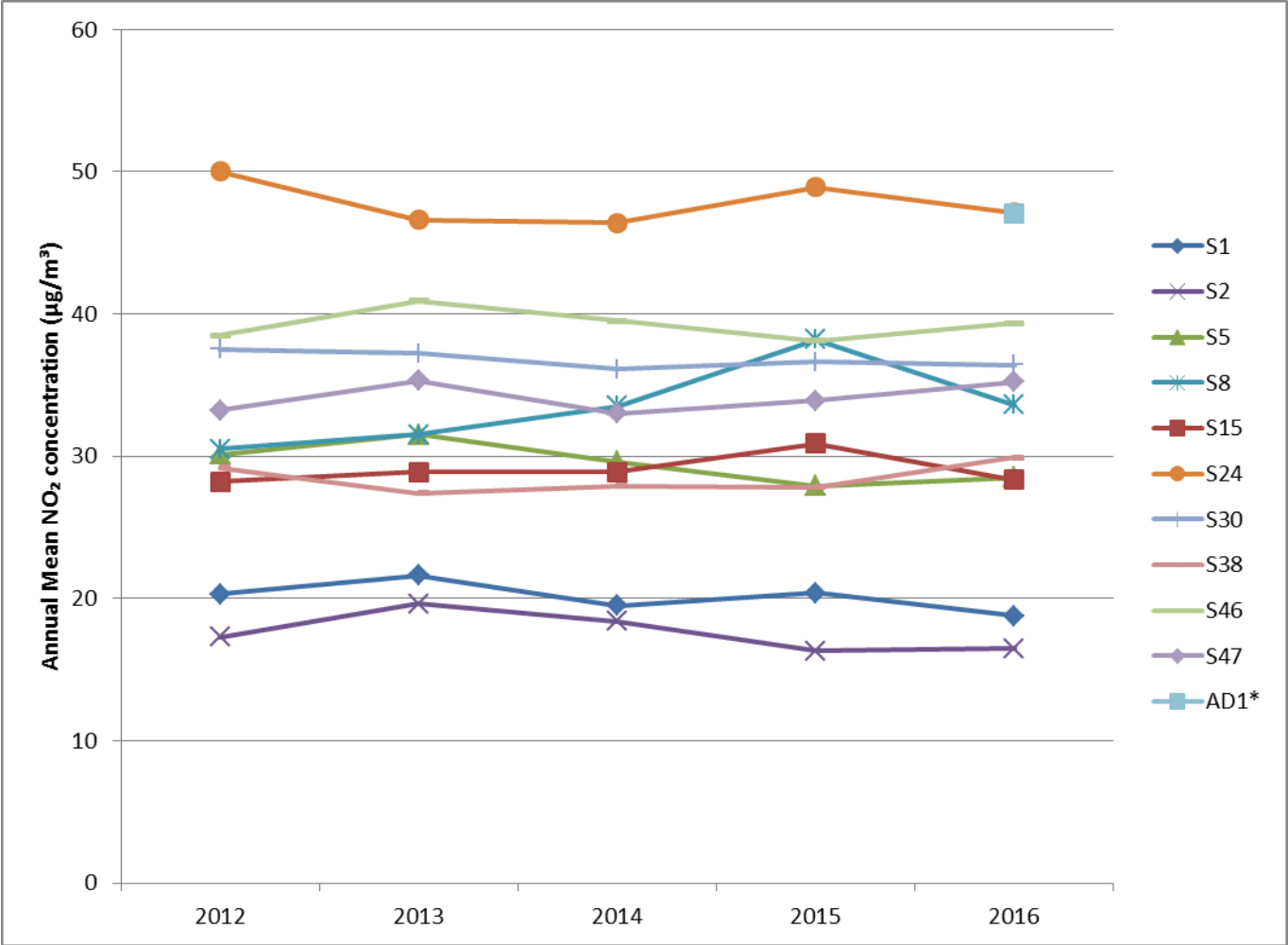
NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

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

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

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

Figure A.1 – Trends in Kerbside Annual Mean NO₂ Concentrations



* Site AD1 only installed in May 2016

Figure A.2 – Trends in Roadside Annual Mean NO₂ Concentrations (1)

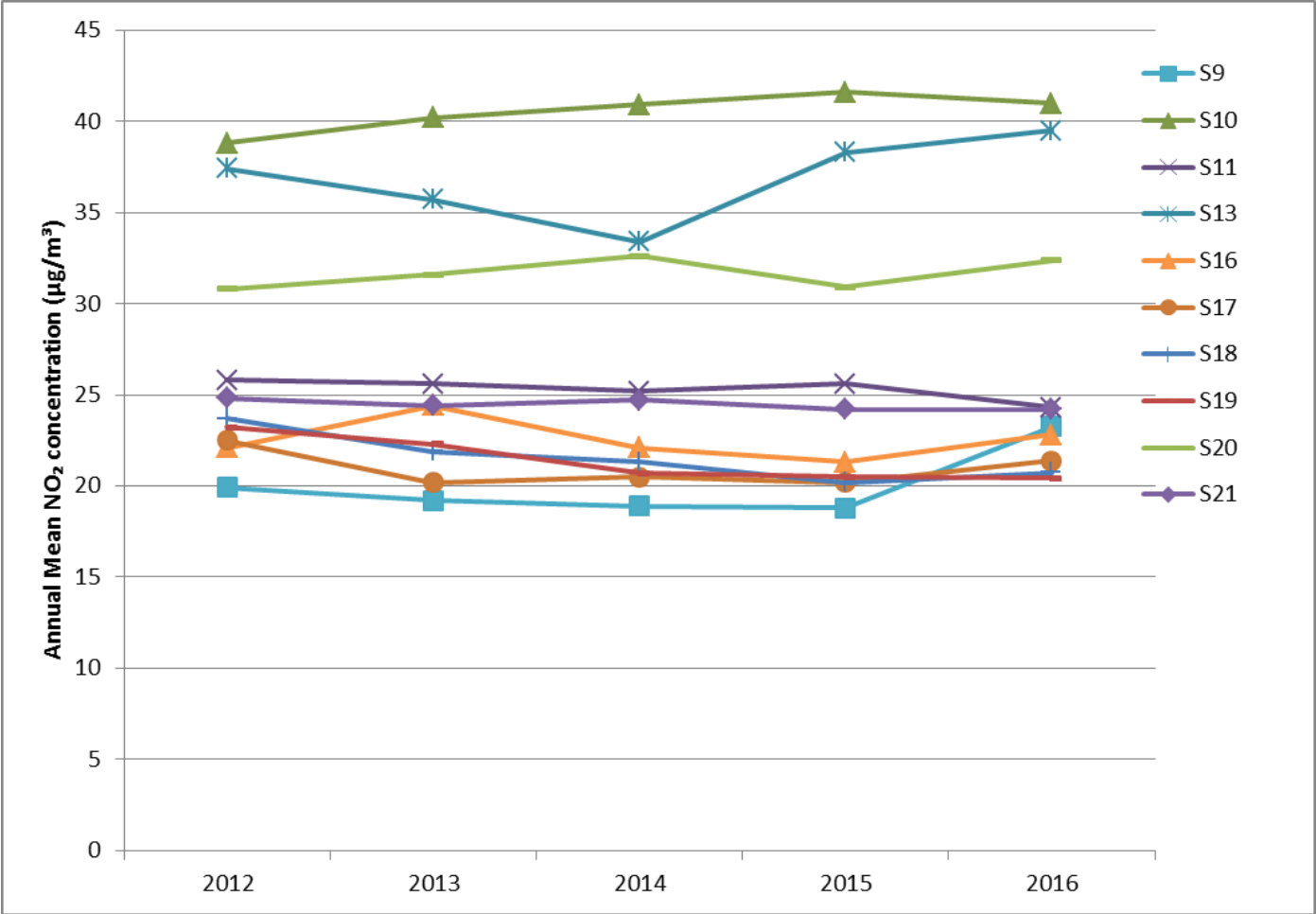


Figure A.3 – Trends in Roadside Annual Mean NO₂ Concentrations (2)

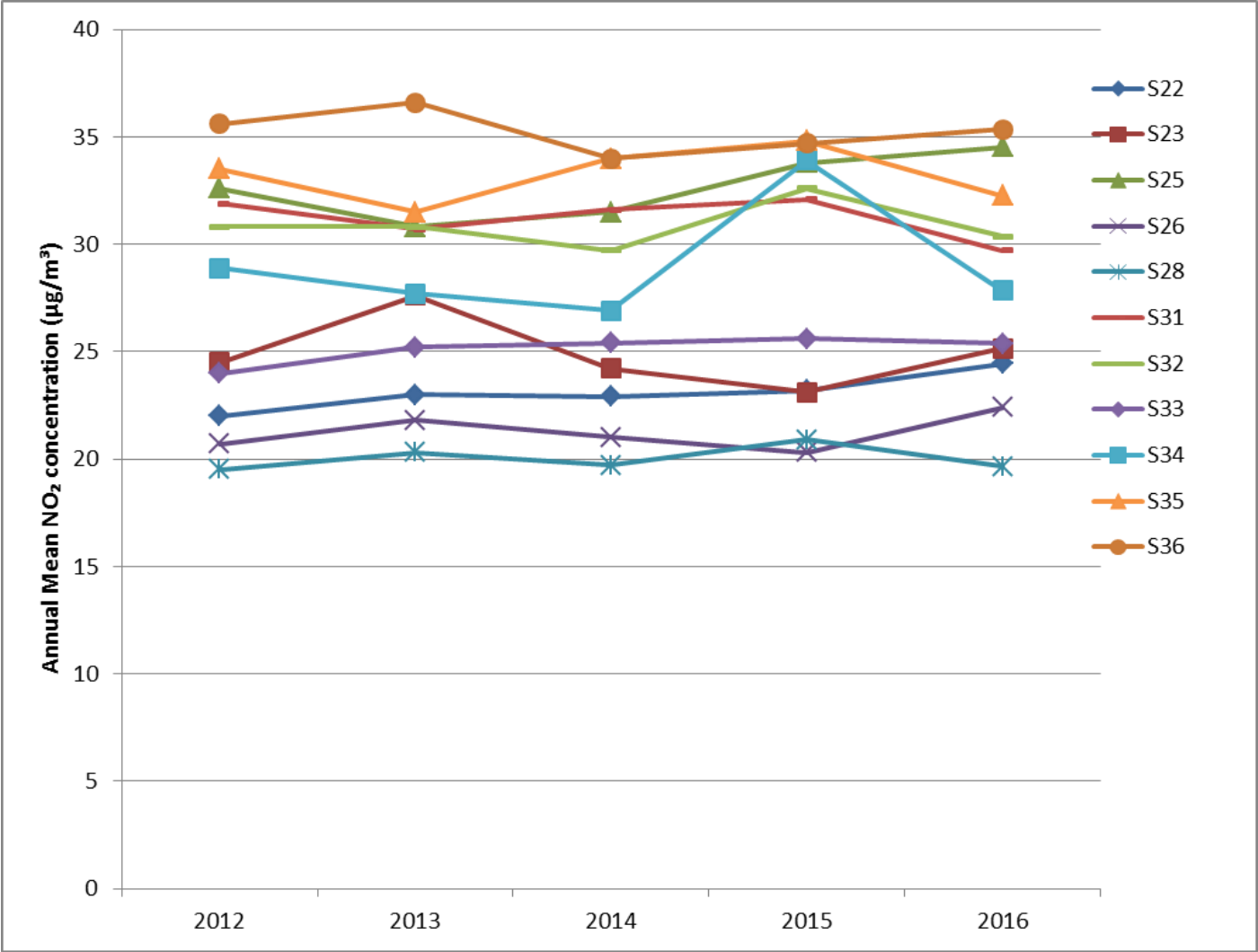


Figure A.4 – Trends in Roadside Annual Mean NO₂ Concentrations (3)

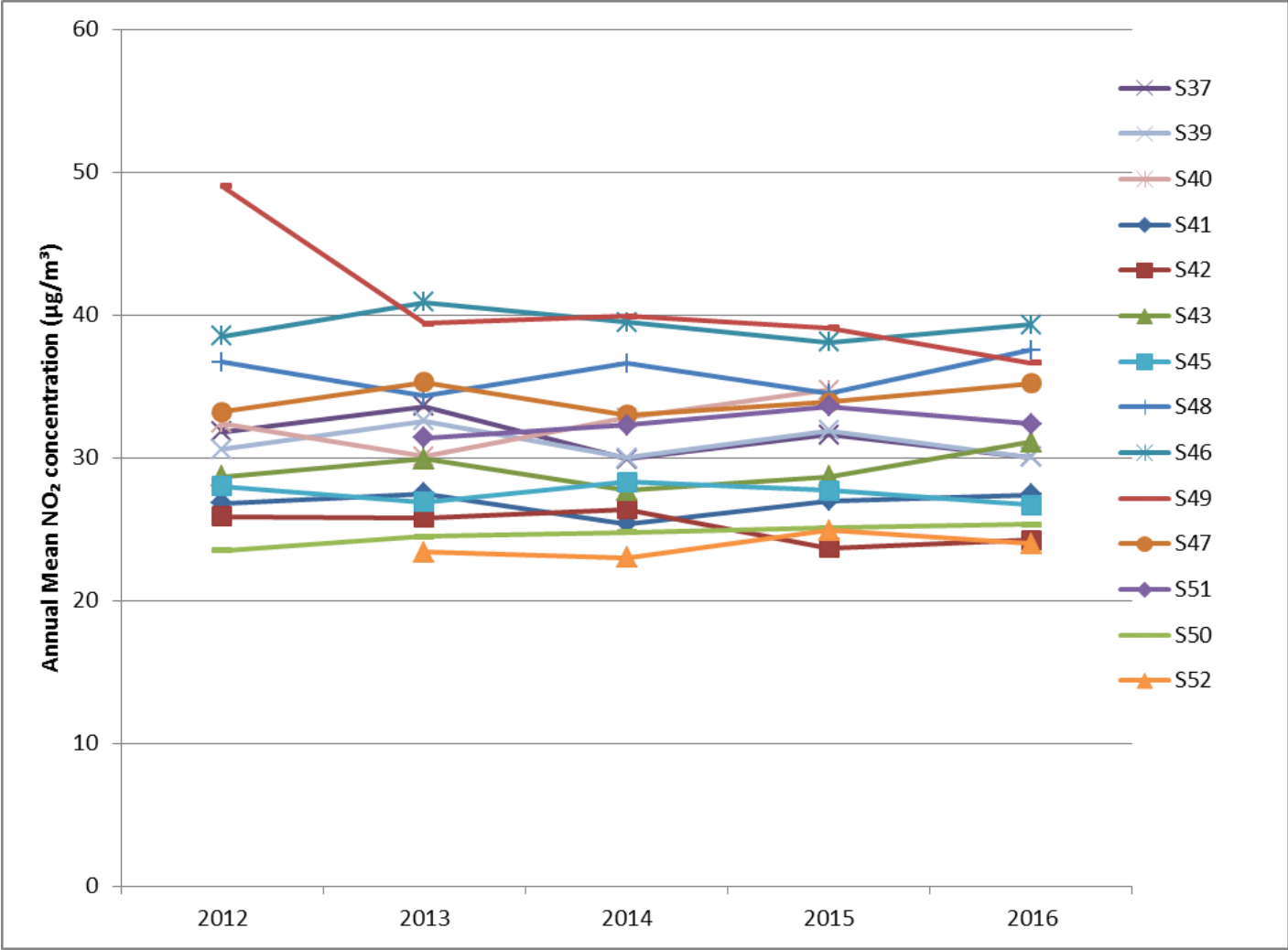


Figure A.5 – Trends in Roadside Annual Mean NO₂ Concentrations (4), at sites opened in 2015 and 2016

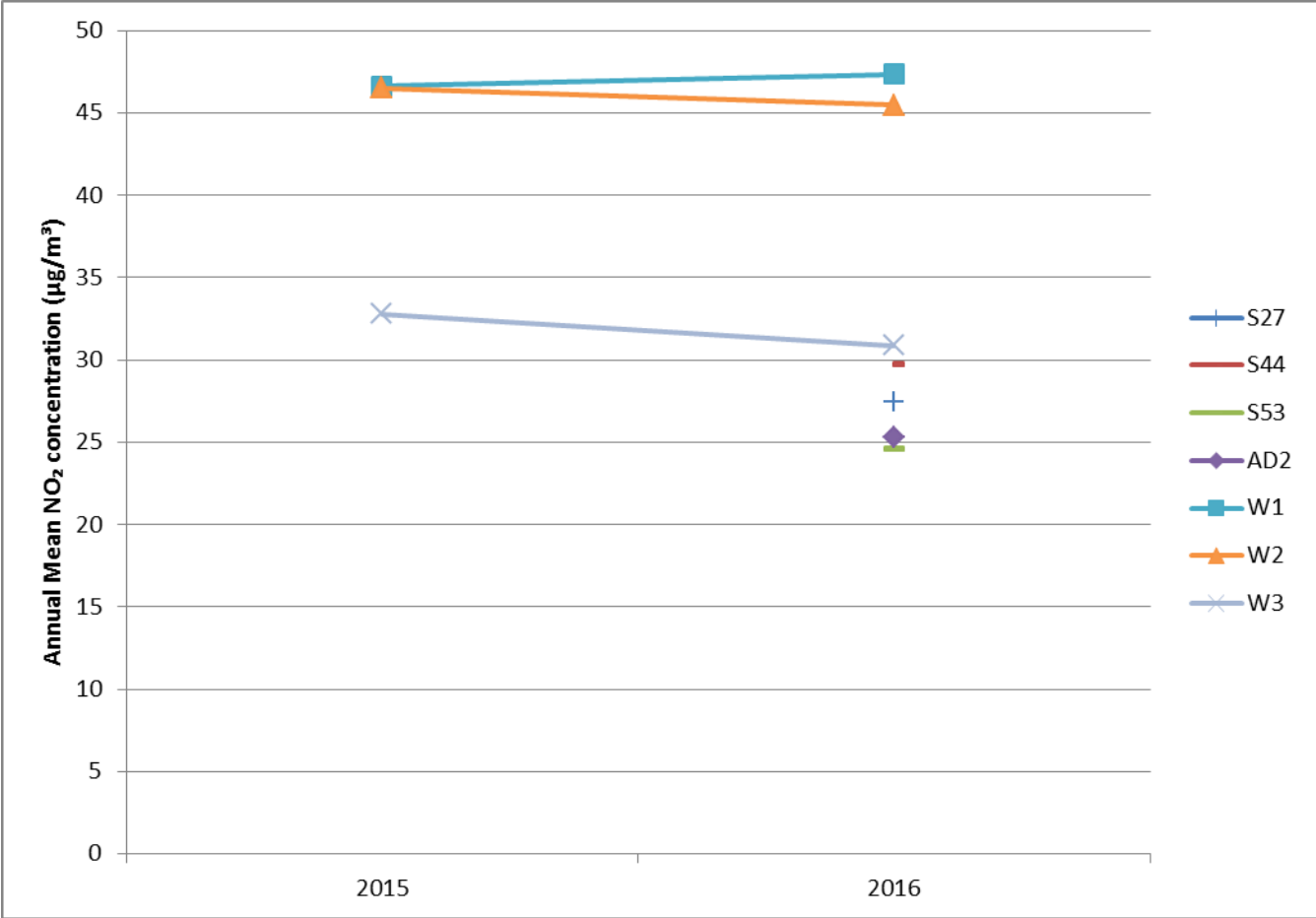


Figure A.6 – Trends in Urban Background Annual Mean NO₂ Concentrations

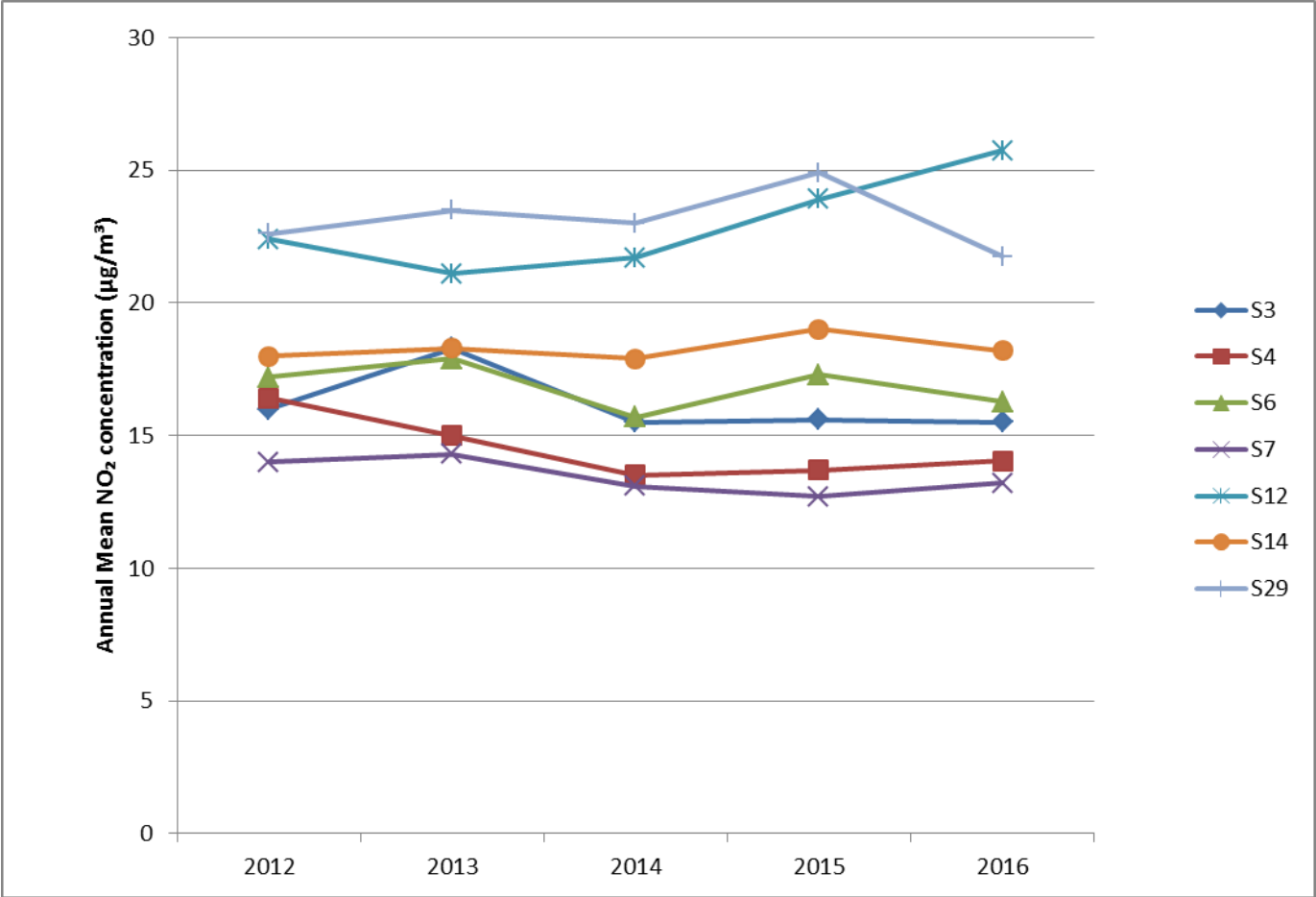


Table A.4 – 1-Hour Mean NO₂ Monitoring Results

| Site ID | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) ⁽¹⁾ | Valid Data Capture 2016 (%) ⁽²⁾ | NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾ | | | | |
|--|-----------|-----------------|---|--|--|------|------|------|------|
| | | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| Rugby Borough Council does not undertake automatic monitoring of NO ₂ | | | | | | | | | |

Notes:

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

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

Table A.5 – Annual Mean PM₁₀ Monitoring Results

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) ⁽¹⁾ | Valid Data Capture 2016 (%) ⁽²⁾ | PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾ | | | | |
|---------|-----------|---|--|--|----------------|----------------|------|------|
| | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| OSR1 | Roadside | 99.9 | 99.9 | No data | No data | No data | 12.8 | 12.5 |

Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ are shown in **bold**.

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

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

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

Table A.6 – 24-Hour Mean PM₁₀ Monitoring Results

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) ⁽¹⁾ | Valid Data Capture 2016 (%) ⁽²⁾ | PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾ | | | | |
|---------|-----------|---|--|---|----------------|----------------|------|------|
| | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| OSR1 | Roadside | 99.9 | 99.9 | No data | No data | No data | 3 | 1 |

Notes:

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

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

Table A.7 – PM_{2.5} Monitoring Results

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) ⁽¹⁾ | Valid Data Capture 2016 (%) ⁽²⁾ | PM _{2.5} Annual Mean Concentration (µg/m ³) ⁽³⁾ | | | | |
|---------|-----------|---|--|---|---------|---------|------|------|
| | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| OSR1 | Roadside | 99.9 | 99.9 | No data | No data | No data | 6.6 | 5.9 |

Annualisation has been conducted where data capture is <75%

Notes:

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2016

| Site ID | NO ₂ Mean Concentrations (µg/m ³) | | | | | | | | | | | | | Annual Mean | | |
|---------|--|------|------|------|------|------|------|------|------|------|------|------|-------------|--|---|--|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Raw Data | Bias Adjusted (0.84) and Annualised ⁽¹⁾ | Distance Corrected to Nearest Exposure ⁽²⁾ | |
| | | | | | | | | | | | | | | | | |
| S1 | 29.4 | 28.5 | 25.3 | 22.6 | 38.2 | 19.2 | 15.3 | 19.1 | 23.2 | 26.6 | 30.1 | - | 22.4 | 18.8 | 18.8 | |
| S2 | 21.3 | 19.8 | 22.8 | 18.3 | 17.7 | 17.8 | 9.9 | 8.1 | 17.2 | 32.1 | 18.1 | 31.5 | 19.6 | 16.5 | 14.6 | |
| S3 | 20.9 | 16.8 | 20.2 | 15.9 | 14.2 | 11.9 | 8.7 | 13.0 | 15.9 | 22.7 | 26.6 | 31.3 | 18.5 | 15.5 | 15.5 | |
| S4 | 11.4 | 17.1 | 17.5 | 16.6 | 12.0 | 12.6 | 9.5 | 12.0 | 16.0 | 23.7 | 25.5 | 24.5 | 16.7 | 14.0 | 14.0 | |
| S5 | 34.0 | 31.3 | 35.8 | 40.6 | 31.6 | 31.0 | 21.6 | 27.9 | 28.7 | 39.9 | 41.4 | 43.4 | 33.9 | 28.5 | 19.0 | |
| S6 | 17.4 | 21.0 | 23.2 | 21.2 | 14.9 | 14.0 | 11.0 | 12.1 | 17.8 | 24.0 | 28.6 | 25.2 | 19.4 | 16.3 | 16.3 | |
| S7 | 17.9 | 15.4 | 16.7 | 14.1 | 11.2 | 11.1 | 7.4 | 10.5 | 12.8 | 17.2 | 21.5 | 28.3 | 15.7 | 13.2 | 13.2 | |
| S8 | - | 43.5 | 48.0 | 42.8 | 41.7 | 39.3 | 34.0 | 36.5 | 40.0 | 46.4 | 47.8 | 52.8 | 40.0 | 33.6 | 26.9 | |
| S9 | 26.4 | 25.4 | 24.5 | 20.2 | 16.6 | 56.3 | 14.1 | 15.7 | 19.7 | 25.2 | 31.7 | 43.7 | 27.7 | 23.3 | 23.3 | |
| S10 | 51.2 | 46.3 | 50.6 | 46.2 | 52.2 | 47.1 | 36.8 | 42.1 | 47.0 | 53.3 | 51.5 | 58.5 | 48.8 | 41.0 | 41.0 | |
| S11 | 34.1 | 31.8 | 35.6 | 29.0 | - | 23.8 | 20.0 | 21.0 | 28.2 | 32.4 | 39.7 | 43.7 | 28.9 | 24.3 | 24.3 | |
| S12 | 38.8 | 28.9 | 29.4 | 25.3 | 55.1 | 18.1 | 18.0 | 18.0 | 22.9 | 28.8 | 39.4 | 44.1 | 30.7 | 25.8 | 25.8 | |
| S13 | 56.0 | 55.0 | 43.7 | 47.7 | 36.3 | 38.2 | 40.9 | 38.6 | 47.0 | 37.2 | 56.4 | 60.9 | 47.0 | 39.5 | 29.4 | |
| S14 | 24.6 | 31.8 | 19.6 | 20.1 | 15.2 | 10.3 | 12.0 | 15.2 | 18.0 | 27.0 | 31.7 | 34.0 | 21.7 | 18.2 | 18.2 | |
| S15 | 46.0 | 37.0 | 33.5 | 31.1 | 28.8 | 27.4 | - | 27.6 | 31.9 | 34.8 | 48.0 | 50.4 | 33.7 | 28.3 | 28.3 | |

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|-----|------|------|------|------|------|------|------|------|------|------|------|------|-------------|-------------|-------------|
| S16 | 24.2 | 25.4 | 27.3 | 31.0 | 26.8 | 24.2 | 15.5 | 20.6 | 25.1 | 33.4 | 35.0 | 36.3 | 27.2 | 22.8 | 22.8 |
| S17 | 31.0 | 27.1 | 26.1 | 21.0 | 18.7 | 17.7 | 13.2 | 14.3 | - | 28.3 | 35.5 | 41.3 | 25.5 | 21.4 | NA |
| S18 | 30.8 | 25.0 | 26.5 | 23.1 | 18.7 | 16.6 | 13.9 | 14.2 | - | 28.4 | 29.5 | 40.5 | 24.7 | 20.7 | NA |
| S19 | 28.3 | 26.9 | 24.9 | 23.5 | 17.9 | 16.6 | 13.4 | 15.1 | - | 28.0 | 30.1 | 39.2 | 24.3 | 20.4 | NA |
| S20 | 39.8 | 38.3 | 43.5 | 32.3 | 35.2 | 36.5 | 18.4 | 25.4 | 37.0 | 47.7 | 44.1 | 56.6 | 38.5 | 32.4 | 25.1 |
| S21 | 28.8 | 28.4 | 29.8 | 27.0 | 23.2 | 25.0 | 23.5 | 24.1 | 32.2 | 31.4 | - | 38.5 | 28.8 | 24.2 | 18.2 |
| S22 | 33.6 | 28.7 | 28.2 | 27.1 | 28.4 | 23.5 | 19.0 | 19.9 | 27.2 | 33.5 | 34.9 | 41.7 | 29.1 | 24.4 | 19.0 |
| S23 | 30.7 | - | - | 32.0 | 30.4 | 26.0 | 19.0 | 21.6 | 28.3 | 34.1 | 41.0 | 34.9 | 29.9 | 25.1 | 19.7 |
| S24 | 60.3 | 59.0 | 62.5 | 57.4 | 53.6 | 52.3 | 46.3 | 52.2 | 51.8 | 56.5 | 61.0 | 59.2 | 56.1 | 47.1 | 47.1 |
| S25 | 43.3 | 36.9 | 43.2 | 43.0 | 35.3 | 35.8 | 30.8 | 32.5 | 38.3 | 46.8 | 53.5 | 50.4 | 41.1 | 34.5 | 34.5 |
| S26 | 31.0 | 25.7 | 27.3 | 24.2 | 20.3 | 17.3 | 19.1 | 19.7 | 25.9 | 25.6 | 36.3 | 42.3 | 26.7 | 22.4 | 22.4 |
| S27 | - | - | - | - | - | - | 21.8 | 24.1 | 30.0 | 42.4 | 35.5 | 47.8 | 33.8 | 27.5 | 22.9 |
| S28 | 26.8 | 20.3 | 25.2 | 20.1 | 16.7 | 16.7 | 11.8 | 18.6 | 21.0 | 28.1 | 30.3 | 39.1 | 23.4 | 19.7 | 19.7 |
| S29 | 34.5 | 26.3 | 30.2 | 25.3 | 21.9 | 15.7 | 16.2 | 19.8 | 23.6 | 31.0 | 31.1 | 33.9 | 25.9 | 21.7 | 21.7 |
| S30 | 42.7 | 55.8 | 49.5 | 45.4 | 41.8 | 37.8 | 27.9 | 35.8 | 41.8 | 51.2 | 54.0 | 39.1 | 43.3 | 36.4 | 36.4 |
| S31 | 32.3 | 38.1 | 42.1 | 37.0 | 34.1 | 31.6 | 22.5 | 30.3 | 33.9 | 38.5 | 33.2 | 47.1 | 35.4 | 29.7 | 29.7 |
| S32 | 39.6 | - | 37.6 | 37.5 | 33.0 | 34.4 | 28.2 | 27.8 | 36.5 | 43.1 | 53.6 | 52.3 | 36.1 | 30.4 | 30.4 |
| S33 | 35.2 | 32.1 | 30.3 | 27.5 | 21.8 | 20.7 | 19.2 | 24.0 | 27.6 | 35.3 | 42.7 | 42.2 | 30.2 | 25.4 | 25.4 |
| S34 | 32.6 | 38.3 | 36.2 | 29.7 | 25.4 | 25.3 | 26.0 | 29.3 | 30.5 | 35.1 | 37.5 | 47.2 | 33.2 | 27.8 | 27.8 |
| S35 | 42.6 | 43.0 | 27.7 | 37.0 | 32.4 | 33.4 | 36.9 | 36.0 | 40.2 | 42.4 | 43.8 | 44.8 | 38.4 | 32.3 | 32.3 |
| S36 | 49.8 | 48.5 | 50.1 | 45.4 | 33.3 | 36.5 | 27.9 | 34.0 | 39.0 | 35.4 | 46.0 | 53.8 | 42.1 | 35.3 | 28.8 |
| S37 | 44.5 | 44.4 | 33.1 | 27.8 | 29.9 | 30.0 | 27.7 | - | - | 37 | - | 44.9 | 35.8 | 30.1 | 27.1 |
| S38 | 35.1 | 32.7 | 36.6 | 30.5 | 27.3 | 36.0 | 24.8 | 38.2 | 29.6 | 35.1 | 52.8 | 43.1 | 35.6 | 29.9 | 22.5 |
| S39 | 40.2 | 40.5 | 37.2 | 33.3 | 29.2 | 32.9 | 26.3 | 28.7 | 33.0 | 41.7 | 37.6 | 46.0 | 35.8 | 30.0 | 30.0 |
| S40 | 37.7 | 36.6 | 43.6 | 45.9 | 37.2 | 38.3 | 27.0 | 35.2 | 36.1 | 47.3 | 52.5 | 56.2 | 41.3 | 34.7 | 34.7 |
| S41 | 29.0 | 33.1 | 36.6 | 34.1 | 31.8 | 31.3 | 19.1 | 22.1 | 30.0 | 36.4 | 40.2 | 44.5 | 32.6 | 27.4 | 27.4 |
| S42 | 34.0 | 31.1 | 28.6 | 30.7 | 28.7 | 27.0 | 16.7 | 16.8 | 24.2 | 40.6 | 33.3 | 35.9 | 28.8 | 24.2 | 21.0 |

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|-----|------|------|------|------|------|------|------|------|------|------|------|------|-------------|-------------|-------------|
| S43 | 38.9 | 37.1 | 39.4 | 33.1 | 33.3 | 35.8 | 25.1 | 28.6 | 34.0 | 44.2 | 42.1 | 49.1 | 37.0 | 31.1 | 27.5 |
| S44 | - | - | - | - | - | - | 23.0 | 30.2 | 30.0 | 44.5 | 46.9 | 45.6 | 36.9 | 29.8 | 21.2 |
| S45 | 32.3 | 30.5 | 32.6 | 27.9 | 26.3 | 28.6 | 24.5 | 24.9 | 30.2 | 32.7 | 39.6 | 45.9 | 31.8 | 26.7 | 21.2 |
| S46 | 23.5 | 47.3 | 54.0 | 52.0 | 47.6 | 47.6 | 32.1 | 38.1 | 44.4 | 48.9 | 63.3 | 55.7 | 46.8 | 39.3 | NA |
| S47 | 39.7 | 36.3 | 43.7 | 42.1 | 38.2 | 39.5 | 33.6 | 36.1 | 41.0 | 48.4 | 52.1 | 49.2 | 41.9 | 35.2 | 28.7 |
| S48 | 49.5 | 46.7 | 44.5 | 39.3 | 36.7 | 41.3 | 33.9 | 38.4 | 44.5 | 41.7 | 55.1 | 57.6 | 44.7 | 37.5 | 37.5 |
| S49 | 34.0 | 43.8 | 47.9 | 41.9 | 40.6 | 43.1 | 33.0 | 34.4 | 40.2 | 48.5 | 59.2 | 51.8 | 43.6 | 36.6 | 27.2 |
| S50 | 34.6 | - | 33.1 | 31.4 | 25.3 | - | 19.3 | 20.6 | 26.2 | 35.4 | 34.8 | 38.5 | 30.1 | 25.3 | 19.4 |
| S51 | 42.0 | 41.2 | 43.6 | 37.3 | 34.8 | 31.2 | 31.0 | 33.0 | 34.9 | 42.8 | 38.5 | 51.1 | 38.6 | 32.4 | 26.9 |
| S52 | 30.4 | 31.3 | 31.7 | 24.0 | 22.3 | 24.8 | 17.4 | 21.1 | 24.4 | 31.1 | 39.0 | 39.6 | 28.5 | 24.0 | 23.1 |
| S53 | - | - | - | - | - | - | 16.3 | 27.5 | 26.7 | 37.0 | 37.2 | 37.4 | 30.5 | 24.6 | 24.6 |
| W1 | 70.0 | 59.1 | 58.5 | 41.9 | 52.7 | 46.5 | 47.1 | 47.0 | 57.1 | 53.6 | 64.3 | 71.0 | 56.4 | 47.4 | 47.4 |
| W2 | 59.0 | 46.7 | 55.1 | 43.6 | 49.8 | 48.3 | 52.8 | 48.7 | 55.4 | 50.9 | 67.2 | 63.6 | 54.1 | 45.5 | 45.5 |
| W3 | 43.0 | 43.3 | 40.2 | 36.0 | 34.5 | 31.3 | 25.3 | 28.2 | 32.8 | 37.8 | - | 50.1 | 36.8 | 30.9 | 19.5 |
| AD1 | - | - | - | - | 40.4 | 50.6 | 45.8 | 44.0 | 53.2 | 55.5 | 58.4 | 78.7 | 54.2 | 47.1 | 47.1 |
| AD2 | - | - | - | - | 26.4 | 32.9 | 20.6 | 20.8 | 27.6 | 27.1 | 37.7 | 35.9 | 29.2 | 25.3 | 22.5 |

Local bias adjustment factor used

National bias adjustment factor used

Annualisation has been conducted where data capture is <75%

Notes:

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

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

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

(2) Distance corrected to nearest relevant public exposure.

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

QA/QC of Diffusion Tube Monitoring Data

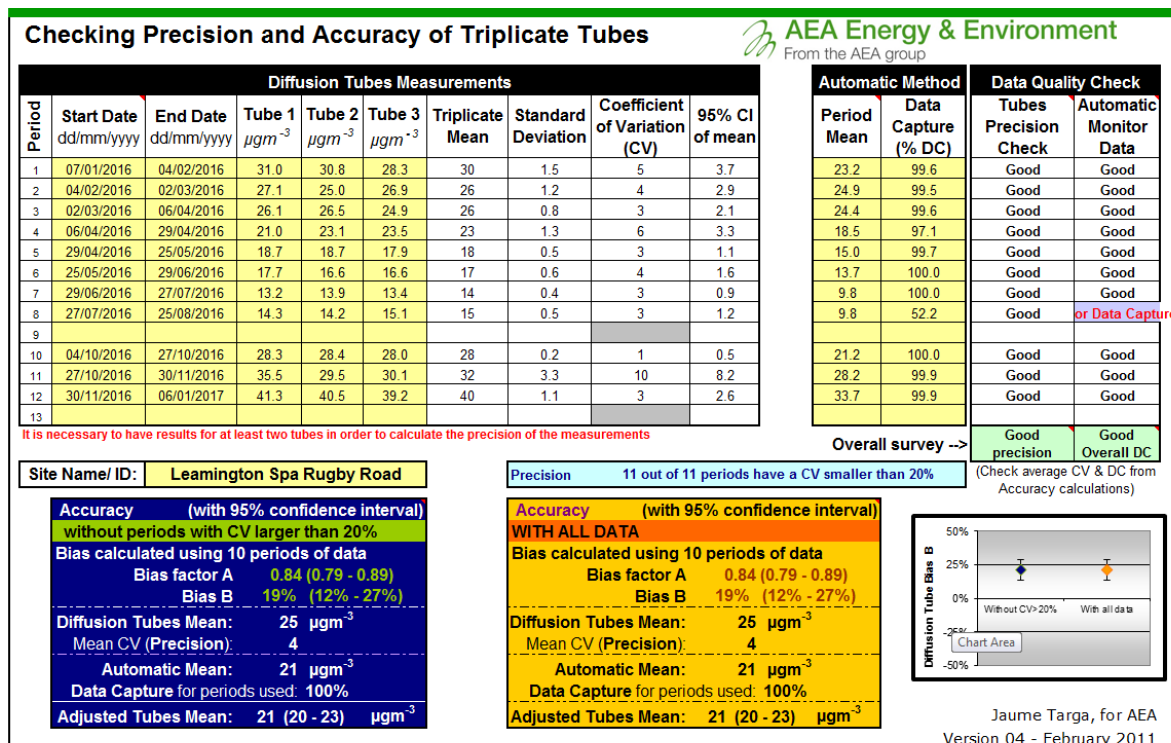
Rugby Borough Council's NO₂ diffusion tubes are supplied and analysed by Environmental Services Group (ESG), Didcot using the 50%TEA in Acetone method. Analyses are performed in accordance with standard operating procedure ANU/SOP/1015 Issue 1. This method conforms to the guidelines set out in Defra's 'Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance' document.

ESG Didcot participates in the AIR NO₂ PT scheme. This scheme forms an integral part of the UK NO₂ Network's QA/QC, and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). In AIR NO₂ PT rounds AR0012, 16, and 18 ESG Didcot achieved 100% satisfactory scores and in AIR NO₂ PT rounds AR0013 and AR0015 ESG Didcot achieved 75% satisfactory scores.

Bias Adjustment of Diffusion Tube Data

A local bias adjustment factor was calculated from the triplicate co-location of diffusion tubes alongside the AURN monitoring station at Leamington Spa Rugby Road. The local bias adjustment factor was calculated as 0.84; details of the calculation are provided in Figure C.1.

Figure C.1 – Local Bias Adjustment Factor Calculation



If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

A national bias adjustment factor was obtained from the national Diffusion Tube Bias Adjustment Factors Spreadsheet for March 2016. Based on the analytical laboratory (ESG Didcot) and tube preparation method (50%TEA/Acetone) a national bias adjustment factor of 0.77 was derived for 2016.

The use of the local bias adjustment factor is considered preferable, particularly when the data used for the calculation are precise and reliable. Given the good quality of the co-location data the local bias adjustment factor has been used to adjust the raw NO₂ diffusion tube results for 2016.

Short-term to Long-term Data Adjustment

Data capture rates for the 51 of the 56 diffusion tube monitoring sites are 75% or greater for the 2015 period; consequently, it is not necessary to seasonally adjust any of these monitored concentrations.

However, for five locations including three of the original sites whose locations were changed in July 2016 (S27, S44 and S53) and the two new sites commissioned in May 2016 (AD1 and AD2), seasonal adjustment was carried out using AURN data from three nearby automatic monitoring stations: Birmingham Acocks Green, Leamington Spa and Leicester University. Details are shown in Table C.1 below.

Table C.1 – Seasonal Adjustment Factor Calculation

| | Birmingham Acocks Green | Leamington Spa | Leicester University |
|--------------------------------|-------------------------------|-------------------|-------------------------|
| Annual Mean [Am] | 21.3 | 21.4 | 28.4 |
| Period Mean [Pm] (S27) | 21.8 | 22.9 | 28.8 |
| Average Am/Pm ratio | 0.967 | | |
| Period Mean [Pm] (S44, S53) | 21.9 | 23.1 | 28.9 |
| Average Am/Pm ratio | 0.960 | | |
| Period Mean [Pm] (AD1, AD2) | 20.6 | 20.6 | 27.7 |
| Average Am/Pm ratio | 1.033 | | |

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

Figure D.1 Map of Parkfield Road Turnkey Osiris Monitoring Location

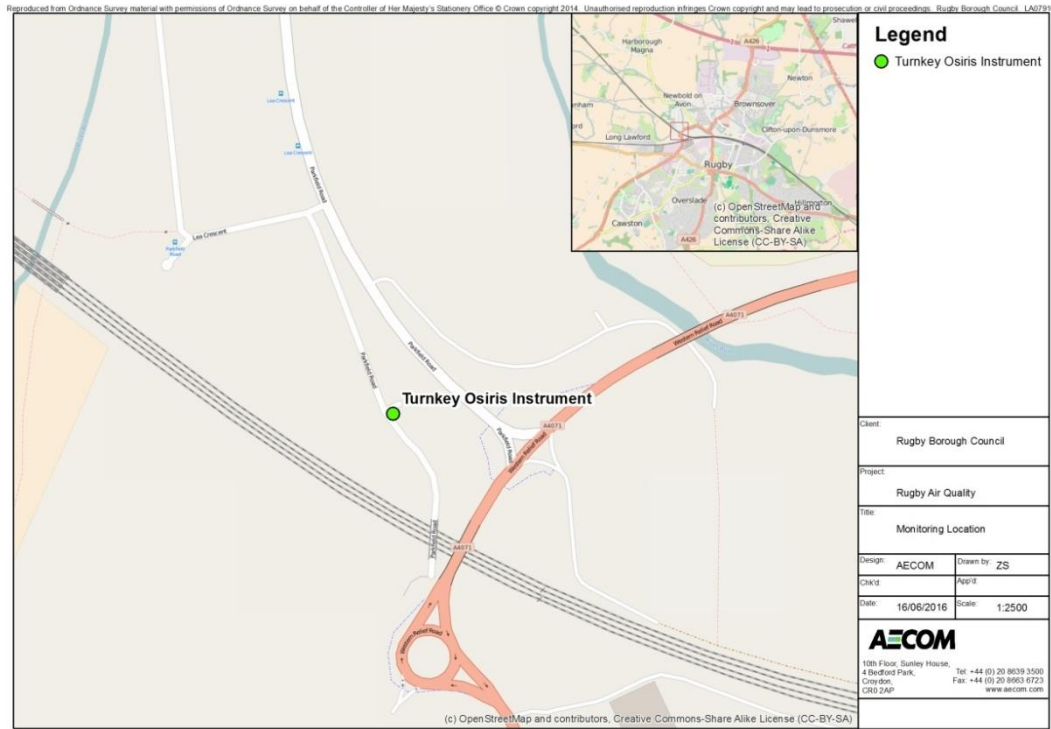


Figure D.2 Map of NO₂ Diffusion Tube Monitoring Locations and AQMA

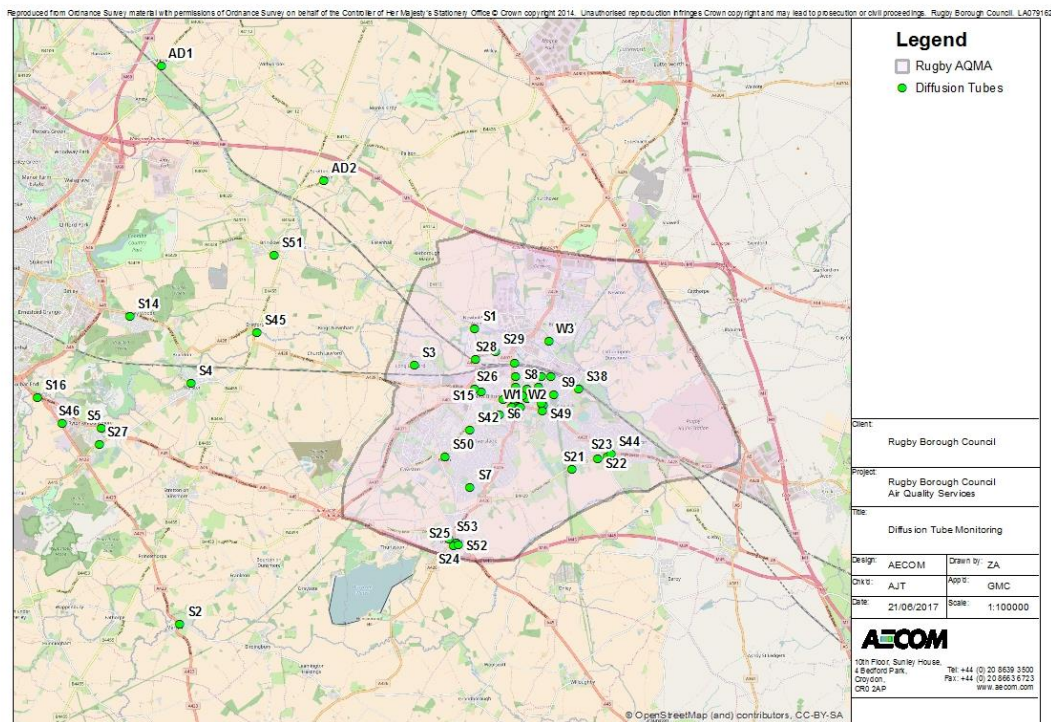


Figure D.3 Map of NO₂ Diffusion Tubes in Rugby Town Centre

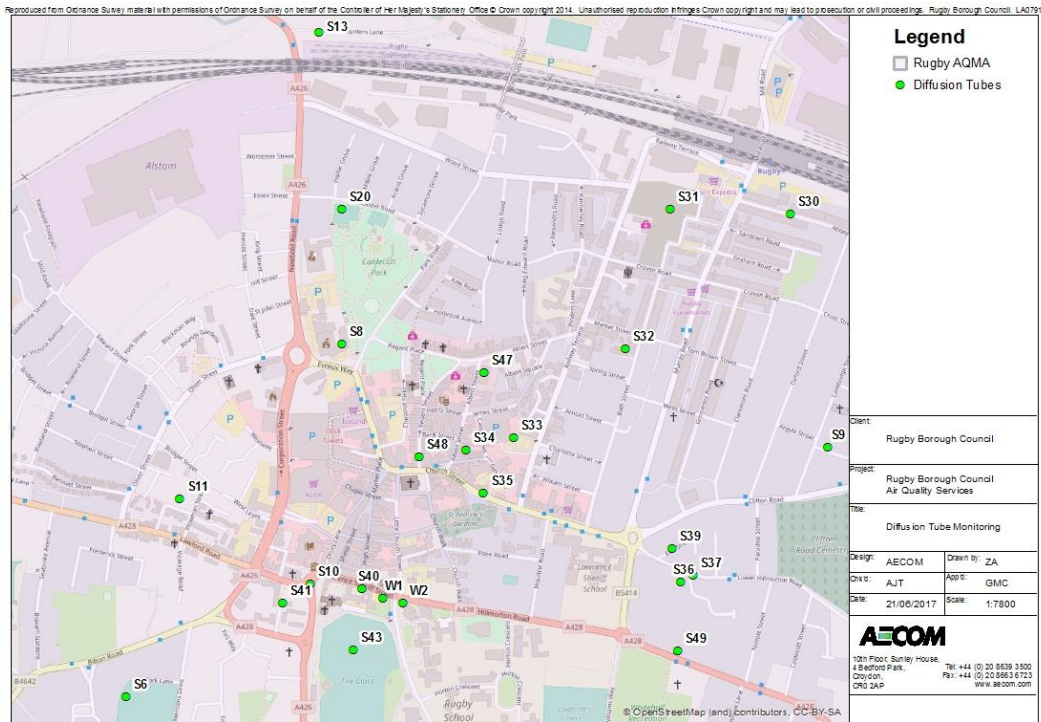
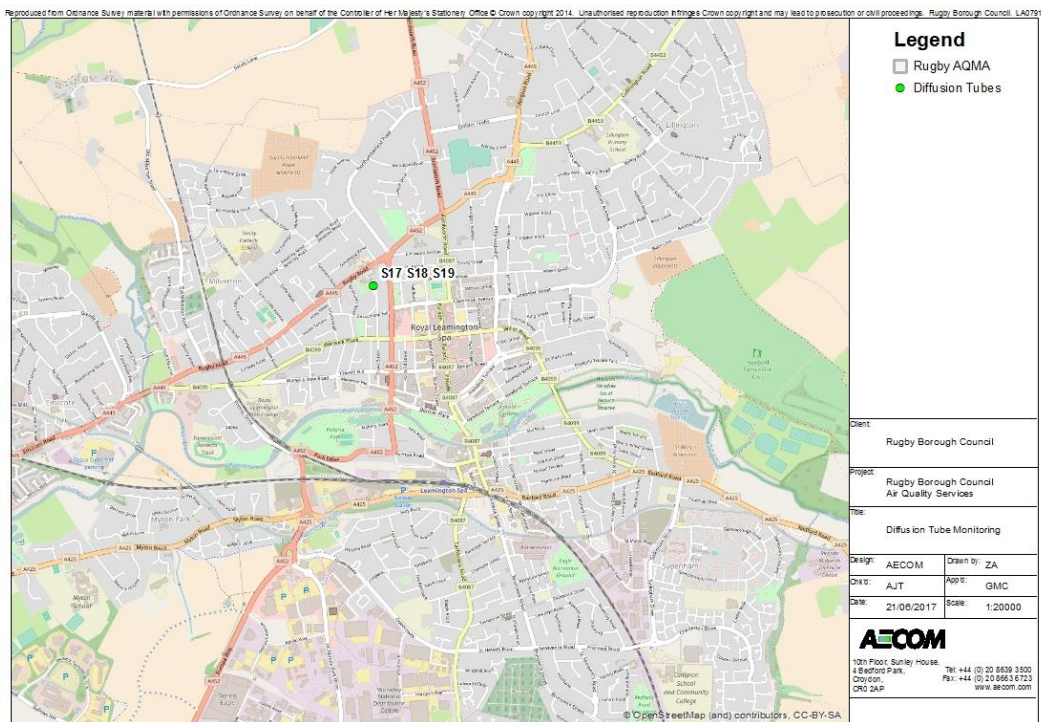


Figure D.4 Map of NO₂ Diffusion Tubes in Leamington Spa



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

| Pollutant | Air Quality Objective ¹⁰ | |
|--|--|----------------|
| | 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 |

¹⁰ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

| Abbreviation | Description |
|-------------------|---|
| AQAP | Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values' |
| AQMA | Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives |
| ASR | Air quality Annual Status Report |
| Defra | Department for Environment, Food and Rural Affairs |
| DMRB | Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England |
| EU | European Union |
| FDMS | Filter Dynamics Measurement System |
| LAQM | Local Air Quality Management |
| NO ₂ | Nitrogen Dioxide |
| NO _x | Nitrogen Oxides |
| PM ₁₀ | Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less |
| PM _{2.5} | Airborne particulate matter with an aerodynamic diameter of 2.5µm or less |
| QA/QC | Quality Assurance and Quality Control |
| SO ₂ | Sulphur Dioxide |

References

1. Environmental equity, air quality, socioeconomic status and respiratory health, 2010
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