2018 Air Quality Annual Status Report (ASR)

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

July 2018

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Executive Summary: Air Quality in Our Area

Air Quality in Rugby Borough Council

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

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

The main pollutants of concern in Rugby, as in most areas of the UK, are associated with road traffic, in particular NO_2 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 NO_2 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.

Actions to Improve Air Quality

Rugby Borough Council has developed a new Health Protection Strategy on the reduction of NO_2 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

[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

- 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 NO_2.

• Continue to monitor NO_2 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 started campaign on Active Transport in 2017. It covers Coventry and Warwickshire and involves 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 and allocations in the emerging Local Plan are listed below:

1. A replacement primary school, new secondary school, and new Special Education Needs school at Rokeby Estate, Rugby. Please note that this is currently subject to a legal challenge.

2. Coton Park East – An allocation in the emerging Local Plan for around 800 dwellings.

3. Gala & Cemex House, Evreux Way – An Outline application for 6255 square metres of retail and an additional 785 square metres of A1/A2/A3/A4/A5 has been

approved but not yet implemented. In addition, a further planning application is being considered under reference R17/0971 for the erection of a two storey drive through restaurant and associated works for 580 square metres of floorspace.

4. Land to the north of Ashlawn Road – allowed on appeal decision for development of up to 860 dwellings and associated school. Planning Appeal Reference: APP/E3715/W/16/3147448.

5. Urban Expansion South West of Rugby – an allocation in the emerging Local Plan for around 5,000 residential dwellings with associated infrastructure comprising of link road, health/community facility, and employment uses, including a local centre, together with primary and secondary schools. This site also covers the development proposal for Ashlawn Road.

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 centre, 3 primary schools and 1 secondary school. Phase 2 is currently under construction. Phase 3 is due to start construction in Autumn 2018.

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), and Phase 4 (134 dwellings) is under construction.

3. Leicester Road/Technology Drive – permission granted for 620 dwellings. The first three phases comprised of 87 dwellings for phase 1, 40 apartments for phase 2, and 75 dwellings for phase 3 and have been completed. On the south side of the development site, three further sites were granted planning permission for Leicester Road West for 87 dwellings, Butterfield Gardens for 101 dwellings (both of which were completed) and Land South of Technology Drive was granted planning permission for 230 dwellings which represents the final phase and is under construction.

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 is now fully constructed and occupied.

6. Junction 1 Retail Park – 5,670 m^2 retail park is now completed and occupied.

7. Coton House – 82 residential properties nearing completion and partly occupied.

8. Cawston Extension – Outline planning permission granted for up to 600 homes under reference R11/0114. However, the site has been divided into four sections with four different developers. Each of the four sections have been substantially completed and partly occupied. The northern most section has been constructed by William Davis for 184 dwellings under reference R16/1721. The southern site has been constructed by Linden Homes for a total of 246 dwellings (from combined planning permissions of R16/1780 and R17/1885). To the east of these two sites, Redrow Homes constructed 113 dwellings (from planning permission R15/0540), whilst the furthest site to the east has been constructed by Triosquare and comprises 10 dwellings granted under combined references of R12/1947 and R16/2295 (it should be noted that these last two permissions were not part of the original outline under R11/0114). In total, these four sections comprise 553 dwellings, nearing completion, and partly occupied.

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.
- 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 website[4], and Defra's Local Air Quality Management (LAQM) website[5].

[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 2017. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by 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		
						At Declaration	Now	Name	Date of Publication	Link
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/Rugby BC%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 2017 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 Plan[6]. 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.

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, together with a more integrated approach to the treatment of planning applications, linking the policy approach to planning applications, especially for schemes either affecting or within the AQMA.

Rugby Borough Council has developed in conjunction with the Air Quality Alliance, a consultant and Planning Policy Officers a new Air Quality Supplementary Planning Document. This will provide guidance to planners of what developments require Air Quality Assessment and what mitigation is suitable to minimise the negative impacts on air quality within the AQMA and try and ensure that future development remains air quality neutral

It has been agreed with Warwickshire County Council to develop a Rugby Specific Local Transport Plan which will include specific Air Quality Strategy with policies directed at tackling air quality issues in particular congestion and exceedances around the Warwick Street Gyratory. This will feed into an updated Air Quality Action Plan.

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 draft[7] 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 emerging draft, an Air Quality Supplementary Planning Document will be released to facilitate the understanding of air quality considerations for developers and planners. This is primarily based upon policy HS5, which sets out the requirements for developments in terms of air quality, both within the AQMA and for

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

applications that affect it, including the gyratory. The key emphasis is on major developments, which are those planning applications with 10 units or more, or those that have an air quality impact within the AQMA. Currently, hearings carried out by an Independent Inspector have concluded and the plan is still being examined. It is anticipated that a further consultation will take place over the summer of 2018 and following this, the plan will proceed towards adoption.

Warwickshire County Council is the highways authority for Rugby. The Warwickshire Local Transport Plan[8] 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. The County are also developing a Sustainable Transport Strategy which has links with Air Quality.

[8] 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.
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

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
											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	
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

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
											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.
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. Currently the Euro 6 vehicles we have consists of 13 x refuse freighters', 1 x road sweeper 1 x highways tipper and 7 x housing vans/tippers 3.5t. All replacement vehicles will be Euro 6.	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.	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

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
									Finance has been provided through developers of committed planning developments		measureable emissions reductions of NOx and PM10
K	Cycling	Promoting Travel Alternatives	Promotion of cycling	WCC	Ongoing	Ongoing	Increase in cycling as a result of individual scheme implementation	N/A	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. WCC and RBC provide cycle training for young people and adults who are keen to improve their cycle skills. Cycle facilities have been provided as part of RWRR. The Leicester Road viaduct Connect2 scheme opened in 2014. 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.	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	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	Ongoing	

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
									kerbs, and footway resurfacing/ reconstruction.		
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	Workplace Travel Plans are secured through a S106 agreement as part of new development.	N/A	
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	

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
Q	Energy efficiency improve-ments to Rugby housing & the reduction of fuel poverty.	Policy Guidance and Development Control	Low Emissions Strategy	RBC	Ongoing	Ongoing	HECA report published March 2017, and will be updated at two yearly intervals	N/A	Across the borough we have provided the following services: * 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	DECC statistics show that CO_2 emissions by domestic use (Units kt CO_2) have reduced from 215.7 in 2009 to 213.3 in 2013, a per capita reduction from 21.8 to 19.8 We aim to reduce CO_2 emissions in the housing sector to 172.6kt $CO_2$of 2009 (215.7kt CO_2) levels by 2020. This will be equivalent to a 20% reduction.
Q (cont.)									Council tenants have benefitted from these improvements and services: * electric to gas conversions for 173 properties * new windows and doors to		

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
									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	37 Permitted Industrial Pollution Process (100% inspections completed) achieved 97.3% compliance improvements.	N/A	One site was not compliant making 97.3% compliance improvements achieved
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
U	Planning Development and Planning Applications	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	RBC	Ongoing	Ongoing	N/A	N/A	Air quality assessments have been requested for land use planning developments that meet AQMA thresholds in the Rugby Borough Local Plan (July 2006). The requirements for future assessments have now been embodied in a new Planning Obligations Supplementary Planning Document adopted in	Consultation on on Proposed Modifications – Summer 2018 Receipt of Inspector's Report –	Ongoing Core Strategy 2011 remains the up to date plan until the emerging Local Plan is adopted. The Planning Obligations Supplementary Planning Document adopted in March 2012 remains the

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
									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. The emerging Local Plan is currently being examined by an Independent Inspector and a further consultation process will take place prior to adoption. A new AQ SPD will be produced in conjunction with the air quality alliance and Planning Policy.	Autumn 2018 Adoption: January 2019	most up to date SPD until superseded by the emerging Air Quality Supplementary Planning Document, expected to be adopted by January 2019. Section 7 covers Air Quality as well as providing an air quality guidance document for developers that was agreed by Cabinet 4th February 2013 Work on new Air Quality Supplementary Planning Guidance continues alongside the emerging Local Plan.
Q	Development of Rugby specific Local Transport Plan	Transport Planning and Infrastructure	Other	WCC/RBC	2018	Ongoing	N/A		It has been agreed with Warwickshire County Council Highways to provide a Rugby Specific Local Transport Plan and develop a transport strategy to reduce congestion and impacts of vehicles on Air Quality	Early2019	Need cooperation from WCC

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.

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 NO_2 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 SO_2 and PM_{10} 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/m^3 to 13.0 µg/m^3.

In 2012, the council took the decision to decommission the entire continuous monitoring network as PM_{10} concentrations at the remaining monitoring locations were well below the air quality objectives. Annual mean PM_{10} concentrations between 2008 and 2012 were well below the annual mean PM_{10} objective and showed evidence of reductions over time; exceedances of the daily PM_{10} standard of 50 µg/m^3 were also within the 35 permitted days per year (see Appendix A). The annual mean NO_2 concentrations were exceeding the objective at this time. An extensive NO_2 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, PM_{10} 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. The Council operated a Turnkey Osiris dust monitor, located at Parkfield Road to monitor emissions from the Sita/Suez Climafuel plant until December 2017. The Osiris is capable of measuring multiple particulate size fractions, including PM_{10} and $PM_{2.5}$, and whilst these dust monitors are not certified as reference equivalent they can provide a general indication of PM_{10} 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

3.1.1 Automatic Monitoring Sites

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

Rugby Borough Council undertook automatic (continuous) monitoring at one site during 2017. 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 NO_2 at 56 sites during 2017, including one triplicate co-location at the AURN station at Leamington Spa, Stamford Gardens Rugby Road (Tubes S17-S19).

From August 2017 onwards monitoring was stopped in three locations (W1-3). These were commissioned in 2015 at the request of a local Councillor and were in place during the redevelopment of the Warwick Street gyratory which was completed in May 2015. The data from January 2017 to July 2017 for W1-3 are shown in this report and the mean NO_2 concentrations have been annualised.

Table A.2 in Appendix A shows the details of all of the operational sites in 2017. Maps showing the location of the monitoring sites are provided in Appendix D.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B.

During 2017, the annual mean NO_2 objective was exceeded at four diffusion tube locations (S24, S49, W1 and W3). Site S24 in Dunchurch Square is the only diffusion tube site to have consistently exceeded the air quality objective, year on year, since 2013. S24 is positioned within the existing AQMA and is considered a location of relevant exposure. Although the annual mean NO_2 concentration remained above the national air quality objective in 2017, a large decrease in NO_2 concentration was observed relative to 2016. This is the lowest concentration since 2014 and it continues the reduction in NO_2 concentrations which started in 2016. (Figure A.1).

Site S49, located on the roundabout joining Hilmorton Road and Whitehall Road, exceeded the air quality objective for the first time since 2012. Measured concentrations from September to December at S49 were much higher than the earlier months of 2017 (Table B.1). The increase in concentration is likely to be a result of major road works on Hilmorton Road either side of the Whitehall Road roundabout. S49 is located within the existing AQMA but is not considered a location of relevant exposure. After distance correction, the annual mean NO_2 concentration in 2017 at the nearest location of relevant exposure was predicted to be 30.2 µg/m^3 (Table B.1), which is well below the annual mean NO_2 objective. As a result of the large increase in NO_2 concentration compared to the 2016, concentrations at S49 will

be compared in next year's ASR to determine whether the increase in NO_2 concentration was a result of the roadworks occurring at the time.

At sites W1, W2 and W3, all located at the roadside of the Warwick Street gyratory system near the centre of town within the existing AQMA, concentrations of 45.1 µg/m^3, 43.3 µg/m^3 and 26.6 µg/m^3 were measured respectively. The major improvement works to the gyratory system, part of the AQAP (Measure B - Table 2.2), were completed in May 2015. 2017 was the second 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 NO_2 concentration. At sites W1, W2 and W3, a decrease in annual mean NO_2 concentrations was recorded during 2017 and the concentrations at all three sites were the lowest since monitoring started in 2015 (Table B.1). Due to the decrease in annual mean NO_2 concentrations at these sites since the improvement works to the gyratory system monitoring has been stopped.

A major road improvement scheme for the A45/A46 Tollbar End roundabout in southern Coventry was completed in December 2016. This scheme reduced the volume of traffic using the roundabout by providing a dual-carriageway underpass, and reduced congestion. At sites S5 and S16, which are located in this area, annual mean NO_2 concentrations of 25 µg/m^3 and 18.2 µg/m^3 were measured which is a reduction compared to 2016 and the NO_2 concentrations are well within the air quality objective. These results potentially show a net-beneficial impact on local air quality due to the road improvement scheme.

On the basis of these results, with four sites within the current AQMA exceeding the annual mean NO_2 objective, there is no justification for amendment of the currently declared Rugby AQMA.

3.2.2 Particulate Matter (PM_{10})

Rugby Borough Council does not currently operate any automatic monitoring stations for PM_{10} that are equipped with reference method analysers. Prior to June 2012 Rugby Borough Council operated an extensive network of automatic monitoring stations measuring PM_{10} concentrations throughout the Borough. Following several years of monitored PM_{10} concentrations being well below the relevant air quality objectives, these monitoring stations were decommissioned.

However, monitoring of TSP, PM_{10}, $PM_{2.5}$ and PM_1 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.4 in Appendix A compares the ratified monitored PM_{10} annual mean concentrations for the past 3 years with the air quality objective of 40 µg/m^3. The annual mean PM_{10} concentration for 2017 was 11.3 µg/m^3, which is well below the annual mean PM_{10} objective and slightly below the 2015 annual mean concentration.

Table A.5 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 3 years with the air quality objective of 50 µg/m^3, not to be exceeded more than 35 times per year. In 2017 there were no days where PM_{10} concentrations were greater than 50 µg/m^3.The maximum 24-hour mean PM_{10} concentration was 39.9 µg/m^3.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.6 in Appendix A presents the ratified monitored $PM_{2.5}$ annual mean concentrations for the past 3 years. In 2017, the annual mean $PM_{2.5}$ concentration was 5.6 µg/m^3. This is well below the annual mean $PM_{2.5}$ objective value of 25 µg/m^3 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, PM10, PM2.5, PM1	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	NO2	YES	0	0.5	NO	2.5
S2	Marton A423	Kerbside	440830	269008	NO2	NO	5	1	NO	2.5
S3	69 School Street	Urban Background	447316	276162	NO2	YES	0	15	NO	2.5
S4	St Margaret's School, Wolston	Urban Background	441131	275648	NO2	NO	0	90	NO	2.5
S5	Ryton Village Hall, High Street	Kerbside	438642	274418	NO2	NO	25	0.5	NO	2.5
S6	2 West Field Road	Urban Background	449671	274795	NO2	YES	0	10	NO	2.5
S7	68 Cymbeline Way	Urban Background	448863	272786	NO2	YES	0	10	NO	2.5
S8	EHO Treatment, Newbold Road	Kerbside	450138	275557	NO2	YES	10	1	NO	2.5
S9	(Argyle Street) Cambridge Street	Roadside	451187	275334	NO2	YES	0	5	NO	2.5
S10	Webb Ellis Pub, Corporation Street	Roadside	450069	275040	NO2	YES	0	5	NO	2.5

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)
S11	15 Oliver Street	Roadside	449787	275224	NO2	YES	0	5	NO	2.5
S12	Boughton Leigh School, Hollowell Way	Urban Background	451445	277245	NO2	YES	0	56	NO	2.5
S13	Avon Mill Pub, Newbold Road	Roadside	450088	276229	NO2	YES	15	3	NO	2.5
S14	Binley Woods, Village Hall	Urban Background	439450	277523	NO2	NO	0	20	NO	2.5
S15	Lawford Road / Jubilee Street, Arnie's Batch	Kerbside	449168	275411	NO2	NO	0	0.5	NO	2.5
S16	Hotel, London Road A45, Ryton	Roadside	436867	275275	NO2	NO	0	19	NO	2.5
S17, S18, S19	Stamford Gardens Rugby Road	Roadside	431271	266404	NO2	NO	n/a	6	YES	2.5
S20	Newbold Road	Roadside	450137	275849	NO2	YES	25	3	NO	2.5
S21	Corner of Percival Road and Ashlawn Road	Roadside	451698	273273	NO2	YES	15	2	NO	2.5

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)
S22	Corner of Fisher Avenue and Ashlawn Road	Roadside	452403	273567	NO2	YES	18	5	NO	2.5
S23	Paddox Pub Corner	Roadside	452672	273633	NO2	YES	13	3	NO	2.5
S24	Dun Cow, Dunchurch Square	Kerbside	448496	271244	NO2	YES	0	0.5	NO	2.5
S25	Southam Road, 'Crystal', Dunchurch	Roadside	448414	271175	NO2	YES	0	2	NO	2.5
S26	Lawford Road, (former Simms Scrap Yard)	Roadside	448999	275505	NO2	YES	0	12	NO	2.5
S27	Leamington Road, Ryton on Dunsmore	Roadside	449435	275543	NO2	NO	7	2.5	NO	2.5
S28	256 Parkfield Road	Roadside	449011	276329	NO2	YES	0	2	NO	2.5
S29	Avon Valley School	Urban Background	449575	276540	NO2	YES	0	35	NO	2.5
S30	Murray Road (Bus Stop Nr Rail Station)	Kerbside	451107	275838	NO2	YES	0	0.5	NO	2.5
S31	Wood Street / Park Road	Roadside	450848	275849	NO2	YES	0	3	NO	2.5

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)
S32	Railway Terrace, Station Bar	Roadside	450750	275547	NO2	YES	0	3	NO	2.5
S33	Albert Street, Alma Lodge Hotel	Roadside	450510	275355	NO2	YES	0	3	NO	2.5
S34	Regent Street, near Oxfam	Roadside	450405	275329	NO2	YES	0	3	NO	2.5
S35	Church Street, Town Fryer	Roadside	450444	275236	NO2	YES	0	3	NO	2.5
S36	Whitehall Road junction with Clifton Road Roundabout	Roadside	450870	275043	NO2	YES	12	3	NO	2.5
S37	Lower Hillmorton Road junction with Clifton Road. Roundabout	Roadside	450897	275059	NO2	YES	5	2	NO	2.5
S38	Clifton Road before railway bridge	Kerbside	451868	275501	NO2	YES	9	0.5	NO	2.5
S39	Clifton Road Roundabout Murray Road	Roadside	450852	275116	NO2	YES	0	5	NO	2.5
S40	Lawrence Sherriff	Roadside	450181	275029	NO2	YES	0	5	NO	2.5

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)
	Street, Drury Lane									
S41	Bilton Road, Big Yellow House	Roadside	450010	274998	NO2	YES	0	15	NO	2.5
S42	Bilton Road, near Crow Pie Pub	Roadside	448855	274352	NO2	YES	10	5	NO	2.5
S43	Dunchurch Gyratory Residential	Roadside	450162	274898	NO2	YES	4	3	NO	2.5
S44	Barby Lane/ Ashlawn Road	Roadside	453394	273633	NO2	YES	15	2	NO	2.5
S45	Bretford- electricity pole near 3 Avon Cottages	Roadside	442963	277071	NO2	YES	11	3	NO	2.5
S46	Oxford Road, Ryton Belvedere	Kerbside	437555	274561	NO2	NO	30	1	NO	2.5
S47	Regent Place	Kerbside	450445	275495	NO2	YES	5	0.5	NO	2.5
S48	North Street, Nat. West. Bank	Roadside	450304	275314	NO2	YES	0	2	NO	2.5
S49	Lesley Suiter House, Whitehall Road, Hillmorton	Roadside	450864	274896	NO2	YES	13	3	NO	2.5

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)
S50	Bilton Church	Roadside	448169	273625	NO2	YES	18	3	NO	2.5
S51	Brinklow, Brays Close	Roadside	443433	279208	NO2	NO	6	3	NO	2.5
S52	Daventry Road East, Dunchurch	Roadside	448537	271195	NO2	YES	1	3	NO	2.5
S53	Conventry Road West, Dunchurch	Roadside	448361	271334	NO2	YES	0	1.5	NO	2.5
W1	Rugby School Lamppost 5	Roadside	450226	275008	NO2	YES	0	1.5	NO	2.5
W2	Rugby School Lamppost 6	Roadside	450269	274998	NO2	YES	0	1.5	NO	2.5
W3	57 Boughton Rd	Roadside	451162	276772	NO2	YES	8	2	NO	2.5
AD1	Church Road, Shildon	Kerbside	440416	284401	NO2	NO	0	0.5	NO	2.5
AD2	Bramble Cottage, Stretton Under Fosse	Roadside	445004	281330	NO2	NO	5	2	NO	2.5

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2017 (%) [2]	NO_2 Annual Mean Concentration (µg/m³) [3]				
					2013	2014	2015	2016	2017
S1	Kerbside	Diffusion Tube	92	92	21.6	19.5	20.4	18.8	17.8
S2	Kerbside	Diffusion Tube	92	92	19.6	18.4	16.3	16.5	13.4
S3	Urban Background	Diffusion Tube	92	92	18.3	15.5	15.6	15.5	12.2
S4	Urban Background	Diffusion Tube	75	75	15.0	13.5	13.7	14.0	12.3
S5	Kerbside	Diffusion Tube	92	92	31.5	29.6	27.9	28.5	25.0
S6	Urban Background	Diffusion Tube	92	92	17.9	15.7	17.3	16.3	14.1
S7	Urban Background	Diffusion Tube	92	92	14.3	13.1	12.7	13.2	10.4
S8	Kerbside	Diffusion Tube	83	83	31.5	33.5	38.2	33.6	29.3
S9	Roadside	Diffusion Tube	92	92	19.2	18.9	18.8	23.3	15.9
S10	Roadside	Diffusion Tube	92	92	**40.2**	**40.9**	**41.6**	**41.0**	34.8
S11	Roadside	Diffusion Tube	92	92	25.6	25.2	25.6	24.3	21.8
S12	Urban Background	Diffusion Tube	83	83	21.1	21.7	23.9	25.8	21.3
S13	Roadside	Diffusion Tube	67	67	35.7	33.4	38.3	39.5	36.5
S14	Urban Background	Diffusion Tube	92	92	18.3	17.9	19.0	18.2	14.7

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2017 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2013	2014	2015	2016	2017
S15	Kerbside	Diffusion Tube	92	92	28.9	28.9	30.9	28.3	25.6
S16	Roadside	Diffusion Tube	83	83	24.4	22.1	21.3	22.8	18.2
S17	Roadside	Diffusion Tube	92	92	20.2	20.5	20.2	21.4	17.1
S18	Roadside	Diffusion Tube	92	92	21.9	21.3	20.2	20.7	17.1
S19	Roadside	Diffusion Tube	92	92	22.3	20.7	20.5	20.4	16.7
S20	Roadside	Diffusion Tube	83	83	31.6	32.6	30.9	32.4	26.7
S21	Roadside	Diffusion Tube	83	83	24.4	24.7	24.2	24.2	22.2
S22	Roadside	Diffusion Tube	92	92	23.0	22.9	23.2	24.4	20.8
S23	Roadside	Diffusion Tube	92	92	27.6	24.2	23.1	25.1	21.7
S24	Kerbside	Diffusion Tube	92	92	**46.6**	**46.4**	**48.9**	**47.1**	**40.7**
S25	Roadside	Diffusion Tube	92	92	30.8	31.5	33.8	34.5	28.0
S26	Roadside	Diffusion Tube	83	83	21.8	21.0	20.3	22.4	18.3
S27	Roadside	Diffusion Tube	83	83	**Location changed July 2016**			27.5	21.3
S28	Roadside	Diffusion Tube	75	75	20.3	19.7	20.9	19.7	16.1
S29	Urban Background	Diffusion Tube	83	83	23.5	23.0	24.9	21.7	18.7

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2013	2014	2015	2016	2017
S30	Kerbside	Diffusion Tube	83	83	37.2	36.1	36.6	36.4	32.3
S31	Roadside	Diffusion Tube	92	92	30.7	31.6	32.1	29.7	26.1
S32	Roadside	Diffusion Tube	92	92	30.8	29.7	32.6	30.4	28.2
S33	Roadside	Diffusion Tube	92	92	25.2	25.4	25.6	25.4	21.6
S34	Roadside	Diffusion Tube	92	92	27.7	26.9	33.9	27.8	25.5
S35	Roadside	Diffusion Tube	92	92	31.5	34.0	34.8	32.3	28.4
S36	Roadside	Diffusion Tube	83	83	36.6	34.0	34.7	35.3	29.5
S37	Roadside	Diffusion Tube	58	58	33.6	29.9	31.6	30.1	24.1
S38	Kerbside	Diffusion Tube	83	83	27.4	27.9	27.8	29.9	25.7
S39	Roadside	Diffusion Tube	83	83	32.6	30.0	31.9	30.0	25.9
S40	Roadside	Diffusion Tube	92	92	32.4	30.1	32.8	34.7	30.5
S41	Roadside	Diffusion Tube	92	92	27.5	25.4	27.0	27.4	23.0
S42	Roadside	Diffusion Tube	92	92	25.8	26.4	23.7	24.2	20.7
S43	Roadside	Diffusion Tube	92	92	29.9	27.7	28.7	31.1	25.2
S44	Roadside	Diffusion Tube	83	83	**Location changed July 2016**			29.8	23.8

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2013	2014	2015	2016	2017
S45	Roadside	Diffusion Tube	58	58	26.9	28.3	27.7	26.7	22.5
S46	Kerbside	Diffusion Tube	92	92	**40.9**	39.5	38.1	39.3	36.5
S47	Kerbside	Diffusion Tube	92	92	35.3	33.0	33.9	35.2	30.8
S48	Roadside	Diffusion Tube	92	92	34.3	36.6	34.5	37.5	34.3
S49	Roadside	Diffusion Tube	83	83	39.4	39.9	39.1	36.6	**43.7**
S50	Roadside	Diffusion Tube	83	83	24.5	24.8	25.1	25.3	21.5
S51	Roadside	Diffusion Tube	92	92	31.4	32.3	33.6	32.4	28.3
S52	Roadside	Diffusion Tube	92	92	23.4	23.0	24.9	24.0	20.9
S53	Roadside	Diffusion Tube	92	92	**Location changed July 2016**			24.6	20.1
W1	Roadside	Diffusion Tube	86	50	**Site setup in August 2015**		**46.6**	**47.4**	**45.1**
W2	Roadside	Diffusion Tube	86	50	**Site setup in August 2015**		**46.5**	**45.5**	**43.3**
W3	Roadside	Diffusion Tube	86	50	**Site setup in August 2015**		32.8	30.9	26.6
AD1	Kerbside	Diffusion Tube	75	75	**Site setup in May 2016**			**47.1**	37.6
AD2	Roadside	Diffusion Tube	75	75	**Site setup in May 2016**			25.3	20.6

☒ **Diffusion tube data has been bias corrected**

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

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

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

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

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

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

Figure A.1 – Trends in Kerbside Annual Mean NO_2 Concentrations

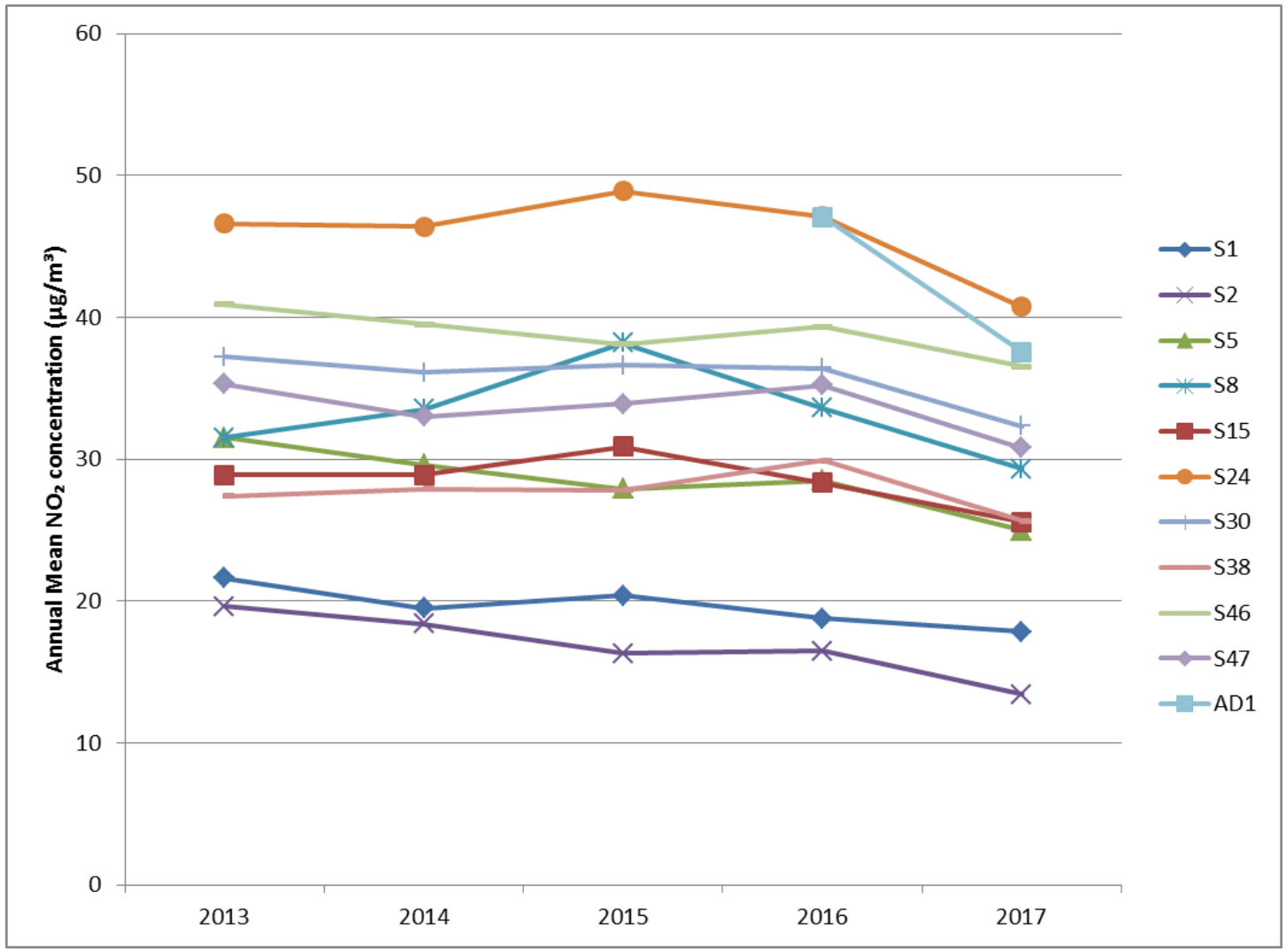


Figure A.2 – Trends in Roadside Annual Mean NO_2 Concentrations (1)

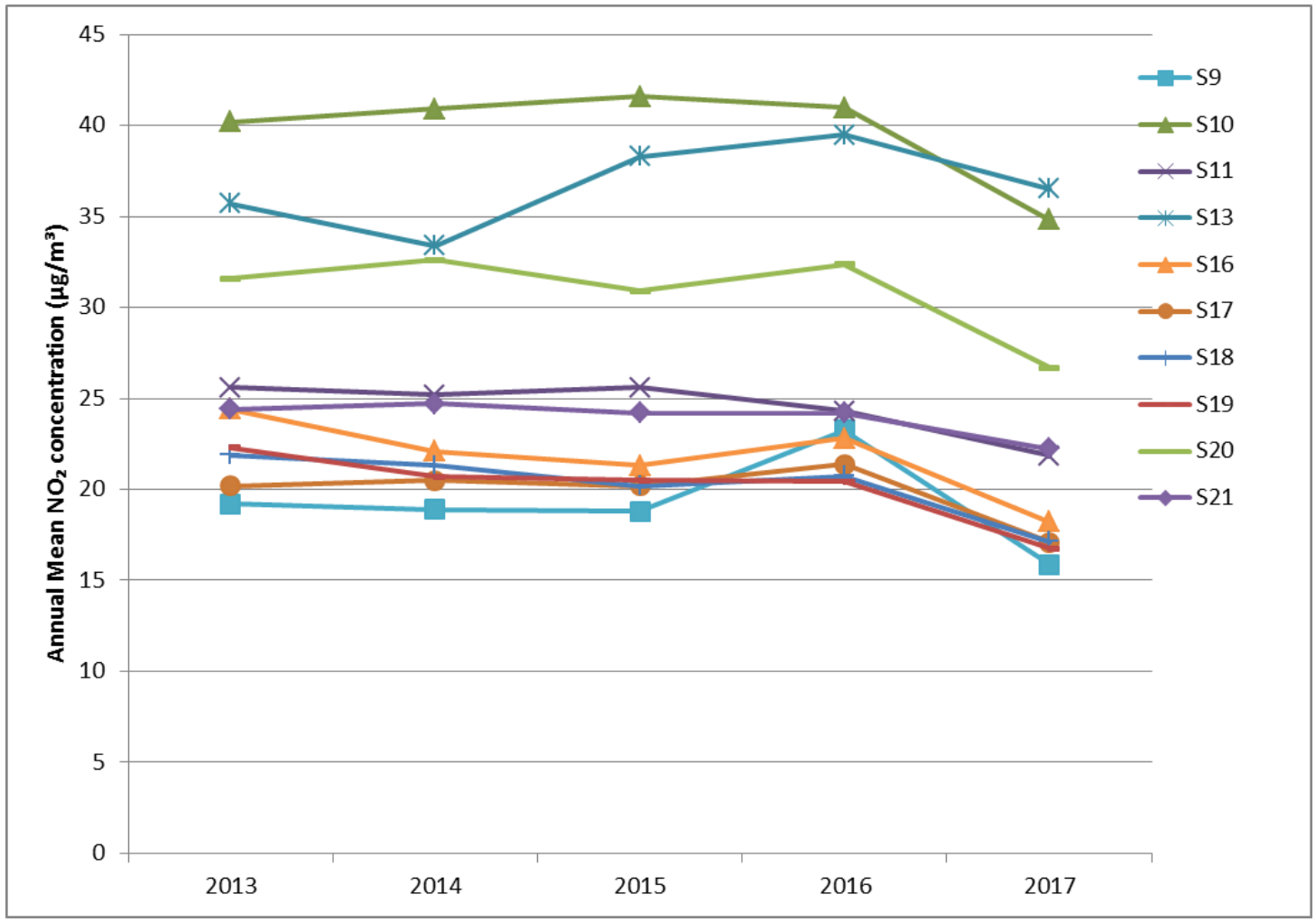


Figure A.3 – Trends in Roadside Annual Mean NO_2 Concentrations (2)

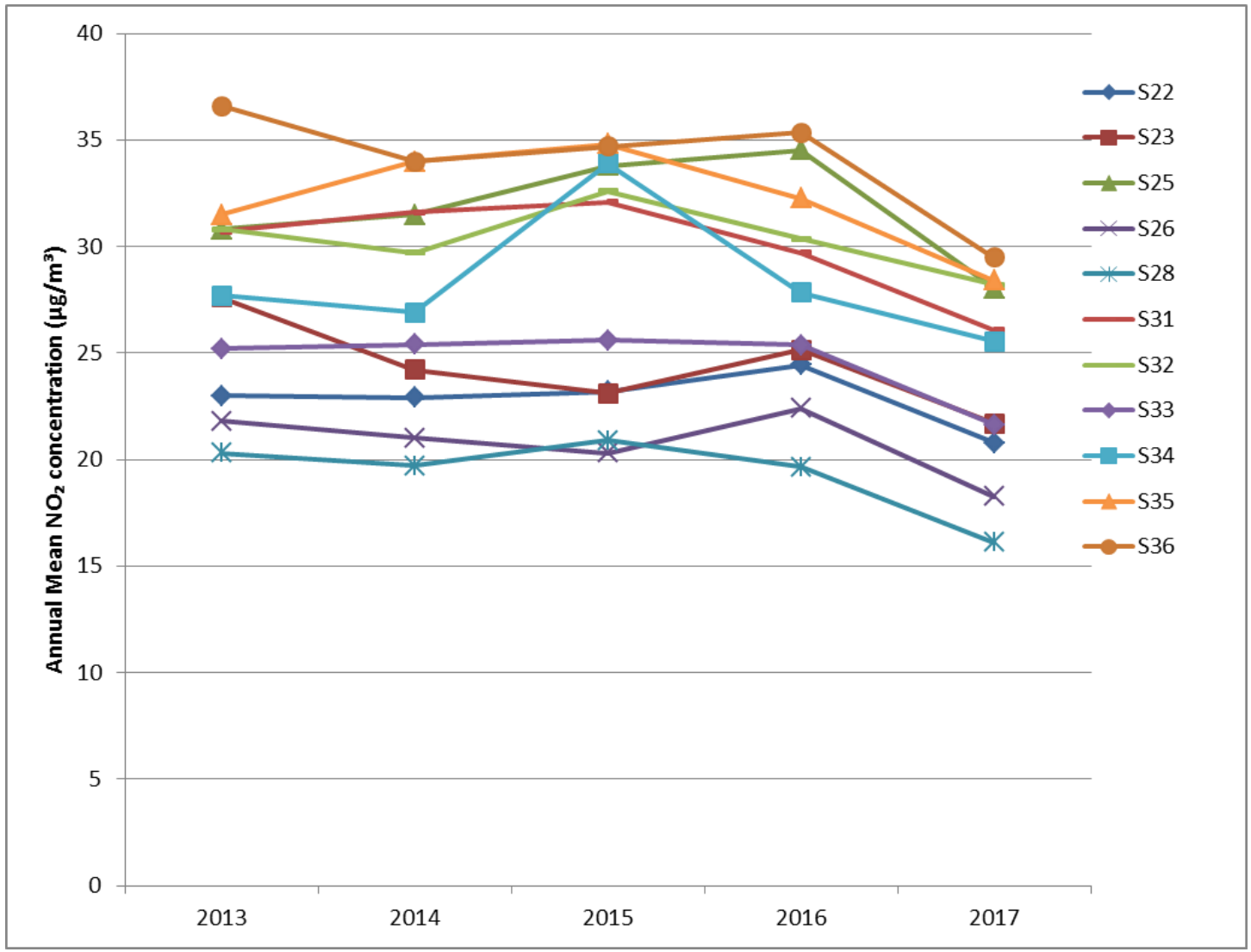


Figure A.4 – Trends in Roadside Annual Mean NO_2 Concentrations (3)

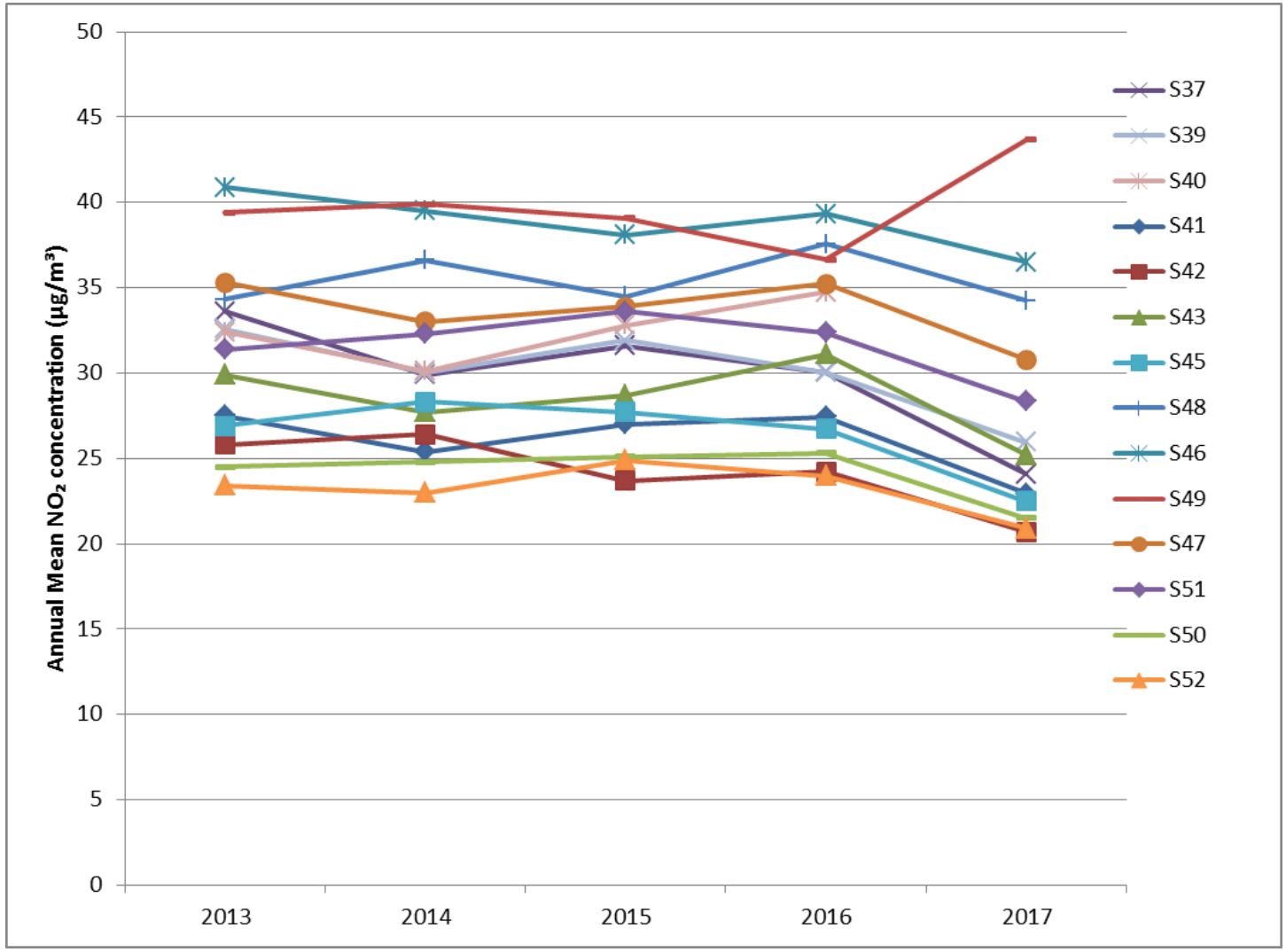


Figure A.5 – Trends in Roadside Annual Mean NO_2 Concentrations (4), at sites opened in 2015 and 2016

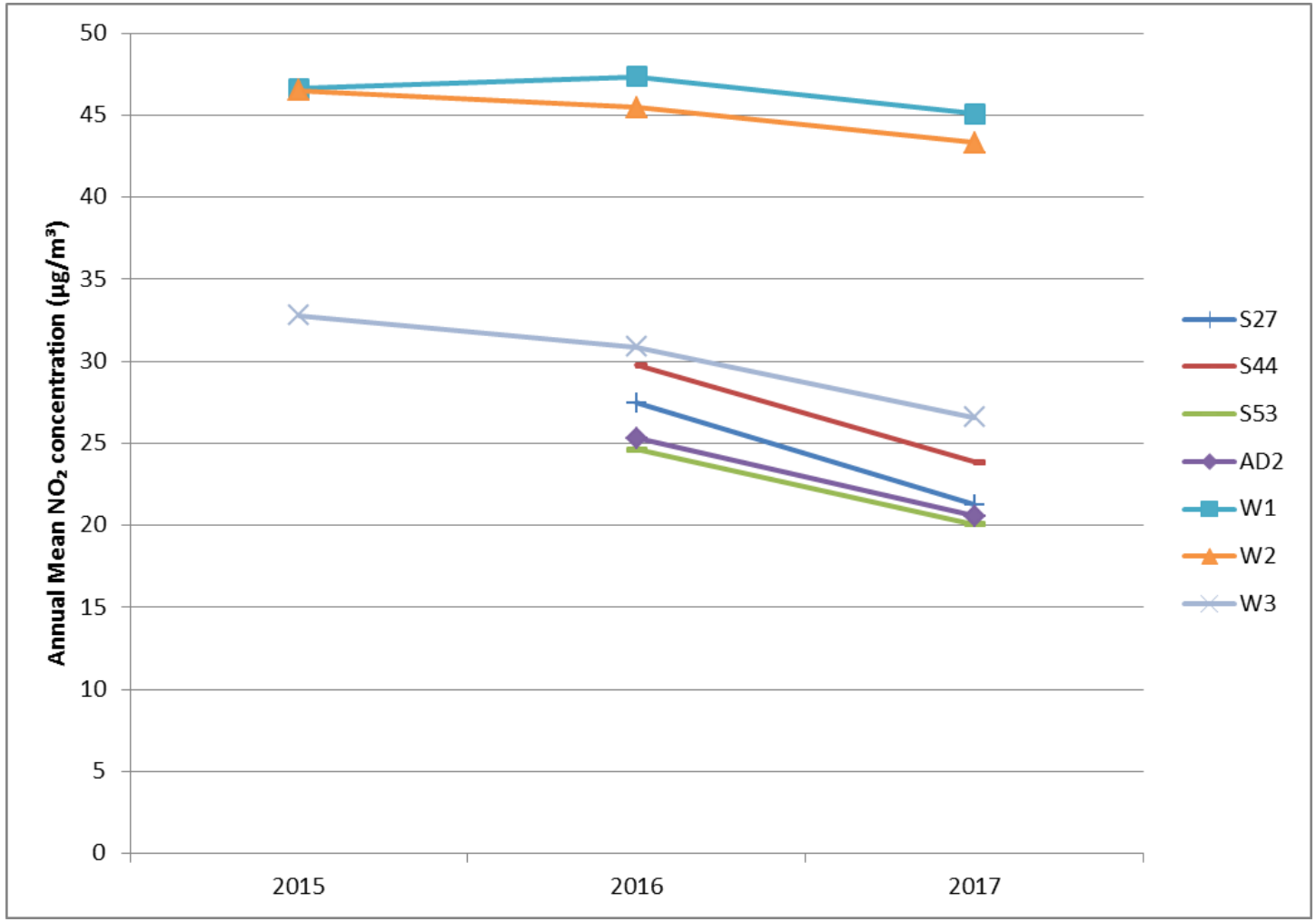


Figure A.6 – Trends in Urban Background Annual Mean NO_2 Concentrations

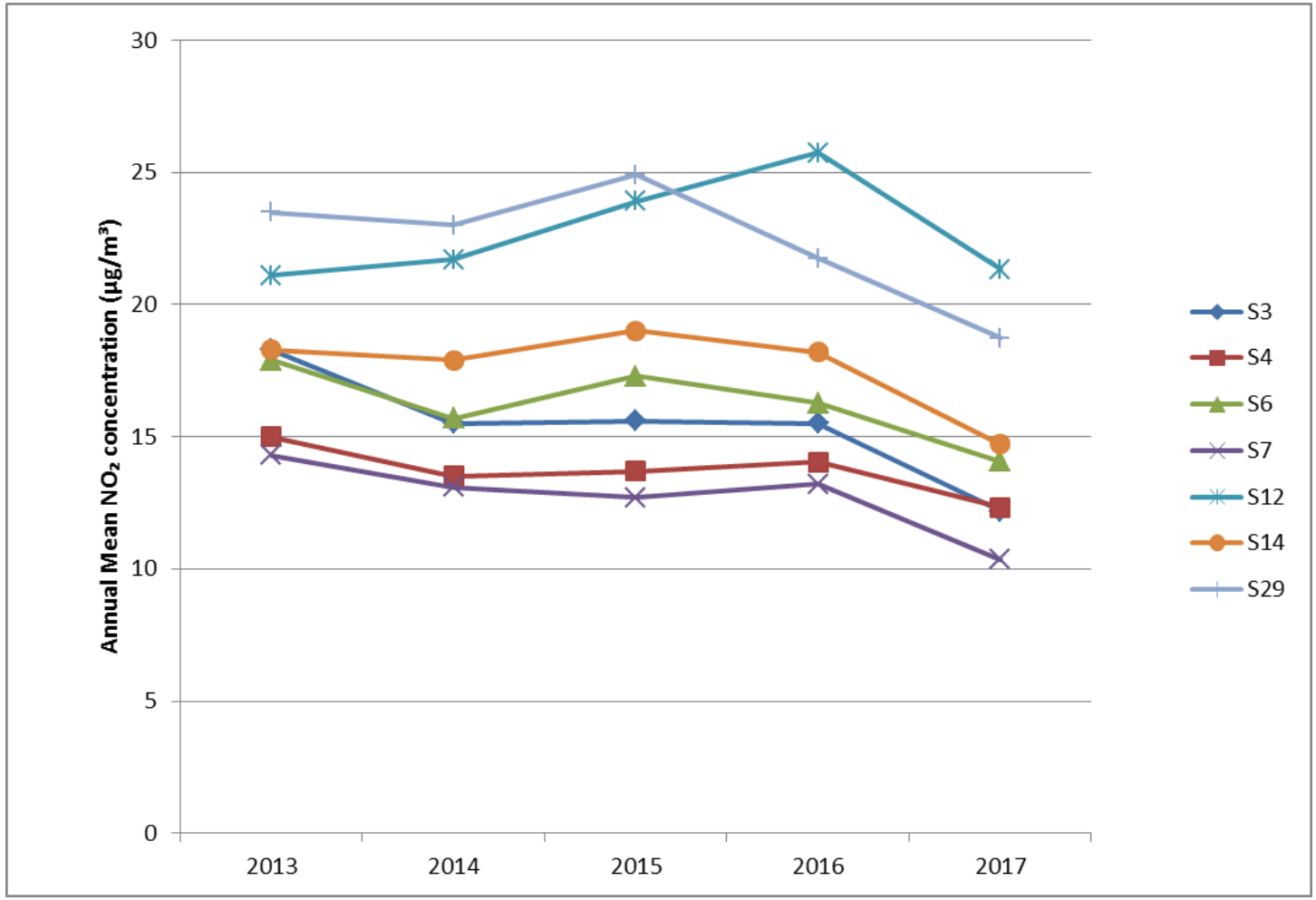


Table A.4 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2013	2014	2015	2016	2017
OSR1	Roadside	99.9	99.9	**No data**	**No data**	12.8	12.5	11.3

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

Notes:

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

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

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

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

Table A.5 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2013	2014	2015	2016	2017
OSR1	Roadside	99.9	99.9	**No data**	**No data**	3	1	0

Notes:

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

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

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

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

Table A.6 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
				2013	2014	2015	2016	2017
OSR1	Roadside	99.9	99.9	**No data**	**No data**	6.6	5.9	5.6

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

Notes:

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2017

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

Site ID	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 (0.78) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
S1	36.3	-	23.6	22.7	19.5	14.5	16.0	16.8	21.8	20.4	31.6	25.0	22.6	17.8	17.8
S2	26.0	-	18.3	16.0	17.6	10.2	10.8	11.5	16.8	15.7	23.2	19.4	16.9	13.4	11.7
S3	20.0	-	20.7	14.5	13.3	9.4	11.2	10.9	13.2	15.5	20.2	19.3	15.3	12.2	12.2
S4	23.0	-	16.8	14.3	10.4	7.6	-	-	12.8	12.9	21.7	19.9	15.5	12.3	12.3
S5	45.5	-	31.1	35.2	29.7	20.3	26.6	23.6	28.4	27.2	44.3	36.0	31.6	25.0	16.2
S6	26.6	-	18.4	29.1	14.7	11.2	11.5	12.2	15.0	16.5	23.2	18.9	17.9	14.1	14.1
S7	21.9	-	16.7	13.5	11.2	8.2	10.1	10.5	13.0	13.5	14.4	9.7	13.0	10.4	10.4
S8	-	-	49.4	41.2	39.8	31.7	34.4	32.2	36.8	38.0	26.0	43.3	37.3	29.3	23.7
S9	35.8	-	21.4	18.5	15.6	12.0	14.2	14.2	18.2	18.7	27.3	24.9	20.1	15.9	15.9
S10	50.5	-	51.4	45.5	40.8	39.7	35.9	40.1	45.9	44.4	52.7	39.0	44.2	34.8	34.8
S11	39.7	-	30.5	29.9	27.0	19.3	22.7	22.2	27.3	22.1	34.5	28.4	27.6	21.8	21.8
S12	39.8	-	31.7	28.8	17.7	15.3	16.8	15.6	21.8	-	43.1	38.4	26.9	21.3	21.3
S13	-	-	-	-	38.9	40.4	39.2	36.8	46.8	42.2	45.8	53.4	42.9	36.5	27.2
S14	28.0	-	21.4	19.3	14.8	11.2	14.2	13.3	17.5	8.3	29.8	27.0	18.6	14.7	14.7
S15	46.4	-	39.4	39.1	30.0	25.3	27.5	25.6	28.5	33.6	38.6	19.5	32.1	25.6	25.6

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 (0.78) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
S16	30.7	-	23.0	27.9	-	15.0	20.0	14.4	23.7	19.2	32.2	24.9	23.1	18.2	18.2
S17	33.2	-	25.5	20.5	16.3	12.9	13.1	14.0	19.1	21.7	32.1	27.9	21.5	17.1	17.1
S18	32.4	-	26.5	20.2	19.0	12.4	13.3	14.9	20.1	19.8	30.0	28.0	21.5	17.1	17.1
S19	34.2	-	24.4	20.1	16.0	13.0	14.6	14.3	19.1	19.5	31.2	24.6	21.0	16.7	16.7
S20	53.2	-	40.0	32.5	31.9	23.7	25.7	-	28.6	28.5	34.7	39.4	33.8	26.7	21.5
S21	39.8	-	29.3	25.6	27.0	25.0	24.4	15.4	27.8	-	34.7	32.5	28.2	22.2	15.8
S22	36.0	-	30.6	25.7	24.5	21.6	21.0	18.1	25.2	25.9	32.3	28.0	26.3	20.8	15.9
S23	41.4	-	29.1	28.7	25.0	19.4	21.7	21.6	26.0	26.6	30.8	33.4	27.6	21.7	16.6
S24	52.7	-	57.0	64.1	48.8	42.6	44.0	44.0	46.9	47.2	67.1	57.3	52.0	**40.7**	**40.7**
S25	35.4	-	39.2	43.6	33.7	27.7	32.0	32.3	33.3	33.0	42.3	41.7	35.8	28.0	28.0
S26	34.1	-	27.8	26.1	20.6	16.0	19.0	20.1	-	14.9	29.4	21.8	23.0	18.3	18.3
S27	36.3	-	-	24.0	19.1	18.1	19.5	23.2	24.6	26.1	45.2	32.8	26.9	21.3	18.6
S28	34.1	-	-	-	19.7	10.8	15.1	15.3	15.3	19.2	27.3	26.0	20.3	16.1	16.1
S29	34.5	-	31.6	20.7	22.9	16.6	16.0	17.1	24.0	20.7	30.1	-	23.4	18.7	18.7
S30	59.0	-	41.7	41.0	44.5	32.4	35.6	34.0	40.6	-	44.1	36.5	40.9	32.3	32.3
S31	34.8	-	39.6	36.5	30.1	23.2	26.7	25.5	33.9	31.8	46.3	35.0	33.0	26.1	26.1
S32	46.3	-	38.0	38.0	32.8	27.1	29.1	29.1	34.5	33.5	45.9	40.1	35.9	28.2	28.2
S33	38.4	-	29.7	28.8	23.0	20.0	19.5	20.7	24.7	27.0	35.2	35.8	27.5	21.6	21.6
S34	42.5	-	37.6	33.1	25.1	23.0	24.3	26.6	29.9	31.5	42.3	40.6	32.4	25.5	25.5
S35	42.0	-	36.0	34.3	35.5	37.5	34.2	33.8	37.6	33.5	34.9	42.1	36.5	28.4	28.4

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 (0.78) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
S36	49.2	-	44.4	41.3	34.7	26.3	28.2	-	33.5	34.2	42.8	39.2	37.4	29.5	24.6
S37	44.8	-	-	36.4	-	24.3	28.6	27.5	32.4	-	-	42.7	33.8	24.1	22.2
S38	41.3	-	33.3	33.0	29.1	24.9	27.5	25.2	-	33.1	41.1	38.1	32.7	25.7	19.2
S39	47.4	-	33.2	37.3	29.8	-	25.0	22.8	31.0	31.2	35.7	38.3	33.2	25.9	25.9
S40	54.6	-	38.2	45.6	36.5	29.7	32.4	27.9	39.5	35.5	50.1	35.5	38.7	30.5	30.5
S41	37.9	-	30.1	36.2	31.7	22.4	21.8	20.6	25.6	26.3	37.0	31.1	29.2	23.0	23.0
S42	41.0	-	27.0	24.5	26.0	17.7	21.4	19.6	24.9	24.7	31.7	30.0	26.2	20.7	17.7
S43	45.1	-	35.2	30.3	34.9	26.4	27.6	22.9	32.6	30.4	36.4	27.1	31.7	25.2	22.4
S44	52.4	-	-	20.6	18.1	26.4	27.4	23.1	33.1	28.9	39.7	32.5	30.2	23.8	16.7
S45	36.9	-	-	-	25.0	-	24.6	27.8	27.7	-	44.1	36.6	31.8	22.5	17.5
S46	65.2	-	40.9	53.5	42.3	37.0	40.4	42.3	47.3	40.8	59.1	43.7	46.6	36.5	20.0
S47	48.9	-	40.6	40.1	40.4	33.1	35.8	35.5	39.6	37.6	43.3	35.8	39.2	30.8	25.2
S48	50.2	-	50.8	45.4	36.9	35.9	36.8	37.0	39.1	41.7	55.0	50.2	43.5	34.3	34.3
S49	45.0	-	44.2	45.0	38.5	-	26.3	28.0	111.2	55.7	91.2	89.5	57.5	**43.7**	30.2
S50	35.4	-	32.7	18.7	22.7	17.6	18.2	20.9	-	25.5	41.9	37.1	27.1	21.5	16.2
S51	47.9	-	41.0	36.5	32.3	29.8	30.1	29.2	33.3	33.9	47.8	30.9	35.7	28.3	23.4
S52	40.4	-	30.9	29.2	22.8	18.5	20.3	21.6	25.3	23.3	35.9	21.5	26.3	20.9	20.1
S53	42.0	-	26.0	25.9	28.1	17.3	20.2	19.5	26.4	20.1	30.6	23.4	25.4	20.1	20.1
W1	62.7	-	67.5	52.3	51.7	53.2	44.4	-	-	-	-	-	55.3	**45.1**	**45.1**
W2	61.8	-	60.9	53.4	46.1	51.3	46.7	-	-	-	-	-	53.4	**43.3**	**43.3**

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 (0.78) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
W3	48.8	-	35.2	30.7	30.3	28.2	21.7	-	-	-	-	-	32.5	26.6	21.9
AD1	62.5	-	62.5	-	-	45.8	46.0	48.6	56.0	45.8	59.9	59.9	54.1	37.6	37.6
AD2	41.0	-	41.0	-	-	21.8	21.7	21.1	25.4	23.9	34.7	31.9	29.2	20.6	19.3

☒ **Local bias adjustment factor used**

☐ **National bias adjustment factor used**

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

☒ **Where applicable, data has been distance corrected for relevant exposure**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

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

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

(2) Distance corrected to nearest relevant public exposure.

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

QA/QC of Diffusion Tube Monitoring Data

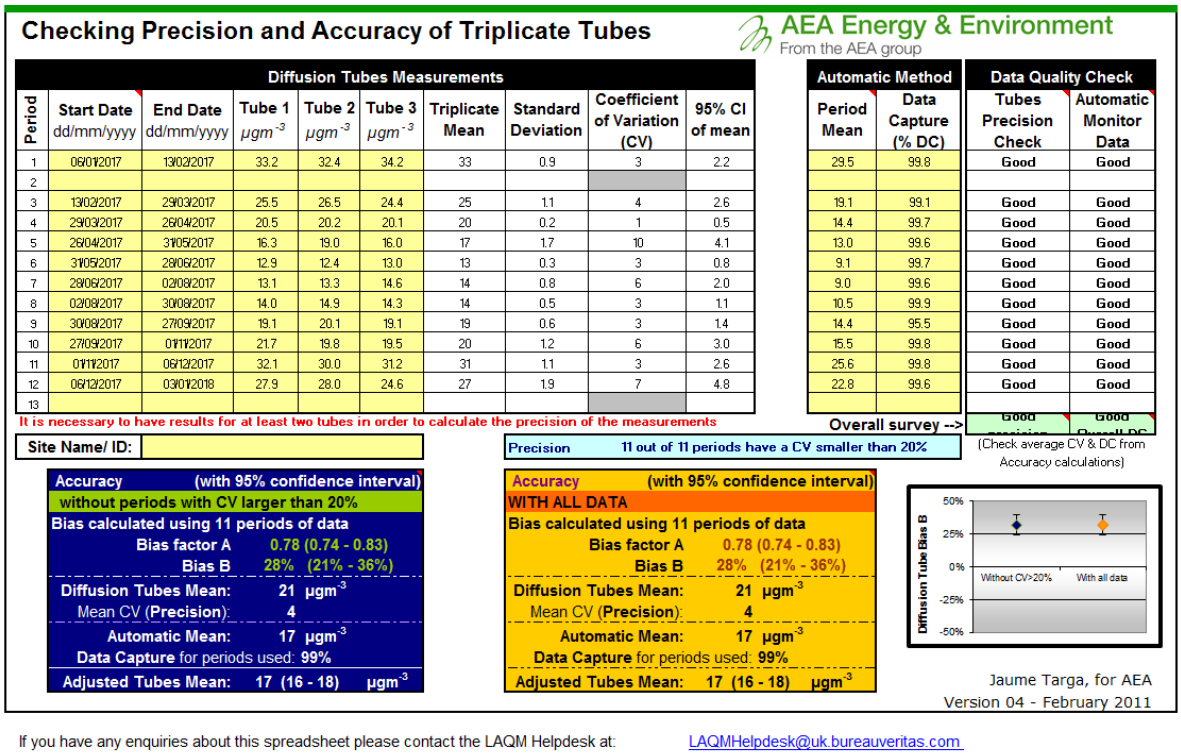
Rugby Borough Council's NO_2 diffusion tubes are supplied and analysed by Environmental Services Group (ESG), Didcot using the 50%TEA in Acetone method. Analyses are performed in accordance with standard operating procedure ANU/SOP/1015 Issue 1. This method conforms to the guidelines set out in Defra's 'Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance' document.

ESG Didcot participates in the AIR NO_2 PT scheme. This scheme forms an integral part of the UK NO_2 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 NO_2 PT rounds AR0012, 16, and 18 ESG Didcot achieved 100% satisfactory scores and in AIR NO_2 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 0.78; details of the calculation are provided in Figure C.1.

Figure C.1 – Local Bias Adjustment Factor Calculation



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	06/01/2017	13/02/2017	33.2	32.4	34.2	33	0.9	3	2.2
2									
3	13/02/2017	29/03/2017	25.5	26.5	24.4	25	1.1	4	2.6
4	29/03/2017	26/04/2017	20.5	20.2	20.1	20	0.2	1	0.5
5	26/04/2017	31/05/2017	16.3	19.0	16.0	17	1.7	10	4.1
6	31/05/2017	28/06/2017	12.9	12.4	13.0	13	0.3	3	0.8
7	28/06/2017	02/08/2017	13.1	13.3	14.6	14	0.8	6	2.0
8	02/08/2017	30/08/2017	14.0	14.9	14.3	14	0.5	3	1.1
9	30/08/2017	27/09/2017	19.1	20.1	19.1	19	0.6	3	1.4
10	27/09/2017	01/11/2017	21.7	19.8	19.5	20	1.2	6	3.0
11	01/11/2017	06/12/2017	32.1	30.0	31.2	31	1.1	3	2.6
12	06/12/2017	03/01/2018	27.9	28.0	24.6	27	1.9	7	4.8
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
29.5	99.8	Good	Good
19.1	99.1	Good	Good
14.4	99.7	Good	Good
13.0	99.6	Good	Good
9.1	99.7	Good	Good
9.0	99.6	Good	Good
10.5	99.9	Good	Good
14.4	95.5	Good	Good
15.5	99.8	Good	Good
25.6	99.8	Good	Good
22.8	99.6	Good	Good
Overall survey -->		Good	Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID:

Precision: 11 out of 11 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 11 periods of data
Bias factor A 0.78 (0.74 - 0.83)
Bias B 28% (21% - 36%)
Diffusion Tubes Mean: 21 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 17 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 17 (16 - 18) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A 0.78 (0.74 - 0.83)
Bias B 28% (21% - 36%)
Diffusion Tubes Mean: 21 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 17 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 17 (16 - 18) µgm^{-3}

Jaume Targa, for AEA
Version 04 - February 2011

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 2017. 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 2017.

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 NO_2 diffusion tube results for 2017.

Short-term to Long-term Data Adjustment

Data capture rates for the 50 of the 56 diffusion tube monitoring sites are 75% or greater for the 2017 period; consequently, it is not necessary to seasonally adjust any of these monitored concentrations.

However, for six locations including three of the original sites (S13, S37 and S45) and the three sites which were decommissioned in August 2017 (W1, W2 and W3), 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]	19.1	17.0	25.7
Period Mean [Pm] (S13)	17.5	15.1	24.1
Average Am/Pm ratio	**1.095**		
Period Mean [Pm] (S37)	21.0	19.4	27.3
Average Am/Pm ratio	**0.908**		
Period Mean [Pm] (S45)	21.2	19.4	27.7
Average Am/Pm ratio	**0.900**		
Period Mean [Pm] (W1, W2 and W3)	19.5	16.2	24.1
Average Am/Pm ratio	**1.031**		

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

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

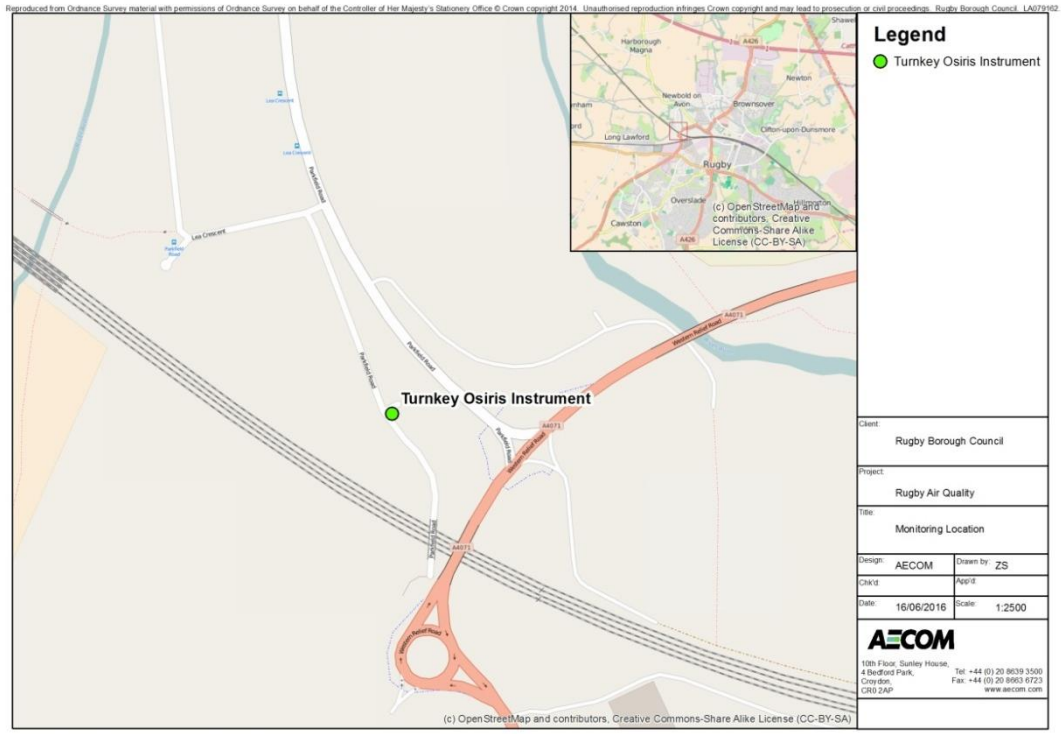


Figure D.2 Map of NO_2 Diffusion Tube Monitoring Locations and AQMA

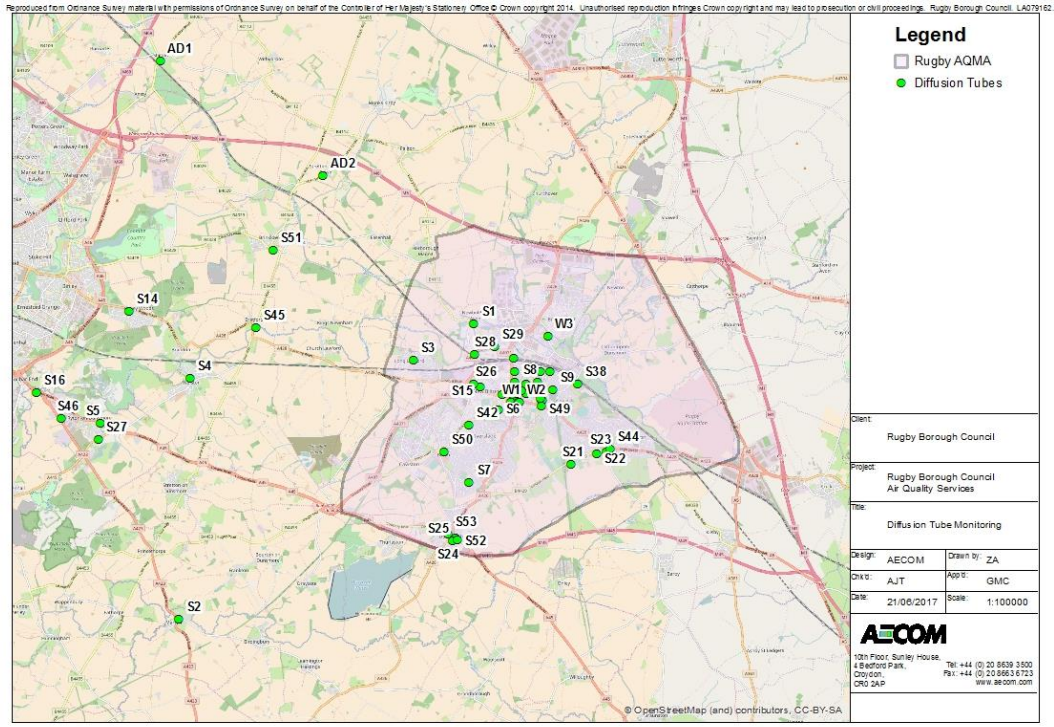


Figure D.3 Map of NO_2 Diffusion Tubes in Rugby Town Centre

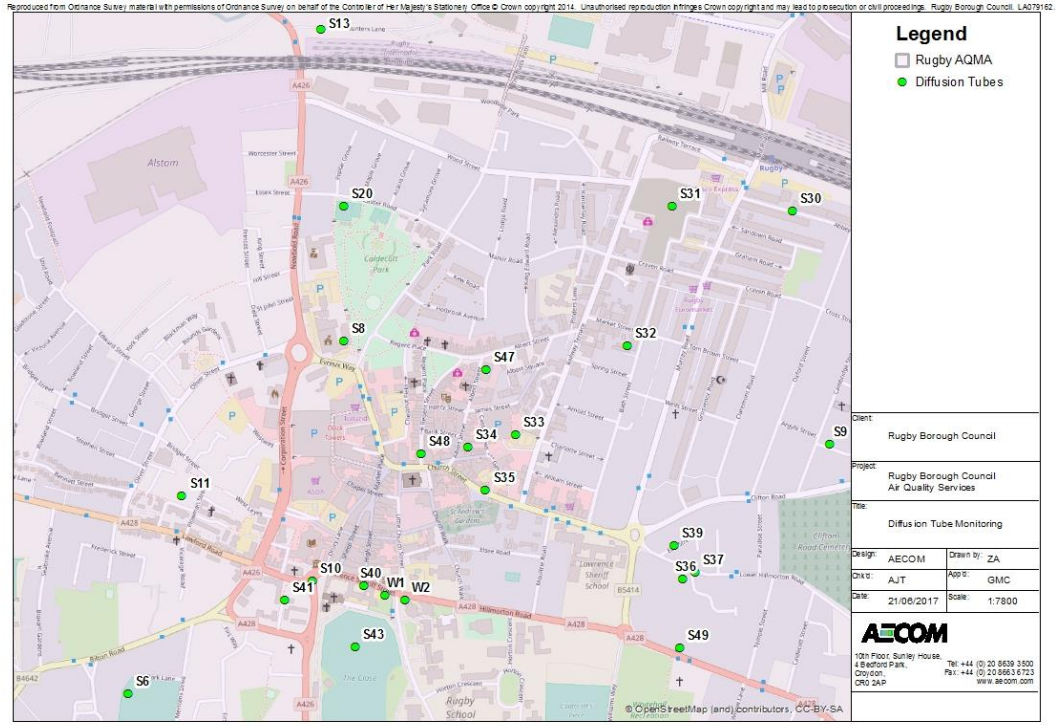
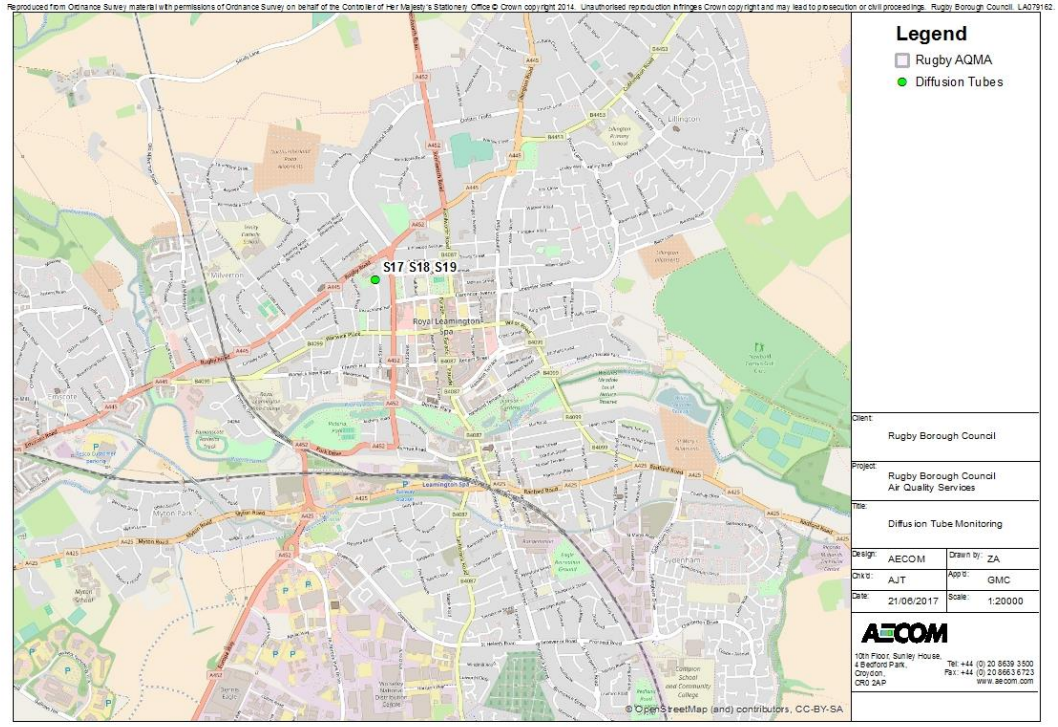


Figure D.4 Map of NO_2 Diffusion Tubes in Leamington Spa



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[9]	
	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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

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2. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
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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/
6. Rugby Borough Council, Local Plan – 2011-2031. Publication Draft September 2016
7. Warwickshire Local Transport Plan 2011-2016. Available at http://www.warwickshire.gov.uk/ltp3