



**Warwick District Council**  
**Annual Status Report 2021**

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# 2021 Air Quality Annual Status Report (ASR)

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

Date: December, 2021

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# Executive Summary: Air Quality in Our Area

## Air Quality in Warwick District 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, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas<sup>1,2</sup>.

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages<sup>3</sup>, with a total estimated healthcare cost to the NHS and social care of £157 million in 2017<sup>4</sup>.

During 2020, compliance of both the annual mean NO<sub>2</sub> and the 1-hour mean NO<sub>2</sub> AQS (Air Quality Strategy) objectives has been achieved at all monitoring locations within Warwick District Council's remit. Significant decreases in the annual mean NO<sub>2</sub> concentrations have been observed from 2019 to 2020, on average 5.5µg/m<sup>3</sup> across 58 monitoring locations, with a maximum decrease of 10.8µg/m<sup>3</sup>. This is largely believed to be resulting from the impacts of the COVID-19 pandemic, whereby the UK Government enforced lockdowns and restrictions, advising people to work from home where possible and to stay local. This saw traffic volumes decrease across the majority of urban areas within the UK.

No monitoring location reported an annual mean NO<sub>2</sub> concentration exceeding 60µg/m<sup>3</sup>, which suggests that there has not been a breach of the 1-hour mean NO<sub>2</sub> AQS objective. Additionally, no automatic monitoring site reported any 1-hour mean NO<sub>2</sub> concentrations exceeding 200µg/m<sup>3</sup>.

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<sup>1</sup> Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

<sup>2</sup> Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

<sup>3</sup> Defra. Air quality appraisal: damage cost guidance, July 2020

<sup>4</sup> Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

In regard to PM<sub>10</sub>, there have been no breaches of either the annual mean PM<sub>10</sub> AQS objective or the 24-hour mean PM<sub>10</sub> objective reported in 2020, which is consistent with previous monitoring years.

## Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy<sup>5</sup> sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero<sup>6</sup> sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Warwick District Council continued to implement and pursue measures to improve air quality during 2020. Key completed measures are as follows:

- WDC's Low Emission Strategy Guidance has been superseded by an Air Quality Supplementary Planning Document (SPD) which has been adopted;
- Funding has been secured from the DfT to introduce electric buses on cross boundary routes between Warwick, Leamington and Coventry;
- Expansion of the 'Choose How You Move in Warwick District' programme, in conjunction with Betterpoints, to include rewards for participants making active and sustainable travel choices across the District;
- The Park and Ride feasibility report has been completed, identifying a number of Park and Ride and Park and Stride sites in and around Warwick and Leamington which could be introduced;
- Installation of 26 twin headed EV charging points in off-street car parks within Leamington, Warwick and Kenilworth. Further funding has been secured from the

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<sup>5</sup> Defra. Clean Air Strategy, 2019

<sup>6</sup> DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

LEP which will allow charging points to be introduced in on-street locations within the District;

- A further electric vehicle has been added to the WDC fleet;
- WDC website includes links to maps showing the [locations of EV charging points](#) in the District;
- Appointment of 2 new Safe and Active Travel Officers to provide significant updates to the [Active Travel website](#); and
- Funding secured for Warwick town centre scheme, including road space reallocation to improve pedestrian and cycle facilities.

## Conclusions and Priorities

All monitoring locations within Warwick District Council were compliant during 2020 with all relevant AQS objectives, and reported lower concentrations compared to 2019. This is believed to be due to the impacts of the COVID-19 pandemic.

Compliance has been achieved for three consecutive years in the Warwick Coventry Road, Warwick Road (Kenilworth), and New Street Kenilworth AQMAs (Air Quality Management Areas). Concentrations in these AQMAs have been observed to be decreasing since the last reported exceedances in 2017, however as 2020 is potentially an atypical year, the Council wishes to keep these designations in place until the long-term impacts on COVID-19 can be accurately assessed, to ensure that compliance will be maintained in future years.

Monitoring shall remain in all locations, with the monitoring network being regularly reviewed in order to determine whether additional monitoring locations are required to capture any areas of potential exceedance.

Warwick District Council will continue to implement measures outlined in the existing AQAP (Air Quality Action Plan). Over five years have elapsed since the previous AQAP was published. The AQAP is scheduled to be updated over the next reporting year.

## Local Engagement and How to get Involved

All Warwick District Council residents can help to improve air quality in the borough by choosing sustainable travel alternatives such as walking, cycling or using public transport.

Warwickshire and Coventry have an ongoing carsharing programme, available online via the [Carshare Warwick website](#).

All enquiries pertaining to air quality should be directed to the Environmental Protection Section, either by email ([pollution@warwickdc.gov.uk](mailto:pollution@warwickdc.gov.uk)) or by phone (01926 456725).

An air pollution page is available on the [Council website](#), all statutory reports and up to date information is uploaded to, and presented within this page. Additionally, the [Active Travel website](#) is available to provide information on sustainable modes of transport within the district. Information and maps showing the [locations of EV charging points](#) are also now available on the Council's website.



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# 1 Local Air Quality Management

This report provides an overview of air quality in Warwick District Council during 2020. 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 Warwick District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

## 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 should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Warwick District Council can be found in Table 2.1. The table presents a description of the five AQMAs that are currently designated within Warwick District Council. Appendix D: Maps of Monitoring Locations and AQMAs provides maps of the AQMAs and the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO<sub>2</sub> annual mean; and
- NO<sub>2</sub> 1-hour mean.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Warwick Coventry Road	Mar-11	NO <sub>2</sub> Annual Mean	Warwick	The area covers the east side of Coventry Road from the junction with St. Johns / Coten End, incorporating 2-4 Coventry Road and Montgomery Court, properties fronting on to Coventry Road only.	50.8µg/m <sup>3</sup>	29.0µg/m <sup>3</sup>	Air Quality Action Plan: Warwick District Council. Published June 1st 2015	<a href="#">Visit the AQAP for the Warwick Coventry Road AQMA</a>
Warwick Road (Kenilworth) AQMA	Nov-08	NO <sub>2</sub> Annual Mean	Kenilworth	An area encompassing all properties along Warwick Road, Kenilworth between the junctions with Station Road and Waverley Road.	48.1µg/m <sup>3</sup>	23.1µg/m <sup>3</sup>	Air Quality Action Plan: Warwick District Council. Published June 1st 2015	<a href="#">Visit the AQAP for the Warwick Road (Kenilworth) AQMA</a>
New Street Kenilworth AQMA	Nov-08	NO <sub>2</sub> Annual Mean	Kenilworth	An area encompassing all properties fronting New Street, Kenilworth from the junction with Bridge Street/Fieldgate Lane up to and	39.8µg/m <sup>3</sup>	22.9µg/m <sup>3</sup>	Air Quality Action Plan: Warwick District Council. Published June 1st 2015	<a href="#">Visit the AQAP for New Street Kenilworth AQMA</a>

				including No. 17 New Street.				
Leamington Spa AQMA	Dec-04 Amended 2014	NO <sub>2</sub> Annual Mean	Leamington Spa	An area of South Town, Leamington Spa, centred on High Street, Clemens Street and Bath Street.	52.9µg/m <sup>3</sup>	36.8µg/m <sup>3</sup>	Air Quality Action Plan: Warwick District Council. Published June 1st 2015	<a href="#">Visit the AQAP for the Leamington Spa AQMA</a>
Warwick AQMA	Dec-04 Amended 2008	NO <sub>2</sub> Annual and 1-Hour Mean	Warwick	An area in the centre of Warwick, encompassing properties along High Street, Jury Street, Bowling Green Street, Theatre Street, Northgate, The Butts, Smith Street, Church St and part of Saltisford, and also including a number of nearby properties. This AQMA is now declared for both annual and hourly mean nitrogen dioxide objectives.	58.3µg/m <sup>3</sup>	31.4µg/m <sup>3</sup>	Air Quality Action Plan: Warwick District Council. Published June 1st 2015	<a href="#">Visit the AQAP for the Warwick AQMA</a>

Warwick District Council confirm the information on UK-Air regarding their AQMA(s) is up to date.

Warwick District Council confirm that all current AQAPs have been submitted to Defra.



## 2.2 Progress and Impact of Measures to address Air Quality in Warwick District Council

Defra's appraisal of last year's ASR concluded that "the report is well structured, detailed, and provides the information specified in the Guidance." Other comments provided are as follows:

1. *"Robust and accurate QA/QC procedures were applied. Calculations for bias adjustment, annualisation and distance-correction factors were outlined in detail.*
2. *The Council has included discussion and review of its AQMAs and monitoring strategy, informed due to the monitoring network.*
3. *Comments from last year's ASR have been mentioned and addressed. This is welcomed, and we encourage this to continue in future ASRs.*
4. *Five years have elapsed since the previous AQAP were published and it is recommended that the AQAP be updated over the next reporting year.*
5. *The Council has an extensive NO<sub>2</sub> monitoring strategy and monitoring of other pollutants is continued to better inform on pollution.*
6. *The Public Health Outcomes Frameworks was mentioned. The Council have referred specifically to indicator D01, which is the fraction of mortality attributable to particulate air pollution, and this is encouraged.*
7. *Council have provided a clear map of the diffusion tube monitoring network; trends are displayed and discussed in the report, this is welcomed.*
8. *Overall the report is detailed, concise and satisfies the criteria of relevant standards. The Council should continue their good and thorough work."*

Warwick District Council acknowledges that the AQAP is now outdated and is now working towards updating the AQAP. Continued delays have occurred due to insufficient resources alongside the impacts of the COVID-19 pandemic. Warwick District Council is actively seeking resources to ensure that the AQAP can be delivered within the next reporting year and is considered a priority.

Warwick District Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 34 measures are included within Table 2.2, with the type of measure and the progress Warwick District Council have

made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

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

- WDC's Low Emission Strategy Guidance has been superseded by an Air Quality SPD which is now being implemented;
- Funding has been secured from the DfT to introduce electric buses on cross boundary routes between Warwick, Leamington and Coventry;
- Expansion of the 'Choose How You Move in Warwick District' programme, in conjunction with Betterpoints, to include rewards for participants making active and sustainable travel choices across the District;
- The Park and Ride feasibility report has been completed, identifying a number of Park and Ride and Park and Stride sites in and around Warwick and Leamington which could be introduced;
- Installation of 26 twin headed EV charging points in off-street car parks within Leamington, Warwick and Kenilworth. Further funding has been secured from the LEP which will allow charging points to be introduced in on-street locations within the District;
- A further electric vehicle has been added to the WDC fleet;
- WDC website includes links to maps showing the [locations of EV charging points](#) in the District;
- Appointment of two new Safe and Active Travel Officers to provide significant updates to the [Active Travel website](#); and
- Funding secured for Warwick town centre scheme, including road space reallocation to improve pedestrian and cycle facilities.

Warwick District Council expects the following measures to be completed over the course of the next reporting year:

- Europa Way corridor improvements at the section between Tachbrook Park and Olympus Avenue;
- An electric taxi project is currently underway with a view to introducing electric charging infrastructure for taxis and incentives to encourage taxi drivers to make the switch to electric vehicles;

- Active travel website is being progressed and updated by the Safe and Active Travel team. Significant updates due for launch in 2021; and
- Continued improvements to the Europa Way corridor.

Warwick District Council's priority for the coming year is to update the AQAP as over five years have elapsed since the publication of the previous AQAP.

The principal challenge facing Warwick District Council with the implementation of current and future measures is predominantly a lack of resources and funding for some of the schemes and measures outlined in Table 2.2.

Progress on the following measures has been slower than expected due to the COVID-19 pandemic and the re-allocation of resources.

Warwick District Council anticipates that the measures stated above and in Table 2.2 will aid in achieve compliance in all five of the AQMAs.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Area wide improvements to walking and cycling infrastructure	Promoting Travel Alternatives	Promotion of Cycling and Promotion of Walking	Ongoing	Ongoing implementation of schemes	WCC	WCC, possible CIL contribution to some schemes, Getting Building Fund	NO	-	-	Implementation	n/a	n/a	1. Europa Way Corridor Improvements commenced in May 2018 and are ongoing. 2. Shared use cycle path created on Priory Road, Warwick. 3. Traffic model developed for a two way cycle link between Leamington Spa and Warwick along Emscote Road with funding now secured for this scheme. 4. Works have been completed at Northgate, Warwick to improve pedestrian routes between Warwick railway station and the town centre. 5. Bicycle hire/share scheme is being explored that could serve Leamington Spa railway station, Warwick Technology Park, and Heathcote Industrial Estate.	Europa Way corridor improvements are ongoing with section between Tachbrook Park Road and Olympus Avenue due to open summer 2021. Feasibility work on Harbury Lane connections, including to new school site, is being carried out in 2021/22. Funding has been secured from Getting Building Fund through the CWLEP to deliver the following new schemes / upgrades of existing schemes during 2021/22: Stratford Rd & Shakespeare Ave Warwick, Vittle Drive Warwick, Coventry Rd Warwick including link to Woodloes, St Nicholas Park Warwick, Kenilworth Road Leamington Spa. The Stanks Island scheme in Warwick is complete including improved cycle connectivity
2	Smarter Choices and Travel Planning programme	Promoting Travel Alternatives	School Travel Plans and Workplace Travel Planning	Ongoing	Ongoing implementation of schemes	WCC	WCC, DfT	NO	-	-	Implementation	n/a	n/a	1. Engagement with large employers at Warwick Technology Park in relation to active travel. A lift share scheme introduced by local employer Wolesey has proved to be successful, with significant uptake by employees. WCC have since taken this example of a successful scheme to the Coventry and Warwickshire LEP and have promoted the concept to other local companies. 2. Active travel website is operational and being maintained.	WCC's Road Safety Education continue to engage with employers and schools to promote active travel in partnership with road safety initiatives. Funding has been secured for 2 x Safe and Active Travel Officers, who have recently been appointed
3	Targeted bus stop infrastructure upgrades on key public transport corridors	Transport Planning and Infrastructure	Bus Route Improvements	Ongoing	Ongoing implementation of schemes	WCC	WCC, DfT	NO	-	-	Implementation	n/a	n/a	Feasibility work undertaken on some corridors	WCC has been successful in obtaining funding from DfT for electric buses to be introduced on cross boundary routes between Warwick, Leamington and Coventry. The initiative is part of a wider project to introduce all electric buses within Coventry by 2024/25. The introduction of electric buses will be supported by some bus priority measures along the corridor. This project could also provide opportunities for bus charging infrastructure to be installed within the District.
4	Improving infrastructure to improve walking and cycling signage	Promoting Travel Alternatives	Promotion of Cycling and Promotion of Walking	Ongoing	Ongoing implementation of schemes	WCC	WCC	NO	-	-	Planning	n/a	n/a	1. New signage nodes installed in Leamington Spa town centre and railway station in May 2018 showing walking routes/times. Signages nodes at Warwick and Warwick Parkway railway stations also now in place. 2. Bike hire/share scheme being explored to serve Leamington Railway station and large employment sites such as Warwick Technology Park and Heathcote Industrial Estate.	Options for a bike share scheme are still being explored by WDC in conjunction with Stratford DC and WCC.

5	Hearts and Minds campaign to encourage modal shift away from private car use	Public Information	Other	Ongoing	Ongoing campaigns	WCC	WCC, grant funding where available	NO	-	-	Implementation	n/a	n/a	1. The 'Choose how you move' (CHYM) Active Travel campaign is continuing. The campaign has also been expanded in Leamington Spa where WDC, in partnership with WCC, have set up a rewards programme using the 'BetterPoints' app. The scheme encourages walking, cycling and use of public transport in Leamington by allowing users to log their green travel in return for BetterPoints that are then redeemable on the high street. 2. Warwickshire Public Health secured funding for 50 personal air quality monitors and an initial project was carried out looking at air quality awareness and impact on travel behaviours.	The 'Choose How You Move in Warwick District' programme, in conjunction with Betterpoints, is continuing and has been expanded to include rewards for participants making active and sustainable travel choices across the District.
6	Further consideration of Park and Ride	Alternatives to private vehicle use	Bus based Park and Ride	Ongoing	Unknown at this time	WCC	WCC	NO	-	-	Planning	n/a	n/a	1. Park and Ride facilities outlined in key transport corridor proposals. 2. 500 space park and ride scheme at Europa Way has been committed and is required to be developed prior to occupation of residential development along this corridor. 3. A park and ride at Blackdown (North of Leamington Spa) is included in local plan and on Community Infrastructure Levy (CIL) list. 4. Warwickshire County Council commissioning works to explore park and ride facilities to the North and South of Leamington Spa.	The Park and Ride feasibility report has been completed and identifies a number of Park and Ride and Park and Stride sites in and around Warwick and Leamington that could be introduced. Some of the assumptions may need to be reviewed in light of future working patterns for key employers in the area post-Covid
8	Publicising CarShare Coventry and Warwickshire	Alternatives to private vehicle use	Car and lift sharing schemes	Ongoing	Ongoing	WCC	WCC	NO	-	-	Implementation	n/a	n/a	1. Active Travel website publicising car sharing opportunities. Following the success of the Wolsley car share scheme WCC have presented to the Coventry and Warwickshire LEP with a view to expanding the scheme to other local employers. 2. Signage in Leamington Spa and Warwick being explored to further promote scheme.	Limited scope for impact at the current time while the Covid-19 situation has led to increased home working and a reduction in the number of employees commuting to workplaces.
9	Supporting future opportunities for funding for Low Emission Vehicles, in particular for vehicle charging infrastructure	Promoting Low Emission Transport	n/a	Ongoing	Ongoing implementation	WDC / WCC	WCC, OLEV grant	NO	-	-	Implementation	n/a	n/a	WCC currently developing an Electric Vehicle Charging Strategy. OLEV funding secured for approximately 100 twin-headed charging points to be installed across Warwickshire. WCC have introduced electric vehicles for their pool fleet (four vehicles)	OZEV funding has enabled delivery of 26 twin headed charging points in off-street car parks within Leamington, Warwick and Kenilworth. Further funding has been secured from the LEP which will allow charging points to be introduced in on-street locations within the District. The on-street locations are currently being finalised.
10	Use of the planning system to ensure a more widespread infrastructure for low emission vehicles	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Ongoing	Ongoing implementation	WDC	WDC	NO	-	-	Implementation	n/a	n/a	Implementation of Low Emission Strategy Guidance, and more recently WDC's Air Quality Supplementary Planning Document which was adopted by WDC in 2019.	EV infrastructure continues to be sought and implemented as part of the planning process and in line with the Air Quality SPD.
11	Moving the Warwick DC fleet to electric vehicles where practicable	Promoting Low Emission Transport	Public Vehicle procurement	Ongoing	Vehicles in place as of 2016. Ongoing commitment where feasible	WDC	WDC, grant funding	NO	-	-	Implementation	n/a	n/a	Five vehicles ordered as pool vehicles	A further electric vehicle has been added to the WDC fleet bringing the total number of vehicles to 6. Options for adding a further two vehicles are also being considered.
12	Strive to set up an Ecostars scheme in Warwick District Council whereby fleet operators can join for free and strive to reduce their environmental impacts.	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	TBC	Subject to grant funding	WDC	Grant funding if available	NO	-	-	Aborted	n/a	n/a	Not taken forward yet – no grant funding available	No Update

13	Working with Warwickshire County Council and bus operators to encourage lower emission buses (either retrofitting existing buses or use of alternative fuels).	Vehicle fleet efficiency	Promoting Low Emission Public Transport	Ongoing	Subject to grant funding	WCC, DfT	Grant funding if available	NO	-	-	Implementation	n/a	n/a	1. Meetings held with bus providers in the Warwick district. Obtained details on composition of vehicle fleet and have identified eight Euro 4 buses that are eligible for retrofitting. 2. Initial discussions with local bus providers and bus manufacturers on possibility of trialling an electric bus route through the Leamington Spa AQMA. An initial electric bus funding bid was submitted in 2018 but was unsuccessful. Coventry City Council have since applied for funding under the 'all electric bus town' scheme and cross-boundary routes between Coventry and Warwickshire are being considered as part of the bid, a business case will be developed over the coming months. If the bid is successful there is potential for routes between Coventry and the towns within Warwick District to become electric. It would also provide opportunities for bus charging infrastructure to be installed within the District	WCC successfully submitted a bid with CCC to introduce electric buses on cross-boundary routes between Coventry and Leamington/Warwick. The electric buses will be introduced by 2024/25.
14	Ensuring that the electric taxi within Warwick District Council is utilised to promote Low Emission Vehicles to commercial operators and the public.	Promoting Low Emission Transport	Taxi emission incentive	Ongoing	n/a	WDC		NO	-	-	Aborted	n/a	n/a	Not feasible as taxi is privately owned	No update
15	Promotion of electric vehicles through the Warwickshire Drive Electric Website. <a href="http://www.warwickshire.gov.uk/driveelectric">http://www.warwickshire.gov.uk/driveelectric</a>	Promoting Low Emission Transport	Other	Ongoing	Ongoing implementation	WCC	WCC	NO	-	-	Implementation	n/a	n/a	Website is updated and maintained.	Ongoing. WDC website includes links to maps showing the <a href="#">locations of EV charging points</a> in the District
16	Use the taxi and private hire licensing system to try and reduce emissions from taxis and private hire vehicles.	Promoting Low Emission Transport	Taxi emission incentive	Ongoing	To be confirmed	WDC	WDC, grant funding	NO	-	-	Planning	n/a	n/a	Preliminary review of WDC licensed taxi fleet completed in November 2017. Explored possibility of a county-wide taxi euro emission licensing policy through the Coventry and Warwickshire Air Quality Alliance, however, limited interest from neighbouring local authorities.	An electric taxi project is currently underway with a view to introducing electric charging infrastructure for taxis and incentives to encourage taxi drivers to make the switch to electric vehicles.
17	Investigation with procurement colleagues to produce a sustainable procurement guide to ensure transport emissions are as low as possible	Policy Guidance and Development Control	Sustainable Procurement Guidance	TBC	2018	WDC (Procurement)	WDC	NO	-	-	Planning	n/a	n/a	WDC declared a Climate Emergency in 2019 which includes a commitment to becoming a net-zero carbon organisation by 2025, including all contracted out services. It is expected that sustainable procurement will be considered as part of a Climate Emergency Action Programme and that this will impact positively on local air quality at the same time as reducing carbon emissions.	Ongoing
18	Ensuring that the Warwick Low Emission Strategy Guidance for Developers is kept up to date, and implemented	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Ongoing	Ongoing	WDC	WDC	NO	-	-	Implementation	n/a	n/a	1. Good progress in implementing mitigation through development control. 2. WDC's Low Emission Strategy Guidance has been superseded by an Air Quality SPD which is now being implemented.	The SPD makes similar requirements of developers to those made under the previous guidance but with some changes. Additional trigger criteria have been added for major developments which must now be considered when determining the classification of a proposed development, and therefore the level of assessment and mitigation required.  Also, a requirement for construction emission control measures, including non-road mobile machinery (NRMM) controls, is now included where type 2 mitigation is necessary.
19	Working with planning policy colleagues to ensure that the Local Plan fully addresses air quality issues with appropriate policies included	Policy Guidance and Development Control	Other policy	Ongoing	Ongoing	WDC	WDC	NO	-	-	Completed	n/a	n/a	Planning policy relevant to air quality included in new Local Plan	

20	Working with planning colleagues and developers to ensure that new developments are based around the 'five-minute walkable neighbourhood', thereby encouraging active travel as the preferred methods of transport to access local facilities	Policy Guidance and Development Control	Other policy	Ongoing	Ongoing encouragement of active travel	WCC Public Health	WCC Public Health	NO	-	-	Implementation	n/a	n/a	Five minute walkable neighbourhoods have been investigated within work undertaken by WYG on how developments should look	Ongoing
21	Ensure that green infrastructure is integrated into all residential and commercial developments, in line with the National Planning Policy Framework (NPPF)	Policy Guidance and Development Control	Other policy	Ongoing	Ongoing	WDC	WDC	NO	-	-	Implementation	n/a	n/a	NPPF followed for new development. Green infrastructure included where relevant	Ongoing
22	Ensuring that planning applications with potential air quality impacts are fully assessed for their impacts, at relevant locations using appropriate methodologies	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Ongoing	Ongoing	WDC	WDC	NO	-	-	Implementation	n/a	n/a	Air quality assessments asked for on a regular basis and mitigation sought where necessary	Ongoing
23	Ensuring that where possible, cumulative impacts are taken into account. Any committed developments should be included within a given air quality assessment	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Ongoing	Ongoing	WDC	WDC	NO	-	-	Implementation	n/a	n/a	Ongoing work required where large areas of development are allocated in Local Plan. Potential cumulative impacts raised at pre-application and outline planning application stages as necessary.	Ongoing
24	Ensuring that appropriate mitigation is implemented where any relevant impacts are identified	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Ongoing	Ongoing	WDC	WDC	NO	-	-	Implementation	n/a	n/a	Mitigation asked for on a regular basis as part of the Low Emission Strategy (superseded in 2019 by WDC's Air Quality SPD).	Ongoing
25	Junction improvements on key travel corridors in Warwick and Leamington Spa AQMAs are proposed which include junction/highway modifications, improvements for walking and cycling and bus priority measures	Traffic Management	Strategic Highway Improvements	Ongoing	Ongoing for different corridors, Europa Way works commenced in 2018 and are continuing.	WCC (Transport)	WCC (Transport) / CIL contribution	NO	-	-	Implementation	n/a	n/a	Good progress on planning and starting to implement corridor proposals. Work on the Europa Way corridor has begun and is ongoing. A scheme to address air quality issues in the Bath Street, Leamington area is being developed. Options include priority measures for buses, traffic management proposals to reduce queuing traffic in and around the Bath Street area, and improved connectivity for pedestrians and cyclists.	Two proposals for the Bath Street scheme have been developed. Option assessment will include impact on air quality using Ricardo air quality modelling tool alongside traffic modelling.
26	An investigation of 20 mph zones as part of the wider transport strategy, where this will smooth traffic flow	Traffic Management	Reduction of Speed Limits, 20 mph zones	Ongoing	2022	WCC (Transport)	WCC (Transport)	NO	-	-	Implementation	n/a	n/a	Good progress	No update
27	Targeted re-allocation of road space to prioritise and facilitate movement of pedestrians, cyclists, public transport and car share users	Traffic Management	Strategic Highway Improvements	Ongoing	Ongoing for different corridors, Europa Way works commenced in 2018 and are continuing. Shared use cycle link completed on Priory Road, Warwick which is to be expanded to Northgate, Eastgate, Westgate, St. Johns, and Emscote Road	WCC (Transport)	WCC (Transport)	NO	-	-	Implementation	n/a	n/a	Good progress on planning and starting to implement corridor proposals. Northgate pedestrian improvement works were completed in 2019 and funding has been secured to complete the remainder of the planned Warwick town centre works which will act to make movement easier for pedestrians and cyclists. All of the remaining works planned for Warwick, including junction improvements at Eastgate and Westgate and the introduction of one-way routing in some areas, are expected to go ahead.	Work on the Europa Way corridor is ongoing.  Funding secured for Warwick town centre scheme, including road space reallocation to improve pedestrian and cycle facilities



28	Manage deliveries across Warwick District Council to ensure that no additional congestion is caused by stationary delivery vehicles in busy locations	Traffic Management	Congestion Management	Ongoing	n/a	WCC (Transport)	WCC (Transport)	NO	-	-	Planning	n/a	n/a	Will review at future Steering Group meetings	No update, ongoing
29	Re-investigate funding for a website to engage with the public on air quality, the health impacts of poor air quality, sustainable transport and strategies to improve air quality	Public Information	Via the internet	Ongoing	Ongoing implementation	WCC Public Health	WCC Public Health	NO	-	-	Implementation	n/a	n/a	Air quality information incorporated into <a href="#">Active Travel website</a> . Further information about air quality and local AQMAs to be included.	Active travel website being progressed by Safe and Active Travel team. Due for launch in 2021
30	Working with planners and developers to embed Public Health's Evidence for Planning guidance, thereby encouraging any new developments to support access to active travel	Policy Guidance and Development Control	Other policy	Ongoing	Ongoing	WCC Public Health	WCC Public Health	NO	-	-	Implementation	n/a	n/a	The guidance document is used when responding to planning applications, pre-planning applications and local plan consultations on an ad-hoc basis.	Ongoing
31	Investigate implementing a campaign aimed at vulnerable members of the public (i.e. those with existing respiratory or cardiovascular conditions) in order that they could change behaviour to reduce exposure when pollution levels are high	Public Information	Via the internet	Ongoing	Ongoing	WCC Public Health	WCC Public Health	NO	-	-	Implementation	n/a	n/a	Instead will embed active travel in everything we do, aimed at whole population	Funding for personal air monitors was secured and an initial project completed.
32	Continuation of monitoring within Warwick District Council, focussed on AQMAs, but also in other strategic locations	n/a	n/a	Ongoing	Ongoing	WDC	WDC	NO	-	-	Implementation	n/a	n/a	Monitoring reported in this report. Three additional diffusion tubes have been installed in and around Castle Hill, Warwick to determine whether the current boundary of the Warwick AQMA should be adjusted.  Two further tubes have also been added to the network for the purpose of investigating any temporary air quality concerns, these have been deployed in Dale Street, Leamington since July 2018 and are expected to be relocated during 2020.	Ongoing
33	Regular assessment of air quality against air quality objectives as specified by the LAQM process with reports to Defra and the public	n/a	n/a	Ongoing	Ongoing	WDC	WDC	NO	-	-	Implementation	n/a	n/a	Undertaken in this report	
34	Review of measures set out in this Air Quality Action Plan on a regular basis to ensure they are up to date and being implemented	n/a	n/a	Ongoing	Ongoing	WDC	WDC	NO	-	-	Implementation	n/a	n/a	Undertaken in this report	



## 2.3 PM<sub>2.5</sub> – 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<sub>2.5</sub> (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM<sub>2.5</sub> has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Although the existing AQAP and AQMAs focus on reducing NO<sub>2</sub> emissions, the majority of measures will also lead to reductions in PM<sub>2.5</sub> emissions. Transport sources result in both NO<sub>2</sub> and PM<sub>2.5</sub> emissions, and in the latter case this is mostly from break and tyre wear. Therefore, any measures that target reducing NO<sub>2</sub> emissions by reducing overall vehicle trips and usage would also lead to a decrease in reducing PM<sub>2.5</sub> emissions.

Alongside this, the Council continues to monitor and review combustion emissions from industrial processes and domestic appliances, whilst enforcing statutory controls through the use of permitting etc.

The Department of Health's [Public Health Outcomes Framework](#) has a number of public health indicators that are used focus public health action, identify areas of health inequality and concern and monitor the differences in health impacts across regions in the UK. This framework includes an indicator "D01- Fraction of Mortality Attributable to Particulate Air Pollution" which is calculated using background annual average PM<sub>2.5</sub> concentrations, modelled at a 1km<sup>2</sup> resolution based on measured concentrations from the AURN.

Warwick has a 5.1% fraction of mortality calculated for 2019, which is equal to the average for England overall, however lower than that of the West Midlands Region (5.3%). The 2019 data is used as the 2020 dataset has not been made available at the time of writing.

Measures to improve air quality often have shared wins with other public health indicators, a good example being the encouragement of active travel and commuting leading to increased physical activity and increased wellbeing.

Monitoring of PM<sub>2.5</sub> is completed at two Automatic Urban and Rural Network (AURN) sites within the District – Leamington Spa Hamilton Terrace (UKA00265) and Leamington Spa Rugby Road (UKA00564), referred to as AURN1 and AURN2 respectively within this report. AURN1 concentrations have mostly shown a steady decrease across a five year period, with a 2.7µg/m<sup>3</sup> decrease in annual mean concentration in 2020 compared to

2019. The roadside AURN2 site has seen PM<sub>2.5</sub> concentrations showing a slight increase up until 2019, and since then has been decreasing with a reported decrease of 2.9µg/m<sup>3</sup> reported from 2019 to 2020.

There are a number of Smoke Control Areas (SCA) within the Council's boundary. In these areas, only authorised and smokeless fuels are allowed to be burnt, unless being used in an exempt appliance. This helps control and reduce PM<sub>2.5</sub> emissions in these areas. Further information on these, including authorised fuels, can be found on [Warwick District Council's website](#).

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

This section sets out the monitoring undertaken within 2020 by Warwick District Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

### 3.1 Summary of Monitoring Undertaken

#### 3.1.1 Automatic Monitoring Sites

Warwick District Council undertook automatic (continuous) monitoring at one site during 2020. Additionally, there are two AURN automatic monitoring stations located within the district. Table A.1 in Appendix A shows the details of the automatic monitoring sites. Table A.3 presents automatic monitoring results for Warwick, with the AURN monitoring results available through the [UK-AIR website](#). All automatic monitoring data carried out in the district is also available to be requested from [WeCare4Air](#).

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

Warwick District Council undertook non-automatic (i.e. passive) monitoring of NO<sub>2</sub> at 56 sites during 2020, inclusive of two triplicate locations. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

## 3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

### 3.2.1 Nitrogen Dioxide (NO<sub>2</sub>)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past five years with the air quality objective of 40µg/m<sup>3</sup>. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.5 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past five years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year.

In 2020, all monitoring sites, both automatic and non-automatic, have reported an annual mean NO<sub>2</sub> concentration less than the annual mean NO<sub>2</sub> AQS objective of 40µg/m<sup>3</sup>. This may in part be down to the COVID-19 pandemic, whereby traffic levels were observed to decrease across the UK as a result of UK Government enforced lockdowns. It is estimated that during the initial lockdown, concentrations may have decreased in urban areas by up to 30%. Further information on this is detailed in Appendix F.

The maximum reported annual mean NO<sub>2</sub> concentration at any of the sites was 36.8µg/m<sup>3</sup>, site ID W13, which had reported an exceedance in 2019. All sites, with the exception of W41, showed a decrease in concentration from 2019 to 2020. Despite reporting an increase in concentration, W41 still remained below the annual mean AQS objective at a concentration of 26.0µg/m<sup>3</sup> in 2020.

No diffusion tube monitoring locations required distance correction, as all sites either reported an annual mean NO<sub>2</sub> concentration below 36µg/m<sup>3</sup>, in accordance with LAQM.TG(16), or is already located at a site or relevant exposure.

With direct reference to each of the AQMAs:

- Warwick AQMA - an exceedance was last reported in 2019, therefore this should remain in place;
- Warwick Coventry Road AQMA – an exceedance was last reported in 2017, with concentrations decreasing since. Although there has now been three years of compliance, 2020 may be an atypical year, therefore revocation of this AQMA will be considered once the long-term impacts of COVID-19 are understood;
- Leamington Spa AQMA – an exceedance was last reported in 2018, therefore this should remain in place;
- Warwick Road (Kenilworth) AQMA – an exceedance was last reported in 2017, with concentrations decreasing since. Although there has now been three years of compliance, 2020 may be an atypical year, therefore revocation of this AQMA will be considered once the long-term impacts of COVID-19 are understood; and
- New Street Kenilworth AQMA – an exceedance was last reported in 2017, with concentrations decreasing since. Although there has now been three years of compliance, 2020 may be an atypical year, therefore revocation of this AQMA will be considered once the long-term impacts of COVID-19 are understood.

In regards to the 1-hour mean NO<sub>2</sub> AQS objective, whereby there should be no more than 18 hourly NO<sub>2</sub> concentrations greater than 200µg/m<sup>3</sup>, both AURN1 and AURN2 (Hamilton Terrace in Leamington Spa, and Rugby Road in Leamington Spa) continued to reported 0 exceedances, whereas CM1 (Jury St/Pageant House in Warwick) reported 1. CM1 had reported 25 exceedances in 2019, therefore a decrease in short-term exceedances has been observed but this may again be attributable to the impacts of the COVID-19 pandemic. The designation for the 1-hour mean NO<sub>2</sub> AQS objective Warwick AQMA should therefore remain in place as less than three years of compliance has been maintained.

### 3.2.2 Particulate Matter (PM<sub>10</sub>)

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM<sub>10</sub> annual mean concentrations for the past five years with the air quality objective of 40µg/m<sup>3</sup>.

Table A.7 in Appendix A compares the ratified continuous monitored PM<sub>10</sub> daily mean concentrations for the past five years with the air quality objective of 50µg/m<sup>3</sup>, not to be exceeded more than 35 times per year.

In 2020, there have been no reported exceedances of the annual mean PM<sub>10</sub> AQS objective of 40µg/m<sup>3</sup> at either of the AURN sites, AURN1 or AURN2. Both sites have shown a decrease in PM<sub>10</sub> concentrations compared to 2019, whereby AURN1 has decreased by 2.4µg/m<sup>3</sup> and AURN2 has decreased by 2.9µg/m<sup>3</sup>. Similarly to the impacts of COVID-19 on NO<sub>2</sub> concentrations, this decrease may likely be a result of reduced volumes of traffic observed during the national lockdowns.

In terms of the 24-hour average PM<sub>10</sub> AQS objective of no more than 35 exceedances of 50µg/m<sup>3</sup>, both AURN sites reported 0 exceedances. This again is a decrease on the 3 – 4 exceedances reported in 2019.

### 3.2.3 Particulate Matter (PM<sub>2.5</sub>)

Table A.8 in Appendix A presents the ratified and adjusted monitored PM<sub>2.5</sub> annual mean concentrations for the past five years.

Annual mean PM<sub>2.5</sub> concentrations have decreased in 2020, similarly to PM<sub>10</sub> and NO<sub>2</sub>. At the continuous monitoring sites AURN1 and AURN2, a decrease of 2.7µg/m<sup>3</sup> and 2.9µg/m<sup>3</sup> has been observed respectively compared to 2019.

### 3.2.4 Benzene (C<sub>6</sub>H<sub>6</sub>)

Whilst there is no obligation for Warwick to report on Benzene levels within the Council, in the interest of transparency, the monitored Benzene results from AURN1 have been presented in Table A.9.

In addition to being part of the AURN, the AURN1 monitoring site is part of the Non-Automatic Hydrocarbon Network that monitors ambient benzene concentrations across the UK.

Benzene concentrations for 2020 at AURN1 have marginally decreased from 2019 to a concentration of 0.40µg/m<sup>3</sup>, remaining well below the annual average AQS objective of 5µg/m<sup>3</sup>.

### 3.2.5 Ozone (O<sub>3</sub>)

Whilst there is no obligation for Warwick to report on Ozone levels within the Council, in the interest of transparency, the monitored Ozone results from AURN1 for the past five years have been presented in Table A.10.

The number of 8-hourly Ozone concentrations exceeding  $100\mu\text{g}/\text{m}^3$  observed in 2019 at AURN1 have increased from five being reported in 2019 to 24 in 2020. This is above the AQS objective of no more than 10 exceedances. The number of exceedances reported over the past five years have generally fluctuated from one to 10 8-hourly concentrations greater than  $100\mu\text{g}/\text{m}^3$ . This increase may be a result of lower  $\text{NO}_x$  emissions from vehicles, as NO actively removes  $\text{O}_3$  from the atmosphere. All 24 of these exceedances were also reported during the months of April, May, June, July, August, and September, when temperatures are typically elevated and  $\text{O}_3$  is more readily created in the atmosphere by the interactions of UV radiation on  $\text{O}_2$ .

## Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
AURN1	Hamilton Terrace, Leamington Spa	Urban Background	431943	265730	NO <sub>2</sub> , O <sub>3</sub> , C <sub>6</sub> H <sub>6</sub> , PM <sub>10</sub> , PM <sub>2.5</sub>	NO	Chemiluminescence, Ultra-violet fluorescence (UVF), FDMS	9	50	4
AURN2	Rugby Road, Leamington Spa	Roadside	431271	266404	NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub>	NO	Chemiluminescence, FDMS	23	8	3.5
CM1	Jury St/Pageant House, Warwick	Roadside	428263	264877	NO <sub>2</sub>	YES – Warwick AQMA	Chemiluminescence	13	2.8	2.4

**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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
W1	Bath Street	Kerbside	431978	265280	NO <sub>2</sub>	Y - Leamington Spa AQMA	3.4	0.7	No	2.7
W2	High Street	Roadside	432075	265234	NO <sub>2</sub>	Y - Leamington Spa AQMA	0.0	2.2	No	2.7
W5	Hampton Street (3)	Roadside	427615	264563	NO <sub>2</sub>	N	2.4	2.0	No	1.5
W6, W7, W8	Hamilton Terrace	Urban Background	431943	285730	NO <sub>2</sub>	N	9.0	n/a	Yes	3.1
W10	Farley Street	Roadside	432560	265254	NO <sub>2</sub>	N	11.0	0.1	No	2.9
W11	Clemens Street	Roadside	432051	265060	NO <sub>2</sub>	Y - Leamington Spa AQMA	2.0	3.2	No	2.9
W12	Spencer Street	Roadside	431866	265371	NO <sub>2</sub>	Y - Leamington Spa AQMA	2.9	5.0	No	2.8
W13	Wise Street	Roadside	431900	265189	NO <sub>2</sub>	Y - Leamington Spa AQMA	0.0	1.0	No	2.7
W14	Tachbrook Road	Roadside	431862	265169	NO <sub>2</sub>	N	2.9	5.2	No	2.8
W15	Old Warwick Road	Roadside	431849	265193	NO <sub>2</sub>	N	2.4	2.0	No	2.6
W16	Parade	Roadside	431951	265397	NO <sub>2</sub>	Y - Leamington Spa AQMA	6.3	7.5	No	2.8

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
W17	Coventry Road (Woodville Road)	Kerbside	428704	265236	NO <sub>2</sub>	N	12.7	1.0	No	1.5
W18	Coventry Road (Coachouse Mews)	Roadside	428735	265362	NO <sub>2</sub>	N	2.3	1.5	No	1.5
W19	West Street Torry's	Roadside	427937	264586	NO <sub>2</sub>	N	6.1	3.2	No	1.5
W23	Moorlands Road Jcn	Roadside	429078	271207	NO <sub>2</sub>	N	8.8	4.2	No	1.5
W24	Waverley Road	Roadside	428974	271402	NO <sub>2</sub>	Y - Warwick Road (Kenilworth) AQMA	4.7	2.8	No	4.5
W25	New Street No 1	Roadside	428707	272556	NO <sub>2</sub>	Y - New Street (Kenilworth) AQMA	0.0	0.4	No	1.5
W26	New Street No 2	Roadside	428733	272578	NO <sub>2</sub>	Y - New Street (Kenilworth) AQMA	0.0	1.7	No	1.5
W27	New Street No 3	Kerbside	428750	272612	NO <sub>2</sub>	N	8.8	1.1	No	4.5
W28	Fieldgate Lane Jcn	Roadside	428652	272524	NO <sub>2</sub>	Y - New Street (Kenilworth) AQMA	0.0	0.7	No	4.5
W30	The Square	Roadside	428714	271769	NO <sub>2</sub>	N	0.0	3.4	No	4.5
W31	Barrow Road	Kerbside	428816	271618	NO <sub>2</sub>	Y - Warwick Road	2.1	1.4	No	4.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
						(Kenilworth) AQMA				
W32	Warwick Road	Roadside	428906	271497	NO <sub>2</sub>	Y - Warwick Road (Kenilworth) AQMA	0.0	1.3	No	1.5
W33, W34, W35	Pageant House	Roadside	428263	264877	NO <sub>2</sub>	Y - Warwick AQMA	13.0	2.8	Yes	1.5
W36	Jury Street	Roadside	428391	264966	NO <sub>2</sub>	Y - Warwick AQMA	10.0	2.1	No	1.5
W37	High Street	Roadside	428132	264799	NO <sub>2</sub>	Y - Warwick AQMA	0.0	2.9	No	1.5
W38	West Street	Kerbside	427959	264624	NO <sub>2</sub>	N	4.5	0.6	No	1.5
W39	Crompton Street/ West Street	Roadside	427910	264541	NO <sub>2</sub>	N	0.0	4.1	No	1.5
W40	Bowling Green Street	Kerbside	427992	264695	NO <sub>2</sub>	Y - Warwick AQMA	0.0	0.9	No	1.5
W41	Friars Street	Roadside	427905	264682	NO <sub>2</sub>	N	1.8	1.0	No	1.5
W42	Theatre Street	Roadside	427938	264947	NO <sub>2</sub>	Y - Warwick AQMA	0.0	2.3	No	4.5
W43	Saltisford/northgate	Roadside	428026	265158	NO <sub>2</sub>	Y - Warwick AQMA	0.0	1.5	No	2.5
W44	West Rock	Roadside	427930	265200	NO <sub>2</sub>	Y - Warwick AQMA	3.6	2.3	No	2.6

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
W45	Albert Street/satilsford Junction	Roadside	427867	265275	NO <sub>2</sub>	Y - Warwick AQMA	0.0	2.7	No	2.5
W46	The Butts	Roadside	428240	265088	NO <sub>2</sub>	Y - Warwick AQMA	1.9	1.6	No	2.5
W48	Smith Street	Roadside	428522	265039	NO <sub>2</sub>	Y - Warwick AQMA	0.0	2.0	No	3.0
W49	Gerrard Street	Roadside	428501	264967	NO <sub>2</sub>	N	0.0	1.8	No	2.6
W50	St Nicholas' Church St 1.	Roadside	428600	264983	NO <sub>2</sub>	Y - Warwick AQMA	0.0	1.7	No	2.6
W51	St Mary's Churchyard	Urban Background	428270	264982	NO <sub>2</sub>	N	7.8	n/a	No	2.7
W52	Coventry Road/crown Hotel	Kerbside	428710	265165	NO <sub>2</sub>	Y - Warwick Coventry Road AQMA	17.5	1.0	No	2.5
W53	Coventry Road No 1 (Mongomery Court)	Roadside	428715	265202	NO <sub>2</sub>	Y - Warwick Coventry Road AQMA	1.2	1.8	No	2.4
W54	Coventry Road No 2 (28 Coventry Road)	Roadside	428715	265285	NO <sub>2</sub>	N	0.0	1.9	No	2.4
W55	Coventry Road No 3 (Great Western Arms)	Roadside	428710	265341	NO <sub>2</sub>	N	3.3	1.2	No	2.5
W56	St Johns	Roadside	428619	265113	NO <sub>2</sub>	N	0.0	1.1	No	2.5
W57	Coten End	Roadside	428748	265166	NO <sub>2</sub>	N	0.0	3.0	No	2.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
W58	Emscote Road	Roadside	429514	265469	NO <sub>2</sub>	N	9.8	3.8	No	2.5
W59	Charles Street	Roadside	429501	265494	NO <sub>2</sub>	N	1.5	2.0	No	2.6
W60	Bridge Street	Roadside	430015	265718	NO <sub>2</sub>	N	6.7	2.4	No	2.6
W61	Greville Road	Roadside	429974	265733	NO <sub>2</sub>	N	6.7	5.4	No	2.5
W62	St Nicholas' Church St. 2	Roadside	428608	265042	NO <sub>2</sub>	Y - Warwick AQMA	0.0	2.1	No	3.0
W67	Castle Hill	Roadside	428477	264939	NO <sub>2</sub>	N	1.2	3.2	No	2.5
W69	Castle Hill (2)	Roadside	428513	264921	NO <sub>2</sub>	N	1.5	2.1	No	2.5
W70	Mill Street	Roadside	428554	264870	NO <sub>2</sub>	N	9.8	3.1	No	2.4
W71	Banbury Road	Roadside	428599	264857	NO <sub>2</sub>	N	20.4	2.1	No	2.5
W72	Dale Street East	Roadside	431464	265903	NO <sub>2</sub>	N	2.9	3.1	No	2.5
W73	Dale Street West	Roadside	431480	265878	NO <sub>2</sub>	N	2.6	0.3	No	2.5

**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.3 – Annual Mean NO<sub>2</sub> Monitoring Results: Automatic Monitoring (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2020 (%) <sup>(2)</sup>	2016	2017	2018	2019	2020
AURN1	431943	265730	Urban Background	84.2	84.2	21.4	23.5	17.5	17.8	12.8
AURN2	431271	266404	Roadside	81.1	81.1	20.4	17.3	17	16.3	10.6
CM1	428263	264877	Roadside	85.1	85.1	31.7	35.9	32.4	35.6	27.5

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.

Reported concentrations are those at the location of the monitoring site (annualised, as required), i.e. prior to any fall-off with distance correction.

#### Notes:

The annual mean concentrations are presented as µg/m<sup>3</sup>.

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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%).

Table A.4 – Annual Mean NO<sub>2</sub> Monitoring Results: Non-Automatic Monitoring (µg/m<sup>3</sup>)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2020 (%) <sup>(2)</sup>	2016	2017	2018	2019	2020
W1	431978	265280	Kerbside	100.0	100.0	47.3	<u>61.2</u>	42.3	40.5	33.9
W2	432075	265234	Roadside	100.0	100.0	40.4	48.8	36.0	35.9	30.3
W5	427615	264563	Roadside	100.0	100.0	40.4	35.3	27.7	26.5	22.8
W6, W7, W8	431943	285730	Urban Background	100.0	100.0	21.8	22.9	17.6	17.0	14.1
W10	432560	265254	Roadside	100.0	100.0	26.5	28.9	22.8	22.0	18.4
W11	432051	265060	Roadside	92.9	92.9	25.6	23.8	21.9	21.7	17.6
W12	431866	265371	Roadside	92.9	92.9	36.6	41.3	31.4	30.0	26.3
W13	431900	265189	Roadside	100.0	100.0	50.4	55.4	46.4	45.8	36.8
W14	431862	265169	Roadside	100.0	100.0	39.6	45.4	36.6	37.9	30.6
W15	431849	265193	Roadside	100.0	100.0	45.0	52.0	40.9	38.2	33.2
W16	431951	265397	Roadside	100.0	100.0	32.6	37.6	27.8	26.3	22.2
W17	428704	265236	Kerbside	100.0	100.0	29.4	31.2	26.1	25.3	20.1
W18	428735	265362	Roadside	100.0	100.0	27.2	28.5	23.9	22.8	17.7

W19	427937	264586	Roadside	100.0	100.0	33.3	35.0	27.3	27.3	20.4
W23	429078	271207	Roadside	66.8	66.8	33.6	35.8	27.2	25.6	18.1
W24	428974	271402	Roadside	92.3	92.3	30.4	30.7	25.3	22.8	19.6
W25	428707	272556	Roadside	55.8	55.8	34.6	30.7	22.8	25.4	19.6
W26	428733	272578	Roadside	100.0	100.0	29.0	30.3	23.6	21.4	18.1
W27	428750	272612	Kerbside	100.0	100.0	26.1	26.5	21.0	18.1	15.4
W28	428652	272524	Roadside	100.0	100.0	<b>40.0</b>	<b>44.0</b>	31.8	29.3	22.9
W30	428714	271769	Roadside	100.0	100.0	27.3	29.0	22.6	20.9	16.2
W31	428816	271618	Kerbside	100.0	100.0	37.1	<b>41.4</b>	32.0	28.4	22.5
W32	428906	271497	Roadside	90.4	90.4	37.5	37.2	32.4	28.8	23.1
W33, W34, W35	428263	264877	Roadside	100.0	100.0	<b>44.2</b>	<b>52.5</b>	37.4	34.5	27.7
W36	428391	264966	Roadside	100.0	100.0	<b>46.3</b>	<b>49.5</b>	<b>40.3</b>	37.7	28.8
W37	428132	264799	Roadside	100.0	100.0	<b>41.0</b>	<b>42.7</b>	33.6	31.3	25.4
W38	427959	264624	Kerbside	100.0	100.0	37.4	39.6	31.8	30.7	25.4
W39	427910	264541	Roadside	100.0	100.0	30.7	31.5	24.6	23.2	19.4



W40	427992	264695	Kerbside	100.0	100.0	<b>42.9</b>	<b>47.6</b>	36.9	35.7	27.3
W41	427905	264682	Roadside	100.0	100.0	26.7	27.6	23.2	21.3	26.0
W42	427938	264947	Roadside	100.0	100.0	33.4	32.1	28.3	28.3	21.1
W43	428026	265158	Roadside	100.0	100.0	<b>46.6</b>	<b>50.2</b>	38.5	<b>40.9</b>	30.1
W44	427930	265200	Roadside	100.0	100.0	32.5	34.8	28.0	25.3	20.7
W45	427867	265275	Roadside	100.0	100.0	29.6	31.2	25.9	25.2	19.9
W46	428240	265088	Roadside	100.0	100.0	39.2	<b>40.0</b>	30.6	27.9	23.5
W48	428522	265039	Roadside	92.3	92.3	36.0	39.7	32.9	30.5	22.7
W49	428501	264967	Roadside	90.4	90.4	25.3	26.1	21.3	20.1	15.4
W50	428600	264983	Roadside	100.0	100.0	30.5	32.5	25.4	24.5	19.9
W51	428270	264982	Urban Background	100.0	100.0	20.2	21.4	16.2	15.6	11.7
W52	428710	265165	Kerbside	100.0	100.0	<b>41.4</b>	<b>44.3</b>	37.4	32.5	29.0
W53	428715	265202	Roadside	100.0	100.0	<b>44.0</b>	<b>46.4</b>	37.4	34.7	28.5
W54	428715	265285	Roadside	92.3	92.3	34.8	37.3	29.4	28.9	23.0
W55	428710	265341	Roadside	100.0	100.0	31.0	32.4	27.5	24.9	21.1

W56	428619	265113	Roadside	100.0	100.0	23.7	26.3	19.1	20.3	15.9
W57	428748	265166	Roadside	100.0	100.0	31.8	33.5	28.5	26.0	21.9
W58	429514	265469	Roadside	100.0	100.0	31.0	34.4	26.9	26.6	21.7
W59	429501	265494	Roadside	100.0	100.0	38.1	<b>41.6</b>	32.0	30.6	27.1
W60	430015	265718	Roadside	100.0	100.0	31.6	32.3	26.5	25.4	22.5
W61	429974	265733	Roadside	100.0	100.0	29.5	31.2	24.8	25.1	20.0
W62	428608	265042	Roadside	100.0	100.0	<b>41.5</b>	<b>47.9</b>	39.3	37.9	31.4
W67	428477	264939	Roadside	100.0	100.0	<b>48.0</b>	<b>50.0</b>	<b>42.2</b>	39.4	31.6
W69	428513	264921	Roadside	92.3	92.3	-	-	39.9	35.7	25.8
W70	428554	264870	Roadside	100.0	100.0	-	-	29.4	25.6	20.0
W71	428599	264857	Roadside	100.0	100.0	-	-	33.4	32.4	24.4
W72	431464	265903	Roadside	100.0	100.0	-	-	31.2	29.1	24.1
W73	431480	265878	Roadside	100.0	100.0	-	-	27.5	27.4	22.3

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.

Diffusion tube data has been bias adjusted.

Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction.

**Notes:**

The annual mean concentrations are presented as  $\mu\text{g}/\text{m}^3$ .

Exceedances of the  $\text{NO}_2$  annual mean objective of  $40\mu\text{g}/\text{m}^3$  are shown in **bold**.

$\text{NO}_2$  annual means exceeding  $60\mu\text{g}/\text{m}^3$ , indicating a potential exceedance of the  $\text{NO}_2$  1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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%).

Figure A.1 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Leamington Spa

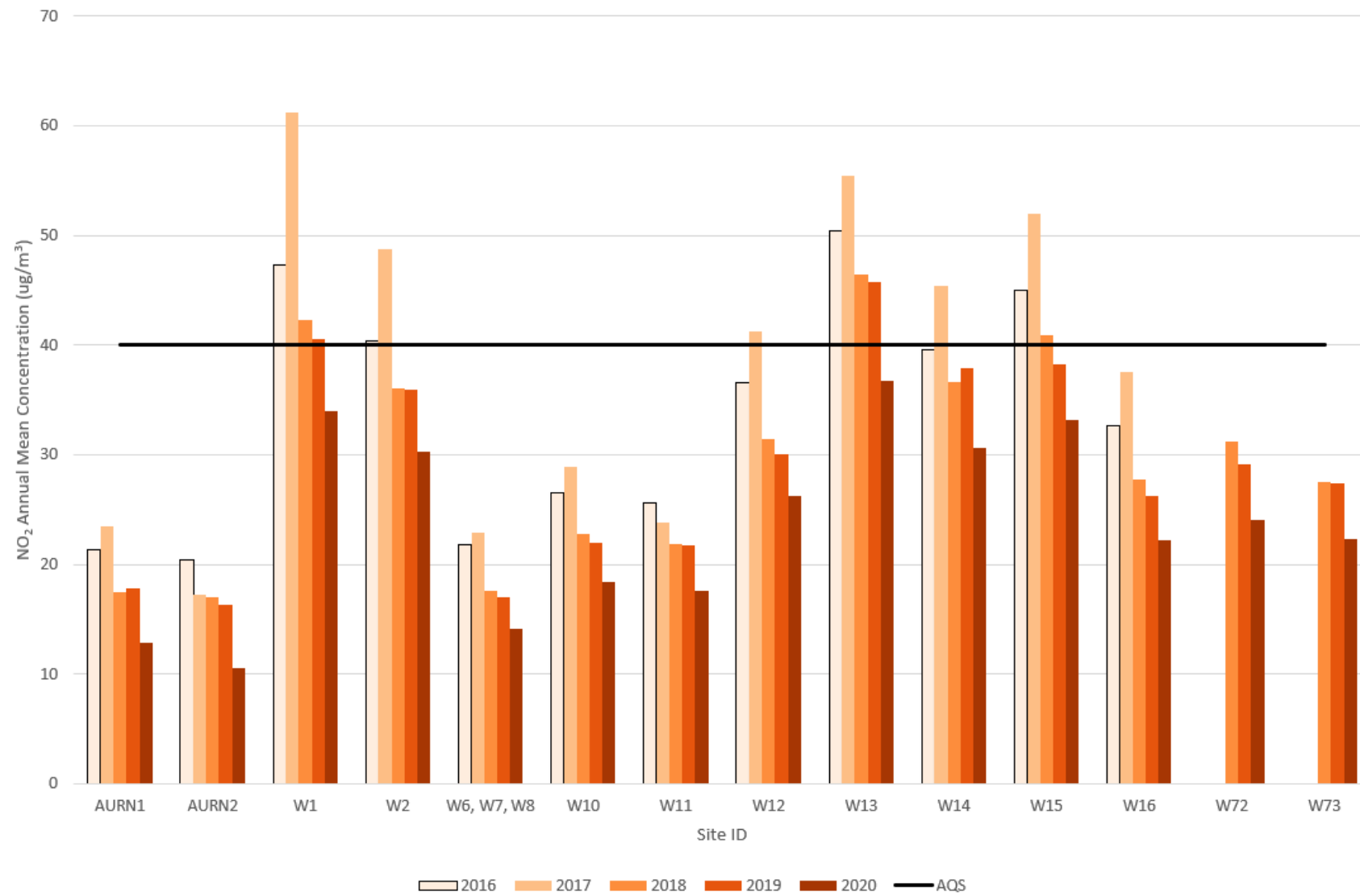


Figure A.2 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Warwick AQMAs

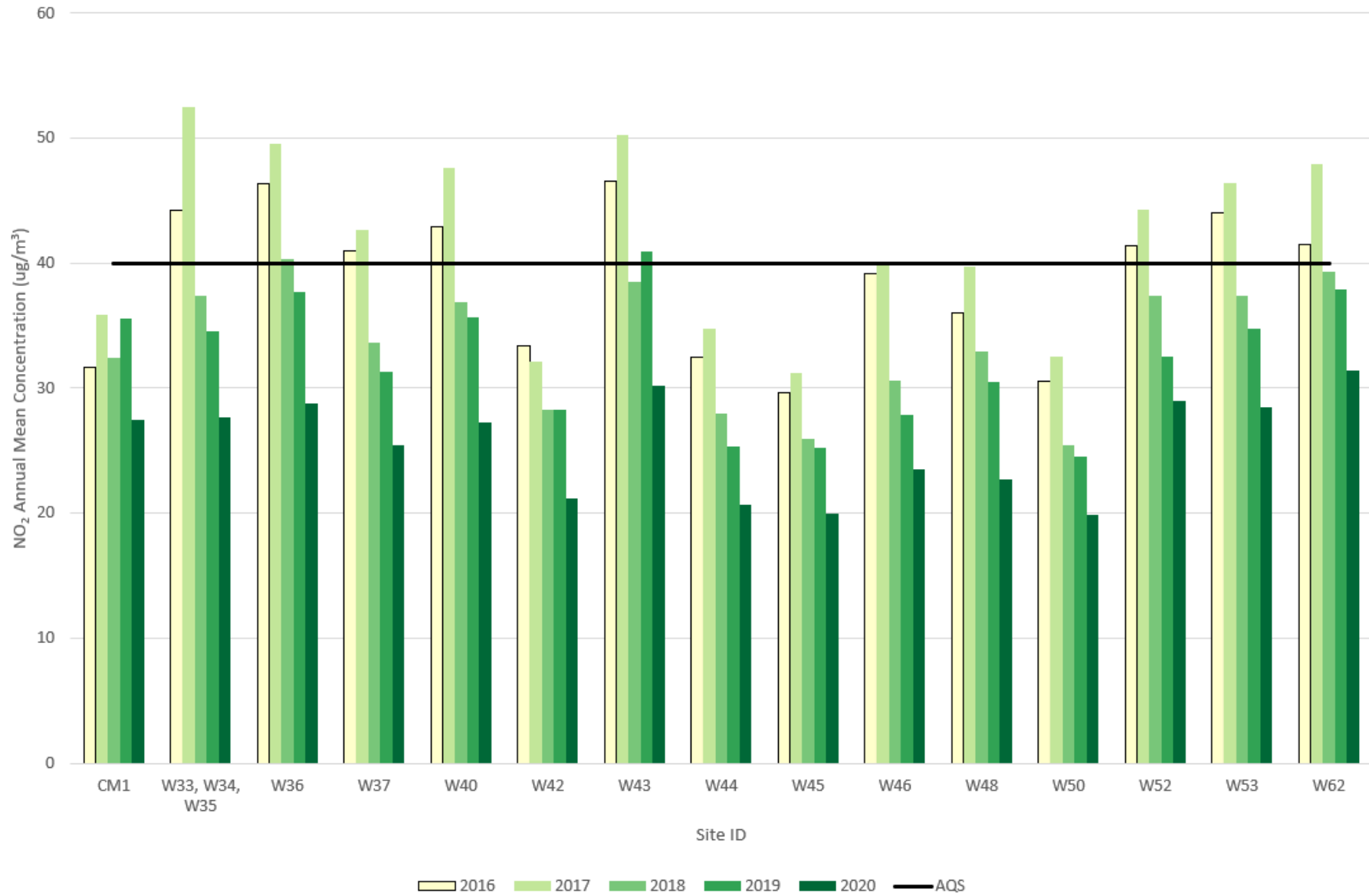


Figure A.3 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Outside Warwick AQMA

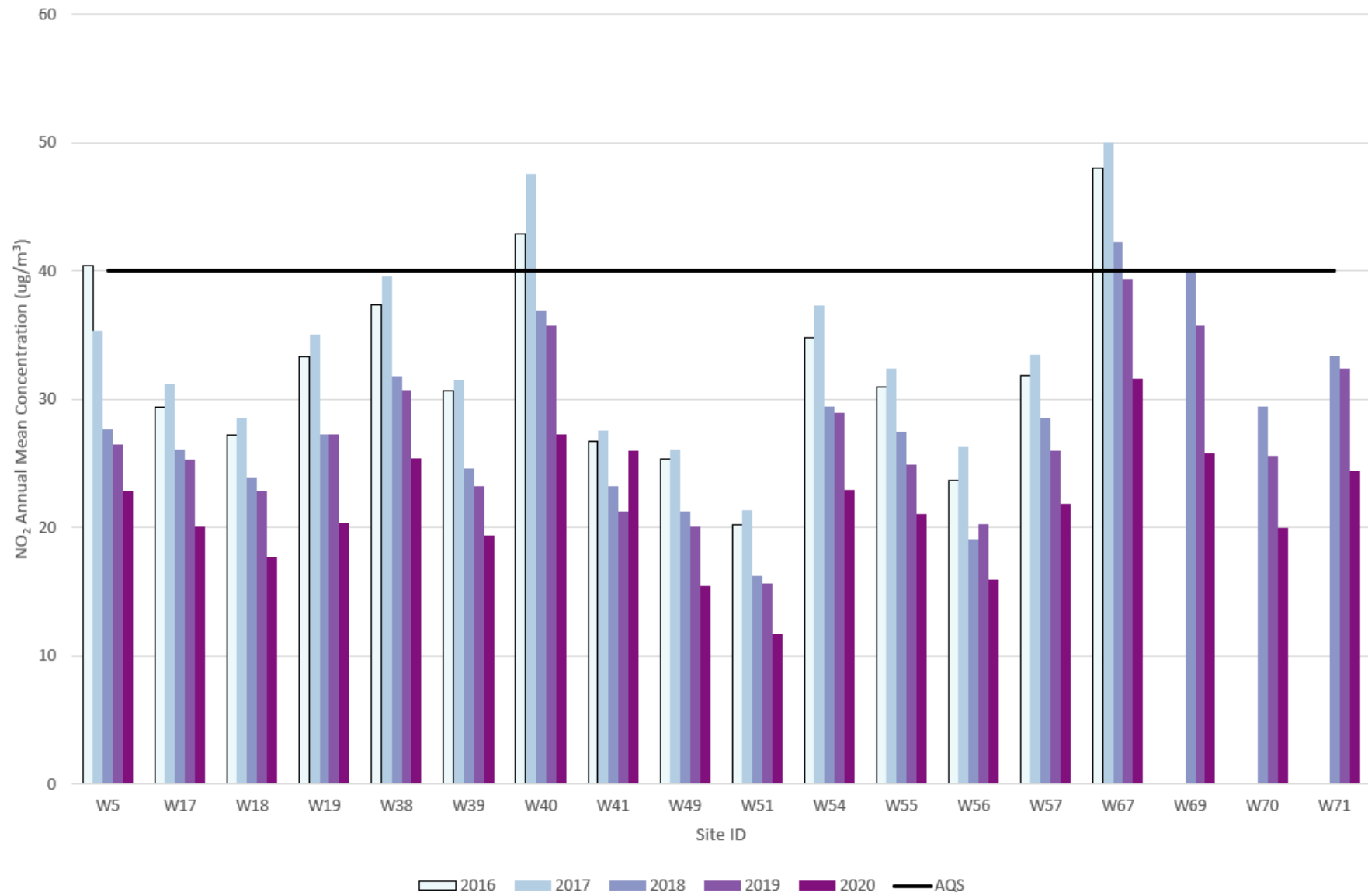


Figure A.4 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Kenilworth and Stoneleigh

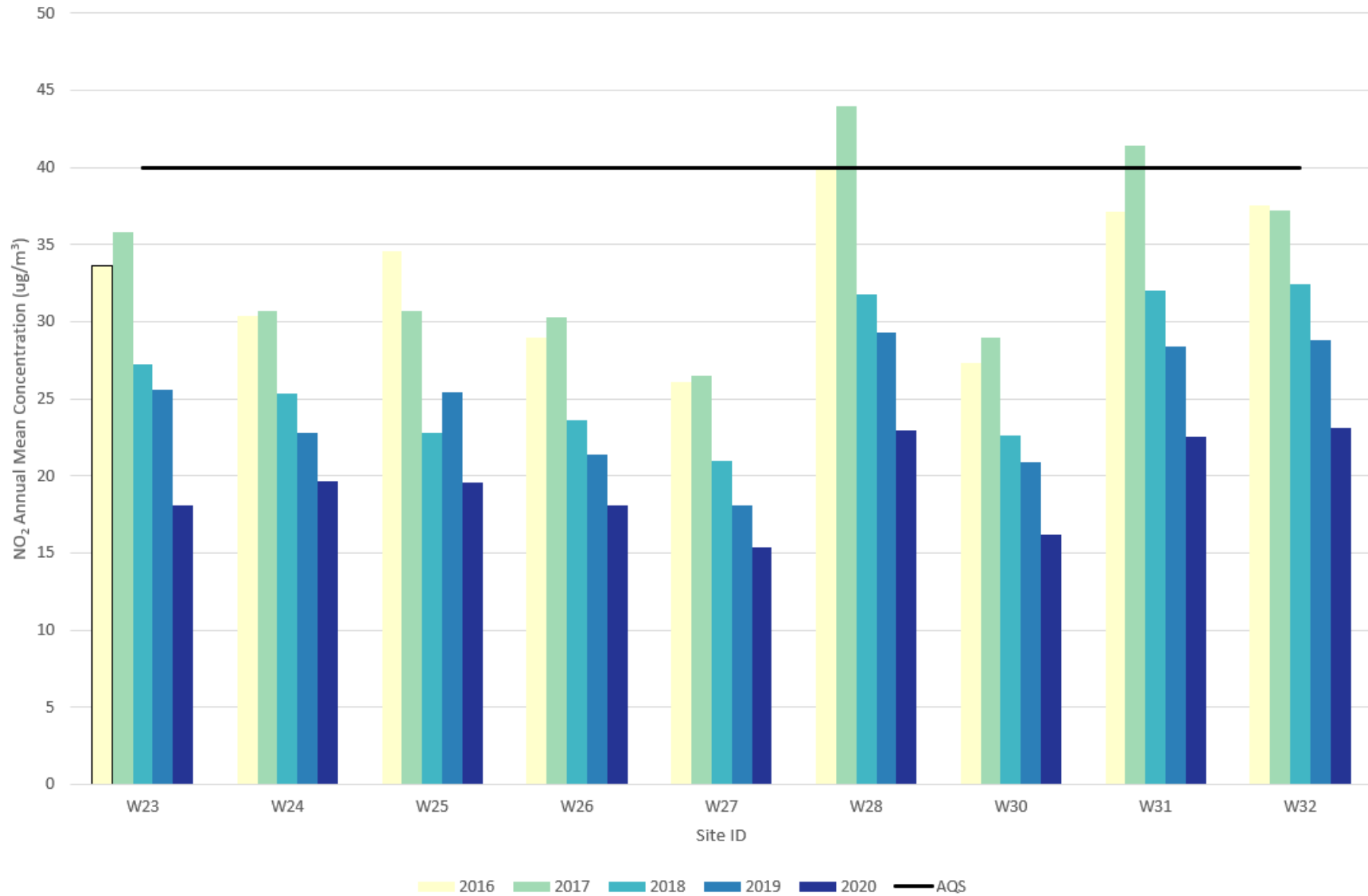
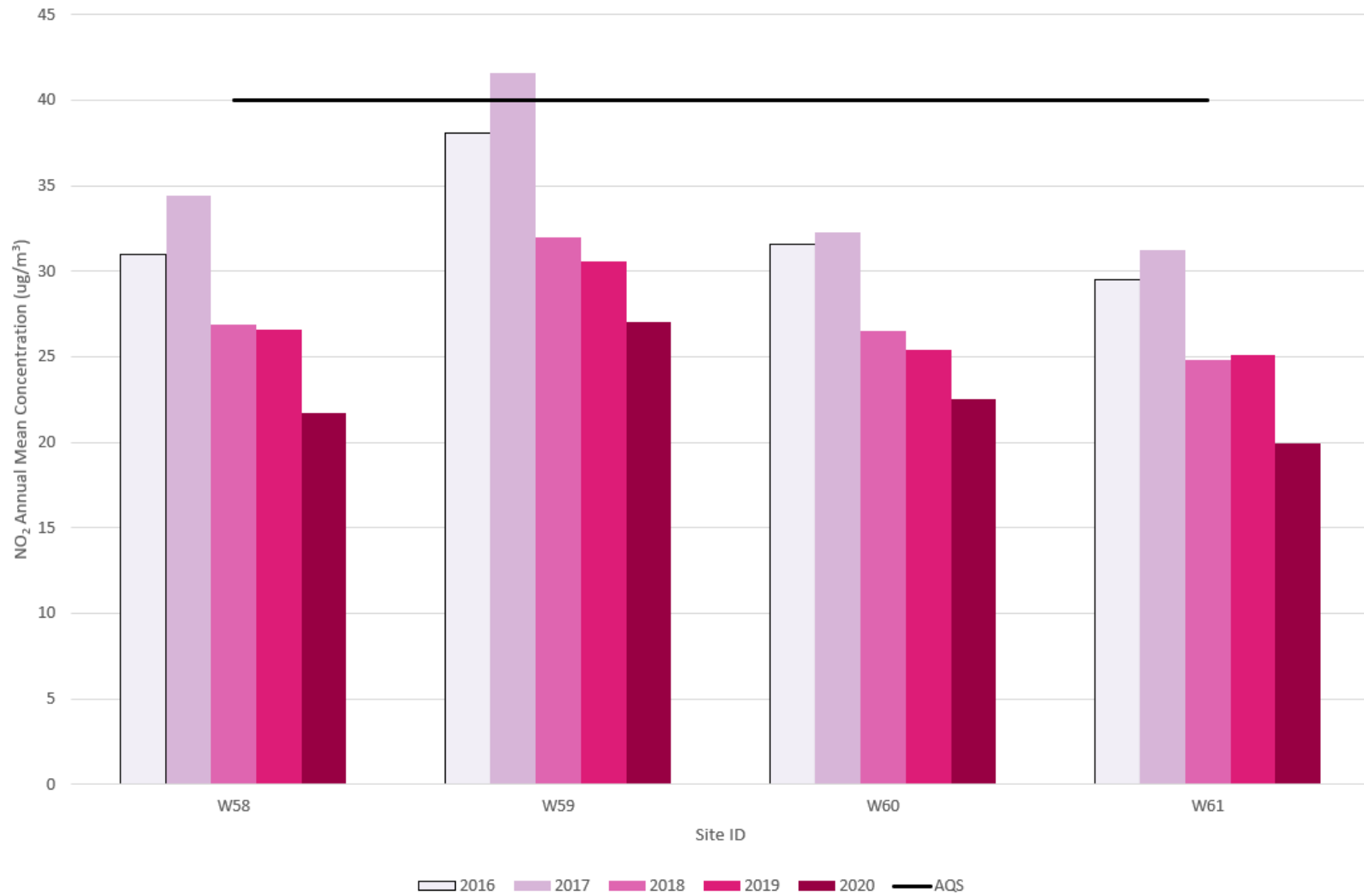


Figure A.5 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Emscote, Warwick





**Table A.5 – 1-Hour Mean NO<sub>2</sub> Monitoring Results, Number of 1-Hour Means > 200µg/m<sup>3</sup>**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2020 (%) <sup>(2)</sup>	2016	2017	2018	2019	2020
AURN1	431943	265730	Urban Background	84.2	84.2	0	0	0	0	0
AURN2	431271	266404	Roadside	81.1	81.1	0	0	0	0	0
CM1	428263	264877	Roadside	85.1	85.1	0	0	0	25	1

**Notes:**

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m<sup>3</sup> have been recorded.

Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in **bold**.

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

(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%).

**Table A.6 – Annual Mean PM<sub>10</sub> Monitoring Results (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2020 (%) <sup>(2)</sup>	2016	2017	2018	2019	2020
AURN1	431943	265730	Urban Background	85.0	85.0	15.4	13.9	14	13.4	11.0
AURN2	431271	266404	Roadside	84.3	84.3	15.7	17.3	13.9	14.4	11.5

**Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

**Notes:**

The annual mean concentrations are presented as µg/m<sup>3</sup>.

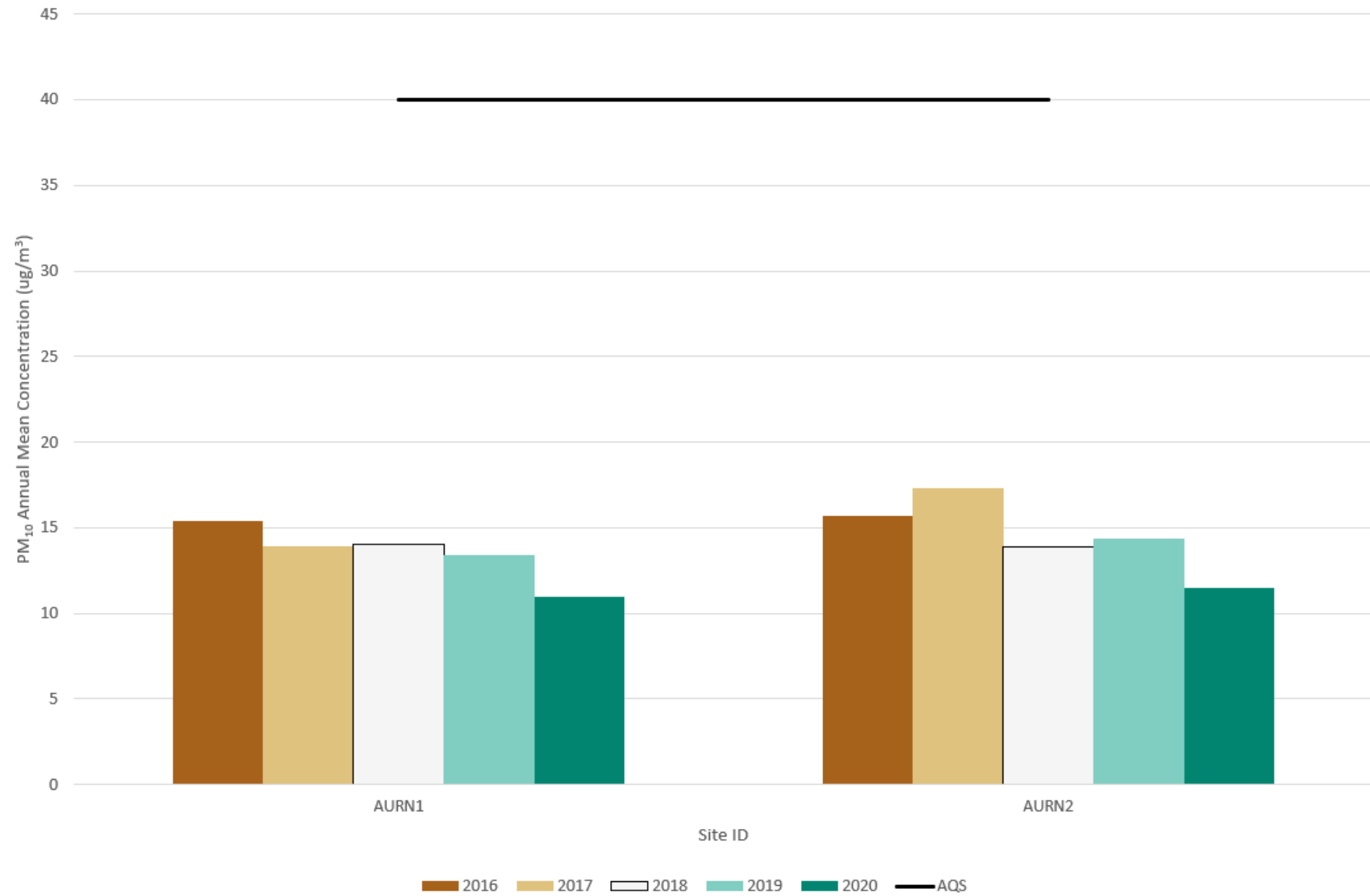
Exceedances of the PM<sub>10</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(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%).

Figure A.6 – Trends in Annual Mean PM<sub>10</sub> Concentrations



**Table A.7 – 24-Hour Mean PM<sub>10</sub> Monitoring Results, Number of PM<sub>10</sub> 24-Hour Means > 50µg/m<sup>3</sup>**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2020 (%) <sup>(2)</sup>	2016	2017	2018	2019	2020
AURN1	431943	265730	Urban Background	85.0	85.0	4	2	1	3	0
AURN2	431271	266404	Roadside	84.3	84.3	2	4	1 (23.6)	4	0

**Notes:**

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m<sup>3</sup> have been recorded.

Exceedances of the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> not to be exceeded more than 35 times/year) are shown in **bold**.

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

(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%).

**Table A.8 – Annual Mean PM<sub>2.5</sub> Monitoring Results (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2020 (%) <sup>(2)</sup>	2016	2017	2018	2019	2020
AURN1	431943	265730	Urban Background	85.0	85.0	10.5	10.7	9.8	9.2	6.5
AURN2	431271	266404	Roadside	84.3	84.3	9.7	11	12	9.8	6.9

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.

**Notes:**

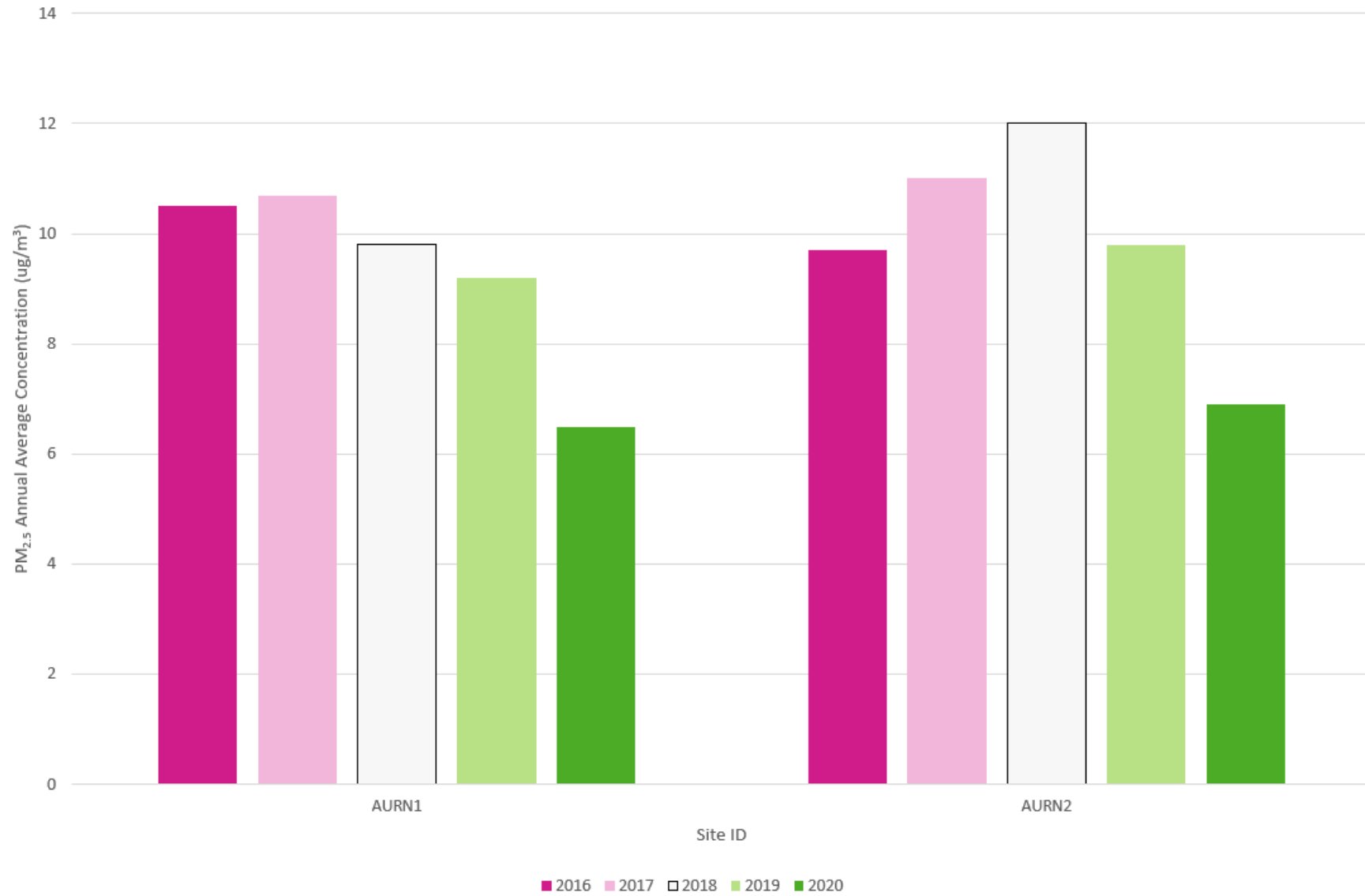
The annual mean concentrations are presented as µg/m<sup>3</sup>.

All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(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%).

Figure A.7 – Trends in Annual Mean PM<sub>2.5</sub> Concentrations



**Table A.9 – Benzene Monitoring Results**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2020 (%) <sup>(2)</sup>	2016	2017	2018	2019	2020
AURN1	431943	265730	Urban Background	100	100	0.53	0.52	0.51	0.47	0.40

The annual mean concentrations are presented as  $\mu\text{g}/\text{m}^3$ .

**Table A.10 – Ozone Monitoring Results**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2020 (%) <sup>(2)</sup>	2016	2017	2018	2019	2020
AURN1	431943	265730	Urban Background	79.7	79.7	8	1	10	5	24

## Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO<sub>2</sub> 2020 Diffusion Tube Results (µg/m<sup>3</sup>)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.97)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
W1	431978	265280	52.0	44.0	33.4	16.1	17.3	28.8	30.3	31.2	40.5	44.2	42.9	40.8	35.1	33.9	-	
W2	432075	265234	41.8	41.9	27.9	17.4	23.7	27.1	26.9	31.3	37.9	36.3	39.7	24.7	31.4	30.3	-	
W5	427615	264563	33.9	27.5	22.8	14.0	13.7	17.6	20.2	20.6	28.2	27.1	29.7	27.9	23.6	22.8	-	
W6	431943	285730	24.6	18.4	14.3	7.4	7.1	9.1	9.5	9.7	15.2	18.5	20.2	21.7	-	-	-	Triplicate Site with W6, W7 and W8 - Annual data provided for W8 only
W7	431943	285730	24.4	19.4	14.1	7.6	6.6	9.0	9.2	9.9	15.4	17.9	21.8	18.9	-	-	-	Triplicate Site with W6, W7 and W8 - Annual data provided for W8 only
W8	431943	285730	23.6	18.8	13.6	7.8	7.0	9.0	9.9	10.1	15.3	19.7	20.5	21.0	14.6	14.1	-	Triplicate Site with W6, W7 and W8 - Annual data provided for W8 only
W10	432560	265254	29.6	26.1	16.9	11.8	10.9	14.2	12.1	16.3	20.3	20.5	25.6	23.9	19.0	18.4	-	
W11	432051	265060	24.0	16.8	17.6		11.2	15.1	12.7	14.7	21.1	17.6	23.5	25.6	18.2	17.6	-	
W12	431866	265371	40.4	34.3	26.8		12.5	21.3	18.3	23.2	30.5	29.0	31.7	31.4	27.2	26.3	-	
W13	431900	265189	50.8	48.0	39.3	23.6	20.8	36.1	30.0	37.7	44.1	40.9	46.9	38.9	38.1	36.8	-	
W14	431862	265169	38.4	38.9	30.0	18.8	21.9	25.0	31.7	29.1	39.7	38.4	35.0	33.4	31.7	30.6	-	
W15	431849	265193	51.2	41.9	35.9	19.5	20.1	27.3	29.4	32.6	41.9	36.7	42.5	32.9	34.3	33.2	-	
W16	431951	265397	34.7	29.8	22.2	12.0	12.1	16.2	18.4	19.8	26.2	25.0	29.9	29.3	23.0	22.2	-	
W17	428704	265236	27.5	24.5	22.2	13.2	11.9	17.3	18.8	18.8	21.5	20.9	25.4	27.1	20.8	20.1	-	
W18	428735	265362	25.4	19.1	17.5	13.5	11.1	15.2	11.5	17.8	21.6	18.5	23.7	25.0	18.3	17.7	-	
W19	427937	264586	30.4	27.6	21.4	12.6	13.4	16.1	18.9	20.6	25.8	25.5	25.4	15.8	21.1	20.4	-	
W23	429078	271207	24.6	24.9		12.9	11.5	16.9				20.9	24.8	26.4	20.4	18.1	-	
W24	428974	271402		24.0	20.2	17.0	13.2	16.2	14.8	19.6	24.4	21.8	24.7	27.5	20.3	19.6	-	



W25	428707	272556	24.2	21.1	19.9	15.1		20.6	14.0			21.1			19.4	19.6	-	
W26	428733	272578	28.1	24.5	18.5	10.7	9.9	13.3	13.1	17.5	21.7	21.1	23.8	22.3	18.7	18.1	-	
W27	428750	272612	22.6	17.9	16.0	11.0	9.3	11.4	11.3	13.6	18.7	17.7	21.0	20.4	15.9	15.4	-	
W28	428652	272524	31.2	24.3	21.5	15.3	16.0	22.3	15.8	28.3	30.5	25.5	27.0	27.1	23.7	22.9	-	
W30	428714	271769	25.2	19.5	16.8	10.0	9.6	13.2	11.9	15.6	19.2	19.2	20.2	20.4	16.7	16.2	-	
W31	428816	271618	35.6	30.3	21.9	13.1	13.2	19.4	17.2	23.9	27.1	26.1	24.8	27.1	23.3	22.5	-	
W32	428906	271497	28.5	22.3	23.4	20.2		23.0	15.2	26.3	26.5	23.8	28.4	25.9	24.0	23.1	-	
W33	428263	264877	41.5	35.8	29.4	18.4	17.3	21.6	13.7	29.2	31.8	31.5	32.0	31.9	-	-	-	Triplicate Site with W33, W34 and W35 - Annual data provided for W35 only
W34	428263	264877	44.5	40.5	30.5	18.6	17.7	20.4	13.5	28.8	34.1	32.1	38.4	33.4	-	-	-	Triplicate Site with W33, W34 and W35 - Annual data provided for W35 only
W35	428263	264877	43.3	38.7	31.3	17.5	17.3	20.5	13.3	28.5	32.8	30.3	37.9	32.6	28.6	27.7	-	Triplicate Site with W33, W34 and W35 - Annual data provided for W35 only
W36	428391	264966	44.1	41.1	29.8	19.1	19.1	24.5	14.3	29.9	35.3	33.7	35.5	31.5	29.8	28.8	-	
W37	428132	264799	32.7	29.5	26.6	16.8	18.8	18.7	20.2	26.3	33.9	31.4	30.7	30.1	26.3	25.4	-	
W38	427959	264624	35.8	27.1	24.4	15.4	17.2	20.3	21.1	26.7	34.0	30.4	31.2	31.4	26.3	25.4	-	
W39	427910	264541	28.7	23.6	20.1	11.7	11.9	14.3	15.4	19.3	25.8	23.4	24.5	22.6	20.1	19.4	-	
W40	427992	264695	40.9	37.7	29.5	15.8	17.1	22.4	23.0	28.4	33.1	27.8	30.8	32.6	28.3	27.3	-	
W41	427905	264682	24.2	18.7	17.6	11.2	10.6	13.8	11.8	15.8	20.3	132.5	23.2	22.7	26.9	26.0	-	
W42	427938	264947	28.4	21.3	22.7	14.9	14.2	18.4	16.9	21.8	26.0	22.5	27.7	27.7	21.9	21.1	-	
W43	428026	265158	39.5	32.4	27.9	21.2	23.8	29.3	27.4	27.2	39.4	33.9	36.7	35.7	31.2	30.1	-	
W44	427930	265200	27.0	24.0	21.1	15.4	11.4	17.9	15.0	20.2	26.4	22.9	28.1	27.2	21.4	20.7	-	
W45	427867	265275	29.0	23.8	19.6	17.5	13.2	18.2	12.8	18.6	22.7	22.1	25.9	24.1	20.6	19.9	-	
W46	428240	265088	30.0	24.2	24.7	17.7	17.3	23.6	16.6	21.6	28.6	26.8	31.4	29.3	24.3	23.5	-	
W48	428522	265039	36.2		23.9	12.2	14.1	12.3	16.9	21.0	29.0	28.4	32.5	31.6	23.5	22.7	-	
W49	428501	264967	22.9	19.1	17.2	11.9	9.2	10.2	10.5	14.1	20.1	18.0	22.5		16.0	15.4	-	

W50	428600	264983	29.0	23.2	21.3	16.9	12.8	14.0	13.6	20.3	23.9	22.2	25.6	23.8	20.6	19.9	-	
W51	428270	264982	17.8	13.6	13.7	9.2	7.3	8.1	7.5	8.1	14.1	11.5	17.2	17.3	12.1	11.7	-	
W52	428710	265165	34.2	28.3	29.7	23.5	21.5	28.2	22.6	32.6	36.6	33.8	34.5	34.1	30.0	29.0	-	
W53	428715	265202	36.3	31.0	27.8	19.6	19.9	29.0	17.8	33.5	35.7	31.4	34.2	37.7	29.5	28.5	-	
W54	428715	265285	30.8	27.3	23.7	16.6	14.3		14.4	21.2	26.9	25.1	30.4	30.6	23.8	23.0	-	
W55	428710	265341	29.6	24.6	21.7	14.7	13.8	20.7	16.2	21.4	26.3	24.4	21.7	26.6	21.8	21.1	-	
W56	428619	265113	24.3	17.5	16.5	11.3	9.3	13.4	14.6	14.8	19.9	19.6	20.4	16.2	16.5	15.9	-	
W57	428748	265166	29.6	25.5	22.1	14.4	14.5	21.6	16.2	21.4	26.1	23.4	29.1	27.6	22.6	21.9	-	
W58	429514	265469	29.0	25.5	22.1	17.2	14.0	19.9	16.6	20.3	24.3	22.9	28.7	28.9	22.5	21.7	-	
W59	429501	265494	38.4	36.8	27.4	17.0	15.8	22.7	23.2	25.0	32.1	30.0	35.8	31.8	28.0	27.1	-	
W60	430015	265718	27.7	25.2	24.5	17.9	17.3	20.9	18.9	23.4	27.1	24.2	27.2	25.4	23.3	22.5	-	
W61	429974	265733	27.7	24.8	20.5	13.3	14.6	16.7	14.6	19.6	24.3	20.7	24.8	26.4	20.7	20.0	-	
W62	428608	265042	41.4	38.1	32.6	23.0	23.9	21.7	29.3	33.2	38.3	34.2	36.3	37.6	32.5	31.4	-	
W67	428477	264939	36.8	33.5	33.9	29.4	24.4	27.1	23.5	37.3	42.5	34.5	36.7	33.3	32.7	31.6	-	
W69	428513	264921	20.7		29.3	21.9	21.7	23.6	22.4	29.8	34.3	29.5	29.4	30.6	26.7	25.8	-	
W70	428554	264870	22.2	21.3	21.2	15.6	16.5	16.8	16.2	21.9	25.5	22.4	23.7	24.8	20.7	20.0	-	
W71	428599	264857	36.1	25.5	22.7	17.5	19.4	22.3	23.6	25.8	30.4	24.0	27.9	27.7	25.2	24.4	-	
W72	431464	265903	34.5	31.2	21.3	13.5	13.7	18.8	21.1	24.3	27.9	28.2	33.0	31.3	24.9	24.1	-	
W73	431480	265878	31.6	23.2	20.3	12.6	12.4	19.1	16.5	24.9	27.1	27.4	30.6	31.0	23.1	22.3	-	

All erroneous data has been removed from the NO<sub>2</sub> diffusion tube dataset presented in Table B.1.

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.

Local bias adjustment factor used.

National bias adjustment factor used.

Where applicable, data has been distance corrected for relevant exposure in the final column.

Warwick District Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

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

### **New or Changed Sources Identified Within Warwick District Council During 2020**

A number of new planning applications which may have an impact on air quality have been granted approval during 2020. Table C.1 provides a summary of these. No other new or changed sources relating to air quality have been identified by Warwick District Council.

Table C.1 – Planning Applications Granted Approval in 2020

Date	Planning Reference	Proposed Development	Address	Status
09/07/2020	W/20/0438	<p>Proposed Artificial Grass Pitch (AGP) and associated features including: 4.5m high ball stop fencing and entrance gates to the AGP perimeter; 1.2m high pitch barriers with entrance gates internally within fenced AGP enclosure to segregate the artificial grass field of play and perimeter area from adjoining hard-standing areas; 2.1m high team shelters (dug outs); hard-standing areas with associated porous asphalt surfacing for portable goals storage, pedestrian circulation and access as well as vehicular maintenance and emergency access; 2.59m high maintenance equipment storage container; relocation of 3m high covered spectator stand within fenced AGP enclosure; 2m high spectator canopy; 2.5m high acoustic barrier partially along AGP perimeter; replacement tree planting.</p>	<p>Racing Club Warwick FC, Hampton Road, Warwick CV34 6JP</p>	<p>Granted</p> <p>Application includes Air Quality Statement.</p> <p>Condition 8 requires that the development must meet the requirements of WDC's Air Quality SPD</p>
12/10/2020	W/19/1940	<p>Redevelopment of former King's High School site consisting of main school site, Priory Building, St Nicholas Building and numbers 2 and 10-14 Chapel Street. Development to include the demolition of gymnasium building, sixth form building, language building, Priory Building and modern elements attached to the Listed Buildings together with alterations to the external appearance of retained non-Listed Buildings.</p> <p>Erection of new apartment buildings and town houses together with the conversion of retained buildings to create a total of 118no. residential units in a mixture of houses, apartments and duplexes. Creation of underground car and cycle parking together with hard and soft landscaping and other associated works.</p>	<p>Kings High School for Girls, Chapel Street, Warwick CV34 4HJ</p> <p>Located within Warwick AQMA</p>	<p>Granted</p> <p>Application includes Air Quality Statement.</p> <p>Condition 26 requires that the development must meet the requirements of WDC's Air Quality SPD</p>

23/10/2020	W/20/0439	Proposed alterations and improvements to the Warwick Boat Club, to include: demolition of 1no. squash court and part of existing club house, and replace with two storey extension; redevelopment of the Court 11 to create two synthetic clay courts with floodlights; replacement boathouse on the site of the existing boathouse to include a small stores extension; replacement of existing bowls green with an enlarged synthetic bowls green with floodlights; removal of some trees together with replacement planting; remodelling of the Banbury Road access to provide improved access arrangements.	Warwick Boat Club, 33 Mill Street, Warwick CV34 4HB	<p>Granted</p> <p>Application includes Air Quality Statement.</p> <p>Condition 15 requires that each phase of the development must meet the requirements of WDC's Air Quality SPD</p>
30/10/2020	W/20/0667	Construction of 54 dwellings and associated infrastructure	Land on the west side of Europa Way, Warwick	<p>Granted</p> <p>Application includes Air Quality Statement.</p> <p>Condition 17 required installation of EV charging points prior to occupation of the development</p>
17/12/2020	W/19/1200	Outline application for demolition of existing dwelling house and outbuildings; residential development of up to 99 no. dwellings including the creation of new vehicular access, open space, land-scaping and surface water attenuation.	Land at South Crest Farm, Crewe Lane, Kenilworth CV8 2DG	<p>Granted</p> <p>Application includes Air Quality Statement.</p> <p>Condition 12 required that no development shall commence until a low emission strategy has been submitted for approval</p>

## Additional Air Quality Works Undertaken by Warwick District Council During 2020

Additional work carried out by Warwick District Council in 2020 includes:

- Carrying out campaigns as part of Clean Air Day 2020 and preparing for Clean Air Day 2021. WDC has been working with local action groups Clean Air for Leamington and Warwick and Clean Air on these, with a particular emphasis on vehicle idling. There has also been collaboration with local schools, with 5 being loaned AQMesh air quality monitors for a week to serve as a tool for education/raising awareness; and
- The 'Choose How You Move in Warwick District' programme has recently been expanded in conjunction with Betterpoints, the scheme rewards participants for choosing sustainable travel options when visiting the District's town centres. Betterpoints can be redeemed for discounts at high street stores.

### QA/QC of Diffusion Tube Monitoring

The diffusion tubes for the year 2020 were supplied and analysed by Staffordshire Scientific Services (SSS), the tubes were prepared using the 20% Triethanolamine (TEA) in water preparation method. All results have been bias adjusted and annualised where required before being presented in Table A.4.

Staffordshire Scientific Services participates in the AIR-PT scheme which is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL).

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

In the 2020 AIR-PT results, AIR-PT AR036 (January to February 2020), SSS scored 100%. No results are available for the periods May 2020 – October 2020 due to the

COVID-19 pandemic. The percentage score reflects the results deemed to be satisfactory based upon the z-score of  $< \pm 2$ .

Additionally, the precision of the NO<sub>2</sub> diffusion tubes supplied by SSS has been classified as 'good' for all observations during 2020. This precision reflects the laboratory's performance and consistency in preparing and analysing the tubes, as well as the subsequent handling of the tubes in the field. Precision summary results are available from the [LAQM website](#).

### Diffusion Tube Annualisation

Annualisation is required for any site with a data capture of less than 75%, but greater than 25%. Two diffusion tube locations required annualisation in 2020, W23 and W25. Annualisation was carried out using the Diffusion Tube Data Processing Tool that incorporates the relevant processes as detailed in [LAQM.TG\(16\)](#). Details of the annualisation undertaken is provided in Table C.3.

### Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO<sub>x</sub>/NO<sub>2</sub> continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Warwick District Council have applied a combined local bias adjustment factor of 0.97 to the 2020 monitoring data. A summary of bias adjustment factors used by Warwick District Council over the past five years is presented in Table C.2. Both Jury Street/Pageant Hamilton Terrace sites report good data quality, therefore these have both been used in combination to calculate a local bias adjustment factor. This was completed using the Diffusion Tube Data Processing Tool, in line with the methodology outlined in LAQM.TG(16) for areas where there is more than one local collocation study. Details of this calculation are shown in Table C.4.

It is recommended by Defra LAQM.TG(16) and the LAQM Helpdesk that the local bias adjustment factor should be used where available and relevant. The national bias



adjustment factor for SSS is 0.85 in 2020 (v09/21). The local factor is more in-line and consistent with the factors applied in previous years, alongside being a more conservative value whilst and likely being more reflective of the local conditions. Therefore, the local factor has been applied to the 2020 monitoring data.

**Table C.2 – Bias Adjustment Factor**

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	Local	-	0.97
2019	Local and National – both factors had the same value	06/20	0.93
2018	Local	-	0.88
2017	Local	-	1.04
2016	Local and National – both factors had the same value	06/17	0.91

### NO<sub>2</sub> Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO<sub>2</sub> concentration at the nearest location relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO<sub>2</sub> fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO<sub>2</sub> concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO<sub>2</sub> monitoring locations within Warwick District Council required distance correction during 2020.

### QA/QC of Automatic Monitoring

All automatic monitoring sites in Warwick, other than AURN2 Rugby Road, are calibrated by the Council's Local Site Operator (LSO) – AURN1 Hamilton Terrace and CM1 Jury Street/Pageant House. The QA/QC of the two Leamington Spa sites (AURN1 and AURN2) is undertaken through its status as part of the AURN and therefore conforms to AURN standards (undertaken by Ricardo-Energy and Environment), whereas WeCare4Air is responsible for data management of the non-AURN site, CM1. WeCare4Air is also

responsible for the servicing and call out contract for AURN1 and CM1. The service contract for AURN2 is arranged by Bureau Veritas and Defra and is provided by Enviro Technology Services.

### **PM<sub>10</sub> and PM<sub>2.5</sub> Monitoring Adjustment**

The type of PM<sub>10</sub> and PM<sub>2.5</sub> monitor(s) utilised within Warwick District Council do not required the application of a correction factor.

### **Automatic Monitoring Annualisation**

All automatic monitoring locations within Warwick District Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

### **NO<sub>2</sub> Fall-off with Distance from the Road**

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO<sub>2</sub> concentration at the nearest location relevant for exposure should be estimated using the NO<sub>2</sub> fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO<sub>2</sub> concentrations corrected for distance are presented in Table B.1.

No automatic NO<sub>2</sub> monitoring locations within Warwick District Council required distance correction during 2020.

**Table C.3 – Annualisation Summary (concentrations presented in  $\mu\text{g}/\text{m}^3$ )**

Diffusion Tube ID	Annualisation Factor Coventry Allesley AURN	Annualisation Factor Leamington Spa AURN	Annualisation Factor Birmingham Ladywood AURN	Average Annualisation Factor	Raw Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Annualised Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Comments
W23	0.9208	0.9089	0.9296	0.9198	20.4	18.7	
W25	1.0364	1.0116	1.0841	1.0441	19.4	20.3	

Table C.4 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
<b>Periods used to calculate bias</b>	12	11			
<b>Bias Factor A</b>	0.96 (0.91 - 1.03)	0.97 (0.8 - 1.25)			
<b>Bias Factor B</b>	4% (-3% - 10%)	3% (-20% - 25%)			
<b>Diffusion Tube Mean (<math>\mu\text{g}/\text{m}^3</math>)</b>	14.6	28.3			
<b>Mean CV (Precision)</b>	3.1%	3.6%			
<b>Automatic Mean (<math>\mu\text{g}/\text{m}^3</math>)</b>	14.1	27.5			
<b>Data Capture</b>	99%	100%			
<b>Adjusted Tube Mean (<math>\mu\text{g}/\text{m}^3</math>)</b>	14 (13 - 15)	27 (23 - 35)			

**Notes:**

A combined local bias adjustment factor of 0.97 has been used to bias adjust the 2020 diffusion tube results.

## Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Map of Monitoring Sites: Warwick

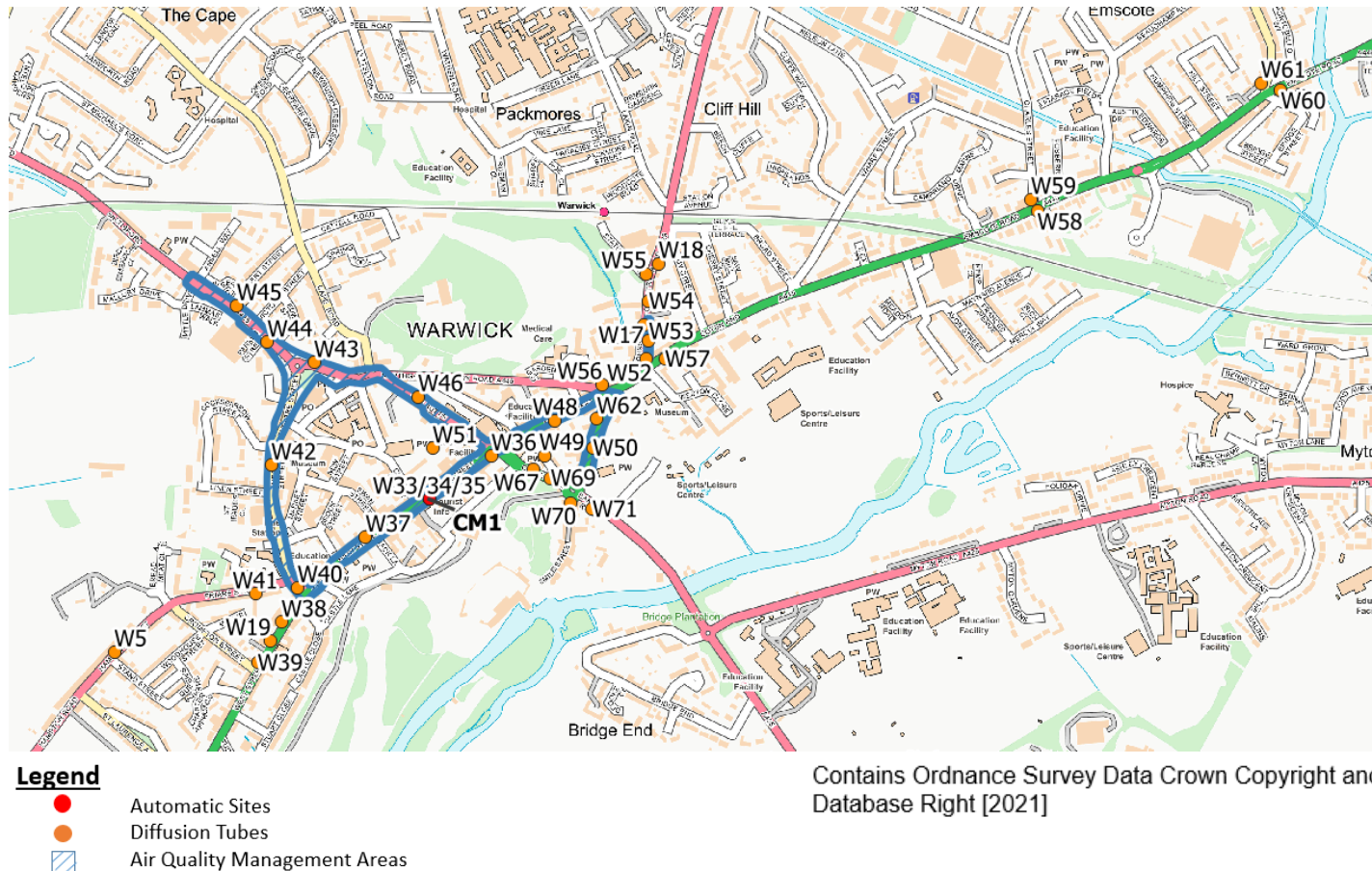
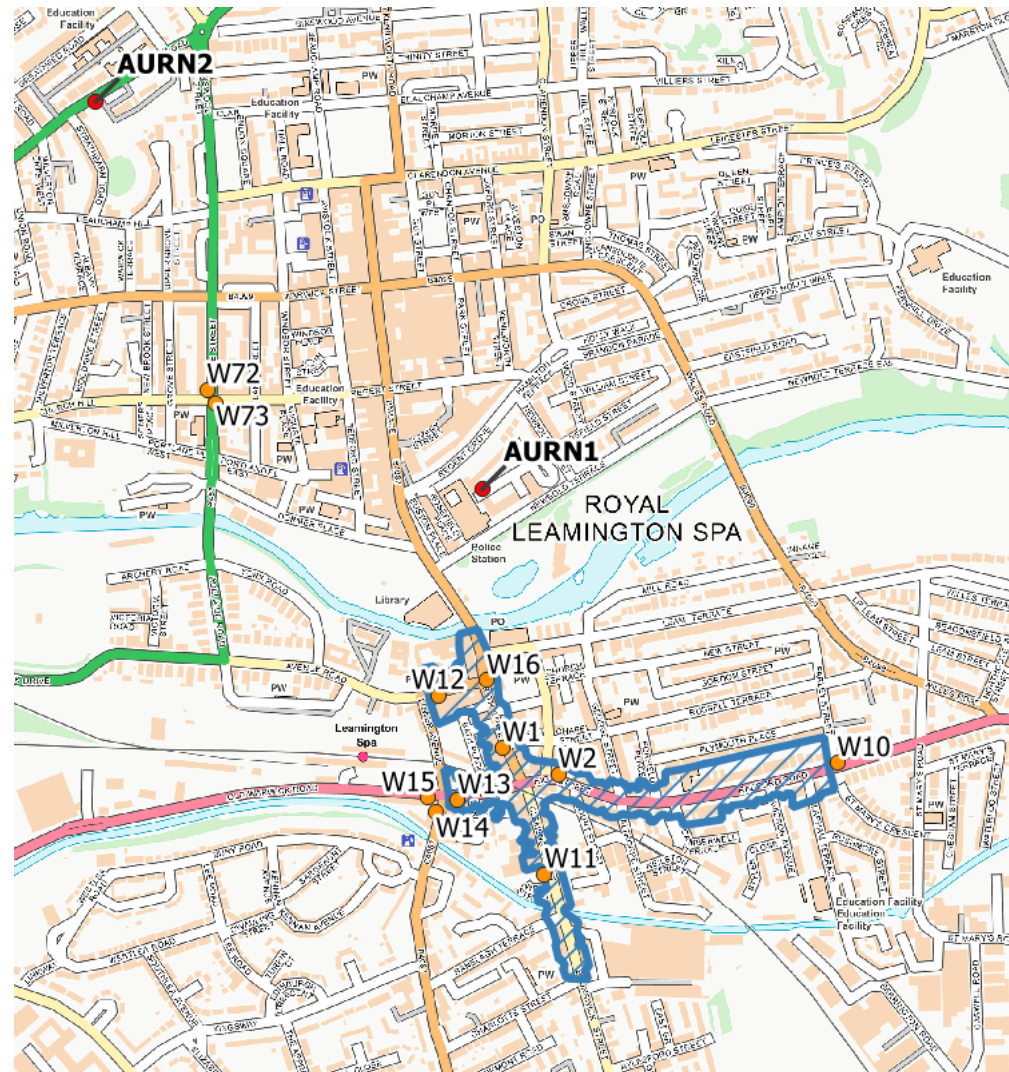


Figure D.2 – Map of Monitoring Sites: Leamington Spa Central

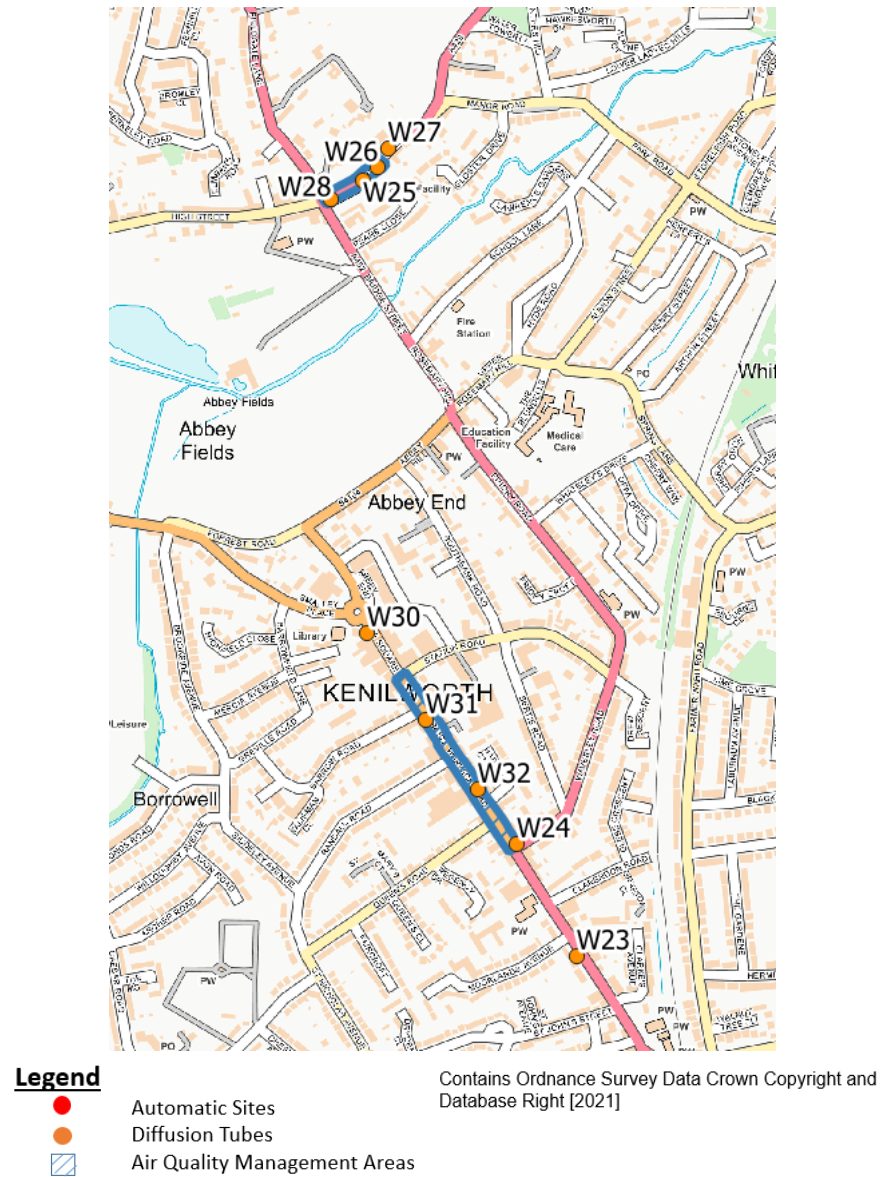


- Legend**
- Automatic Sites
  - Diffusion Tubes
  - Air Quality Management Areas

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Figure D.3 – Map of Monitoring Sites: Kenilworth



## Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England<sup>7</sup>

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO <sub>2</sub> )	40µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM <sub>10</sub> )	40µg/m <sup>3</sup>	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO <sub>2</sub> )	125µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO <sub>2</sub> )	266µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

<sup>7</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).



## Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO<sub>2</sub>) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data<sup>8</sup> suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO<sub>x</sub>), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)<sup>9</sup> has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO<sub>2</sub> annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

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<sup>8</sup> Prime Minister's Office, COVID-19 briefing on the 31<sup>st</sup> of May 2020

<sup>9</sup> Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20 $\mu\text{g}/\text{m}^3$  if expressed relative to annual mean averages. During this period, changes in PM<sub>2.5</sub> concentrations were less marked than those of NO<sub>2</sub>. PM<sub>2.5</sub> concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that PM<sub>2.5</sub> concentrations during the initial lockdown period are of the order 2 to 5 $\mu\text{g}/\text{m}^3$  lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

## Impacts of COVID-19 on Air Quality within Warwick District Council

Although traffic data is not available, across the UK there have been significant decreases in traffic volumes observed during the lockdown periods. Annual mean NO<sub>2</sub> concentrations at almost all of the monitoring locations operated by Warwick District Council have shown a significant decrease from 2019 to 2020 - an average decrease of 5.5 $\mu\text{g}/\text{m}^3$  across 58 monitoring locations, with a maximum decrease of 10.8 $\mu\text{g}/\text{m}^3$ . Comparatively, from 2018 to 2019, there was an average decrease of 1.8 $\mu\text{g}/\text{m}^3$  observed across 49 monitoring locations, and a maximum decrease of 4.9 $\mu\text{g}/\text{m}^3$ .

## Opportunities Presented by COVID-19 upon LAQM within Warwick District Council

Parade within Leamington Spa has been temporarily closed to traffic since the initial re-opening of retail and business following the first lockdown in response to COVID-19. The area currently remains pedestrianised to facilitate social distancing. Traffic, including a number of bus routes, have been re-routed elsewhere and bus stops have been relocated.

## Challenges and Constraints Imposed by COVID-19 upon LAQM within Warwick District Council

The majority of monitoring has continued throughout the COVID-19 pandemic with **very little to no impact**. Diffusion tubes have continued to be changed in-line with the LAQM

calendar, however, there have been some delays in accessing equipment at the Jury Street automatic monitoring location. This is because the building which houses the monitoring equipment and instrumentation has been closed. This has in turn resulted in delayed repairs following equipment breakdowns and some loss of data. Data capture for this site has remained relatively good during 2020 however (~85%).

Table F.1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: Large
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

## 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	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 <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide
UVF	Ultra-Violet Fluorescence
WDC	Warwick District Council
SSS	Staffordshire Scientific Services

## References

- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Warwick District Council Air Quality Action Plan, June 2015.
- Warwick District Council 2020 Annual Status Report.
- Warwick District Council 2020 Appraisal Report.
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 06/21 published in June 2021.
- Defra Diffusion Tube Data Processing Tool, version 1.1
- Defra Background Maps (2018 based)
- Public Health England, Public Health Profiles, Fraction of mortality attributable to particulate air pollution (2019)
- Warwick District Council Air Quality & Planning Supplementary Planning Document, January 2019.