North Warwickshire Borough Council

2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: 31 August 2022

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Report Reference Number	ASRMG2022
Date	31 August 2022

Executive Summary: Air Quality in Our Area

Air Quality in North Warwickshire Borough Council

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, 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[1,2].

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

The World Health Organization (WHO) released new guidelines for several pollutants on 22 September 2021. PM_{10} target has been reduced to 15 µg/m³ and $PM_{2.5}$ to 5 µg/m³ (annual average limit). The health implications of both $PM_{2.5}$ and PM_{10} which both can penetrate deep into the lungs and in the cast of $PM_{2.5}$ into the bloodstream. Research from WHO suggest air pollution kills at least 7 million people a year worldwide[5].

The Environment Act 2021 establishes a legally binding duty on government to bring forward at least two new air quality targets in secondary legislation by 31 October 2022 and these will be for $PM_{2.5}$.

North Warwickshire is a largely rural area and includes the towns of Atherstone and Coleshill. There are major traffic routes of the M42, M6 and A5 running through the borough. The focus has been on monitoring roadside nitrogen dioxide air pollution emissions. The number of monitoring locations was increased from 19 to 29 in 2020 with

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[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

[3] Defra. Air quality appraisal: damage cost guidance, July 2021

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

[5] World Health Organization: New WHO Global Air Quality Guidelines aim to save millions of lives from air pollution 2021

a further two sites added in 2021 bringing the total to 31. An exceedance of the national air quality objective was identified in the 2019 monitoring results at the location for Tube 8 which is situated along the A5 in Dordon. The results for the following two years have been found to be below the national air quality objective. The general trend is for a reduction of NO_2 levels at the monitoring locations over time. However, with a large number of the sites being new monitoring locations limited conclusions can be drawn about long-term trends for these sites. It is believed that part of the reason for the reduction in NO_2 levels in 2020 at the monitoring site for Tube 8 was reduction in vehicle travel during the covid pandemic. The site has been monitored closely since 2020 to check for further exceedance of the objective.

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[6] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[7] 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.

An Air Quality Supplementary Planning Document was also approved by the Council in September 2019 in a bid to help reduce air pollution issues at the planning stage. This has helped to ensure the council are considering air quality with every development that needs planning consent.

North Warwickshire Borough Council adopted a new Local Plan on 29 September 2021 which includes:

LP31 Development Considerations

Avoid and address unacceptable impacts upon neighbouring amenities through air quality.

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[6] Defra. Clean Air Strategy, 2019

[7] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

North Warwickshire is a two-tier authority with Warwickshire County Council being responsible for highways.

As part of the Local Transport Plan, Warwickshire County Council has produced an Air Quality Strategy which details several measures that have been employed to improve air quality across the County. The Air Quality Strategy is contained in the Local Transport[8] Plan and can be seen in full at http://apps.warwickshire.gov.uk/api/documents/WCCC-630-116.

Warwickshire County Council have produced a draft Warwickshire Local Cycling and Walking Infrastructure Plan (LCWIP) following a public consultation which took place from 17 June to 14 August 2022.

Developing Warwickshire's cycle network – Warwickshire County Council

North Warwickshire Borough Council is continuing to work in partnership through the Coventry and Warwickshire Air Quality Alliance, which is made up of the Borough, Districts County Council and City Council as well as and Public Health England.

Conclusions and Priorities

Monitoring over the past 12 months has shown levels of nitrogen dioxide for all monitoring sites to be below the national objective. It is not considered necessary to declare an Air Quality Management Area (AQMA) at the current time.

North Warwickshire Borough Council is continuing to work in partnership through the Coventry and Warwickshire Air Quality Alliance, which is made up of the Borough, Districts County Council and City Council as well as and Public Health England.

North Warwickshire includes active quarries and blasting within these have been the subject of dust complaints from nearby residents. Environmental Health at North Warwickshire Borough Council also receive a large number of smoke complaints each year; 106 complaints about smoke were received during 2021.

Since the launch of the 2022 Air Quality grant scheme this authority has been engaged in discussions with other Warwickshire local authorities to look at the feasibility of making a joint grant bid. This project would aim to improve knowledge of levels of fine particulate

[8] Warwick County Council. Warwickshire Local Transport Plan 2011 – 2026, September 2021

matter in North Warwickshire and implement behaviour change, pollution reduction and strategies to reduce exposure where applicable.

Local Engagement and How to get Involved

If further information is required a copy of the previous Annual Status Report for North Warwickshire can be seen at Air Quality Annual Status Report ASR downloads | North Warwickshire (northwarks.gov.uk)[9]. Also, if you have any questions relating to air quality please contact the Environmental Health Department at North Warwickshire Borough Council on 01827 715341 or via e-mail at environmentalhealth@northwarks.gov.uk.

Local Responsibilities and Commitment

This ASR was prepared by Matt Green, Senior Pollution Control Officer within the Environmental Health Department of North Warwickshire Borough Council

This ASR has not been signed off by a Director of Public Health.

If you have any comments on this ASR please send them to Matt Green, Senior Pollution Control Officer at:

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[9] North Warwickshire Borough Council. Air Quality Annual Status Report ASR downloads, September 2021

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1 Local Air Quality Management

This report provides an overview of air quality in North Warwickshire Borough Council during 2021. 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 North Warwickshire Borough 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.

North Warwickshire Borough Council currently does not have any declared AQMAs.

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

Defra's appraisal of last year's ASR provided the following conclusion. A response to each of the points is provided below where required.

The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports.

1. Further detail on how the annualisation factors were calculated for each of the comparison AURNs would be helpful. It would be good practice to include a third AURN for comparison if possible.

   The annualisation tool version 1.0 was used to calculate annualisation factors. Further details are provided in Table C.2.

2. The report refers to the Public Health Outcomes Framework and the local indicator for $PM_{2.5}$ in the district, comparing it to the reginal and national indicator values.

3. It is promising that the council have introduced 18 new monitoring sites in the last 2 years as they continue to seek out local hotspots.

4. Table B.1 should include the bias adjustment factor in the table headings in place of the (x.x) from the template.

   The bias adjustment factor is included in Table B.1.

5. Distance correction was carried out for one site, evidence of use of the Defra NO_2 Fall of with Distance Calculator should be included.

   Evidence of use of the Defra NO_2 Fall of with Distance Calculator is provided in Table C.3.

6. The council have provided a clear map of the diffusion tube monitoring network; trends are displays and discussed in the report, this is welcomed.

7. Table A.4 contains distance corrected data when it should not as is explained in the table notes, this leads the council to not mention the exceedance at Site 8.

   Table A.4 includes annual mean nitrogen dioxide levels prior to any distance correction calculations.

8. The council should continue to monitor Site 8 closely and consider the declaration of an AQMA if exceedances persist.
9. Exceedances should be highlighted in bold in the tables and a lack of subscript/superscript is used throughout the report but particularly in the section regarding $PM_{2.5}$.

   Exceedances are highlighted in bold in and subscript/superscript is used throughout the report.
10. Overall, the report satisfies the criteria of relevant standards.

North Warwickshire Borough Council have taken direct measure to gather a better understanding of air quality issues in the area. An additional 10 diffusion tubes were distributed around the borough. These additional tubes have proven to be a worthwhile exercise as new hotspots/exceedances have been identified. An exceedance of the air quality objective for nitrogen dioxide was identified in the 2019 data for Tube 8 A5 Watling Street, Dordon (11). The level in 2020 was below the objective but this location will be closely monitored.

An Air Quality Supplementary Planning Document was also approved by the Council in September 2019 in a bid to help reduce air pollution issues at the planning stage[10]. This has helped to ensure the council are considering air quality with every development that needs planning consent.

The Borough Council is continuing to work in partnership through the Coventry and Warwickshire Air Quality Alliance, which is made up of the Borough, Districts County Council and City Council as well as and Public Health England.

The Council have adopted a new Local Plan on 29 September 2021 which includes:

LP31 Development Considerations

avoid and address unacceptable impacts upon neighbouring amenities through air quality

As part of the Local Transport Plan, Warwickshire County Council has produced an Air Quality Strategy which details several measures that have been employed to improve air quality across the County. The Air Quality Strategy is contained in the Local Transport

[10] North Warwickshire Borough Council. Supplementary Planning Documents, September 2019

Plan and can be seen in full at http://apps.warwickshire.gov.uk/api/documents/WCCC-630-116.

Warwickshire County Council have produced a draft Warwickshire Local Cycling and Walking Infrastructure Plan (LCWIP) following a public consultation which took place from 17 June to 14 August 2022.

Developing Warwickshire's cycle network – Warwickshire County Council

North Warwickshire includes active quarries and blasting within these have been the subject of dust complaints from nearby residents. Environmental Health at North Warwickshire Borough Council also receive a large number of smoke complaints each year.

Since the launch of the 2022 Air Quality grant scheme NWBC have been engaged in discussions with other Warwickshire local authorities to look at the feasibility of making a joint grant bid. The grant project would aim to improve knowledge of levels of fine particulate matter in North Warwickshire and implement behaviour change, pollution reduction and strategies to reduce exposure where applicable.

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The Public Health Outcomes Framework (see Public Health Outcomes Framework - Data - PHE[11] includes a new indicator relating to the impact of particulate pollution on human health relating to the period 2020 which is the most recent period available. Indicator D01 – Fraction of mortality attributable to particulate air pollution (new method) provides an estimation of the mortality burden associated with long-term exposure to $PM_{2.5}$ as a percentage of the annual deaths from all causes in those aged 30+. The D01 indicator

[11] Public Health England. Public Health Outcomes Framework, September 2021

value for North Warwickshire is 5.2% for 2020. This is comparable to the regional average for the West Midlands (5.4%) and the national English average (5.6%).

The modelled background level provided by Defra for North Warwickshire are modelled to be between 7.5µg/m^3 and 10.2µg/m^3 for 2021, with the annual mean for 2021 being 8.4µg/m^3.

The Air Quality Objective (AQO) for $PM_{2.5}$ is an annual mean of 25µg/m^3. However, the WHO guideline value are more stringent for $PM_{2.5}$. WHO updated their Global Air Quality Guidelines on 22 September 2021. The new update includes interim targets intended to guide reduction, as well as revised guideline levels, including (as annual mean concentrations):

- $PM_{2.5}$ Interim targets of 35 / 25 / 15 / 10, and a guideline level of 5 µg/m^3

Modelling results show that all of the Borough is exceeding the WHO guideline but is meeting the AQO and all but the last interim target for $PM_{2.5}$.

The Environment Act 2021 establishes a legally binding duty on government to bring forward at least two new air quality targets in secondary legislation by 31 October 2022 and these will be for $PM_{2.5}$.

North Warwickshire Borough Council is taking the following measures to address $PM_{2.5}$:

- Quantify and aim to reduce the number of complaints about smoke.
- Seek to improve knowledge of levels of fine particulate matter and implement behaviour change, pollution reduction and strategies to reduce exposure where applicable.
- Link air quality to any new transport and climate change strategies.
- The Council will continue to inspect processes with environmental permits as per DEFRA guidance.

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

This section sets out the monitoring undertaken within 2021 by North Warwickshire Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Non-Automatic Monitoring Sites

North Warwickshire Borough Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 31 sites during 2021. Table A.1 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_2)

Error! Reference source not found. and Table A.2 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. 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 2021 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.

North Warwickshire Borough Council have taken direct measure to gather a better understanding of air quality issues in the area. An additional 10 diffusion tube locations were monitored during 2020 and a further 2 diffusion tube locations were monitored in 2021 increasing the number of tube locations from 19 in 2019 to 31 in 2022.

These additional tubes have proven to be a worthwhile exercise as new locations were identified with levels close to the national air quality objective for NO_2. An exceedance of the air quality objective for nitrogen dioxide was identified in the 2019 data for Tube 8 A5 Watling Street, Dordon (11). The level in 2021 was below the objective but this location will be closely monitored.

Appendix A: Monitoring Results

Table A.1 – 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) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
Tube 1	Rowland Way Atherstone	Kerbside	430762	298747	NO_2	No	9.0	1.0	No	2.0
Tube 2	Penmire Close Grendon	Suburban	427374	299431	NO_2	No	11.0	1.0	No	2.0
Tube 3	Spon Lane Grendon	Suburban	427835	299652	NO_2	No	15.0	1.0	No	2.0
Tube 4	Bridge St Polesworth	Kerbside	426183	302564	NO_2	No	2.0	1.0	No	2.0
Tube 5	(Top) Long St Dordon	Kerbside	426195	300310	NO_2	No	4.0	1.0	No	2.0
Tube 6	(Bottom) Long St Dordon	Kerbside	426178	300108	NO_2	No	3.0	0.0	No	2.0
Tube 7	New St Dordon	Roadside	426055	300164	NO_2	No	3.0	2.0	No	2.0
Tube 8	11 Watling St	Roadside	426136	300075	NO_2	No	4.0	2.0	No	2.0
Tube 9	55 Watling St Dordon	Roadside	426025	300135	NO_2	No	4.0	2.0	No	2.0
Tube 10	65 Watling St Dordon	Roadside	425943	300172	NO_2	No	2.0	2.0	No	2.0
Tube 11	Old Ambulance Station Dordon	Roadside	425811	300263	NO_2	No	23.0	14.0	No	2.0

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) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
Tube 12	Kingsbury Water Park	Rural	420380	295902	NO_2	No	N/A	N/A	No	2.0
Tube 13	Farthing Lane Curdsworth	Kerbside	418186	292959	NO_2	No	6.0	0.0	No	2.0
Tube 14	Maud Rd Water Orton	Kerbside	418060	290943	NO_2	No	13.0	1.0	No	2.0
Tube 15	Coleshill Heath Rd Coleshill	Other	419854	287041	NO_2	No	N/A	N/A	No	2.0
Tube 16	Coventry Rd Coleshill	Roadside	420027	287360	NO_2	No	12.0	14.0	No	2.0
Tube 17	Parkfield Road Coleshill	Roadside	420120	288627	NO_2	No	8.0	2.0	No	2.0
Tube 18	Church Hill Coleshill	Kerbside	420042	289079	NO_2	No	0.1	1.0	No	2.0
Tube 19	High St Coleshill	Roadside	419983	289095	NO_2	No	0.1	2.0	No	2.0
Tube 20	55 High St Coleshill	Kerbside	419969	289197	NO_2	No	4.0	0.5	No	2.0
Tube 21	Blythe Rd A Coleshill	Kerbside	420024	289176	NO_2	No	5.0	1.0	No	2.0
Tube 22	Blythe Rd B Coleshill	Roadside	420040	289199	NO_2	No	14.0	2.0	No	2.0
Tube 23	Coleshill Rd Furnace End	Kerbside	424876	291320	NO_2	No	6.0	1.0	No	2.0
Tube 24	Coventry Rd Fillongely	Kerbside	428051	287239	NO_2	No	8.0	1.0	No	2.0
Tube 25	Victoria Rd Hartshill	Kerbside	432733	293402	NO_2	No	9.0	1.0	No	2.0

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) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
Tube 26	Church Rd Hartshill	Kerbside	432560	293767	NO_2	No	4.0	1.0	No	2.0
Tube 27	Coleshil Rd Atherstone	Kerbside	430940	297759	NO_2	No	9.0	1.0	No	2.0
Tube 28	Taxi Rank Atherstone	Other	430717	297825	NO_2	No	N/A	N/A	No	2.0
Tube 29	Long St Atherstone	Roadside	430912	297773	NO_2	No	2.0	1.0	No	2.0
Tube 30	Coleshill Rd Curdworth	Kerbside	417832	292974	NO_2	No	8.0	1.0	No	2.0
Tube 31	Kingsbury Rd Curdworth	Roadside	417920	293071	NO_2	No	20.0	2.8	No	2.0

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. NO_2

Table A.2 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	NO_2 Annual Mean Concentration (µg/m3)				
						2017	2018	2019	2020	2021
1	430762	298747	Kerbside	91.7	91.7			19.8	14.0	14.7
2	427374	299431	Suburban	83.3	100.0	18.8	22.6	17.3	13.8	14.6
3	427835	299652	Suburban	91.7	50.0			18.0	13.6	14.0
4	426183	302564	Kerbside	91.7	58.3			24.9	20.6	19.8
5	426195	300310	Kerbside	91.7	100.0			29.4	22.5	23.5
6	426178	300108	Kerbside	91.7	91.7				25.2	26.0
7	426145	300504	Roadside	91.7	91.7	32.1	29.9	28.6	20.6	20.9
8	426026	300135	Roadside	91.7	100.0			**46.8**	35	**42.7**
9	426025	300133	Roadside	91.7	91.7				35.1	35.5
10	425943	300172	Roadside	83.3	100.0				35.4	38.1
11	425811	300263	Roadside	91.7	66.7				23.7	20.7
12	420380	295902	Rural	91.7	100.0	22.9	21.7	20.1	14.1	15.0

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	NO_2 Annual Mean Concentration (µg/m3)				
						2017	2018	2019	2020	2021
13	418186	292959	Kerbside	91.7	66.7	22.8	22.1	18.6	15.4	16.7
14	418060	290943	Kerbside	91.7	100.0	27.5	32.5	26.8	20.9	22.2
15	419854	287041	Other	91.7	100.0			34.1	27.8	29.9
16	420027	287360	Roadside	83.3	100.0	30.2	28.4	28.2	19.7	21.3
17	420120	288627	Roadside	83.3	100.0				19.1	22.0
18	420042	289079	Kerbside	83.3	100.0				18.5	20.0
19	419983	289095	Roadside	91.7	100.0				26.5	28.7
20	419969	289197	Kerbside	91.7	100.0				24.7	25.4
21	420024	289176	Kerbside	91.7	100.0			39.5	29.2	31.6
22	420040	289199	Roadside	91.7	91.7				35.8	37.7
23	424876	291320	Kerbside	91.7	100.0			28.5	21.0	22.6
24	428051	287239	Kerbside	91.7	83.3			22.8	15.7	17.8
25	432733	293402	Kerbside	91.7	100.0			26.1	20.4	22.0

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	NO_2 Annual Mean Concentration (µg/m3)				
						2017	2018	2019	2020	2021
26	432560	293767	Kerbside	58.3	41.7			20.2	17.4	16.7
27	430940	297759	Kerbside	75	66.7			26.0	19.0	20.5
28	430717	297825	Other	91.7	100.0				13.3	13.9
29	430912	297773	Roadside	91.7	100.0	31.3	31.6	30.7	22.6	25.3
30	417832	292974	Kerbside	83.3	83.3					21.9
31	417920	293071	Roadside	91.7	91.7					30.5

☒ **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 µg/m^3.

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

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

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.

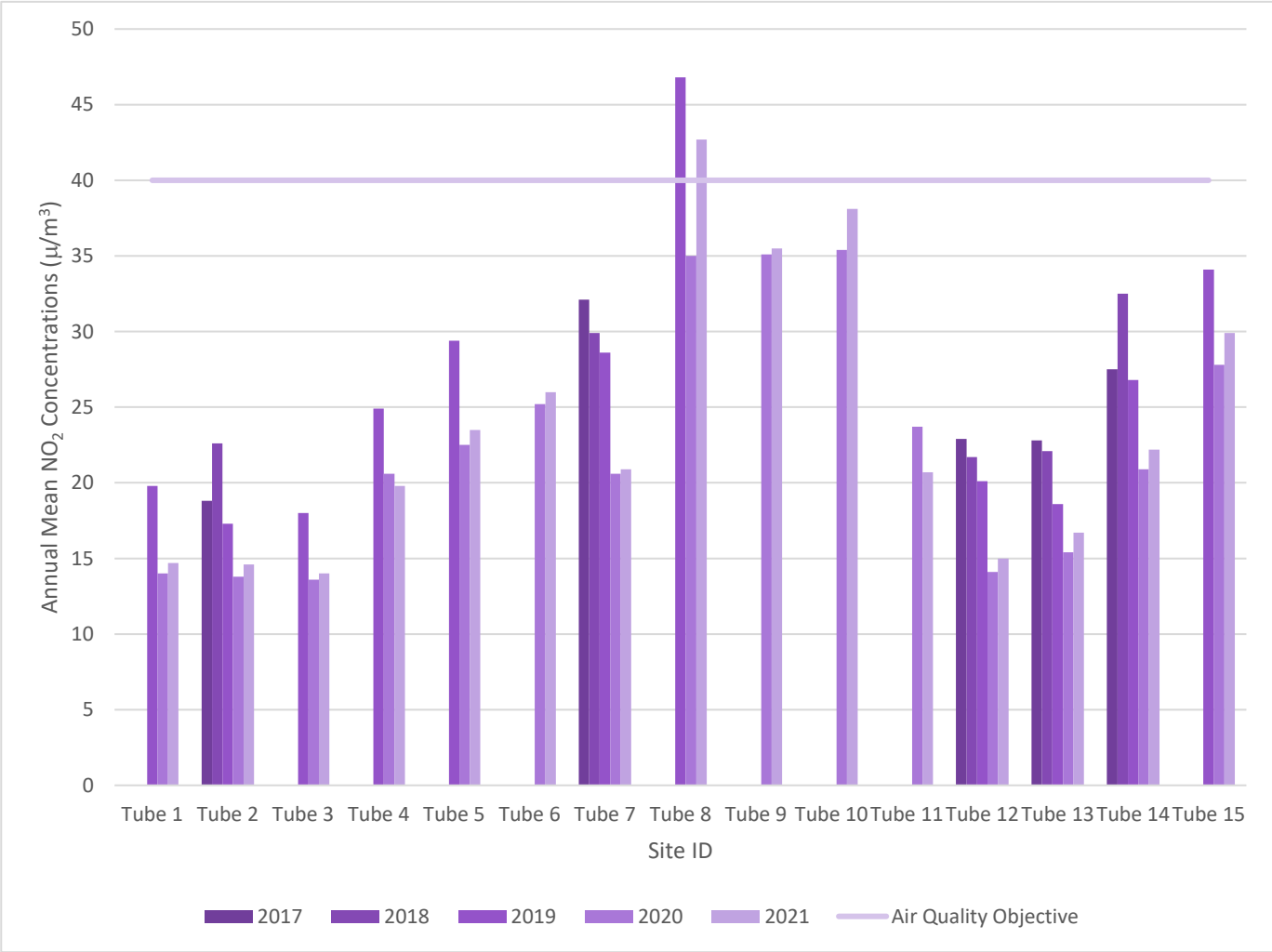
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

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

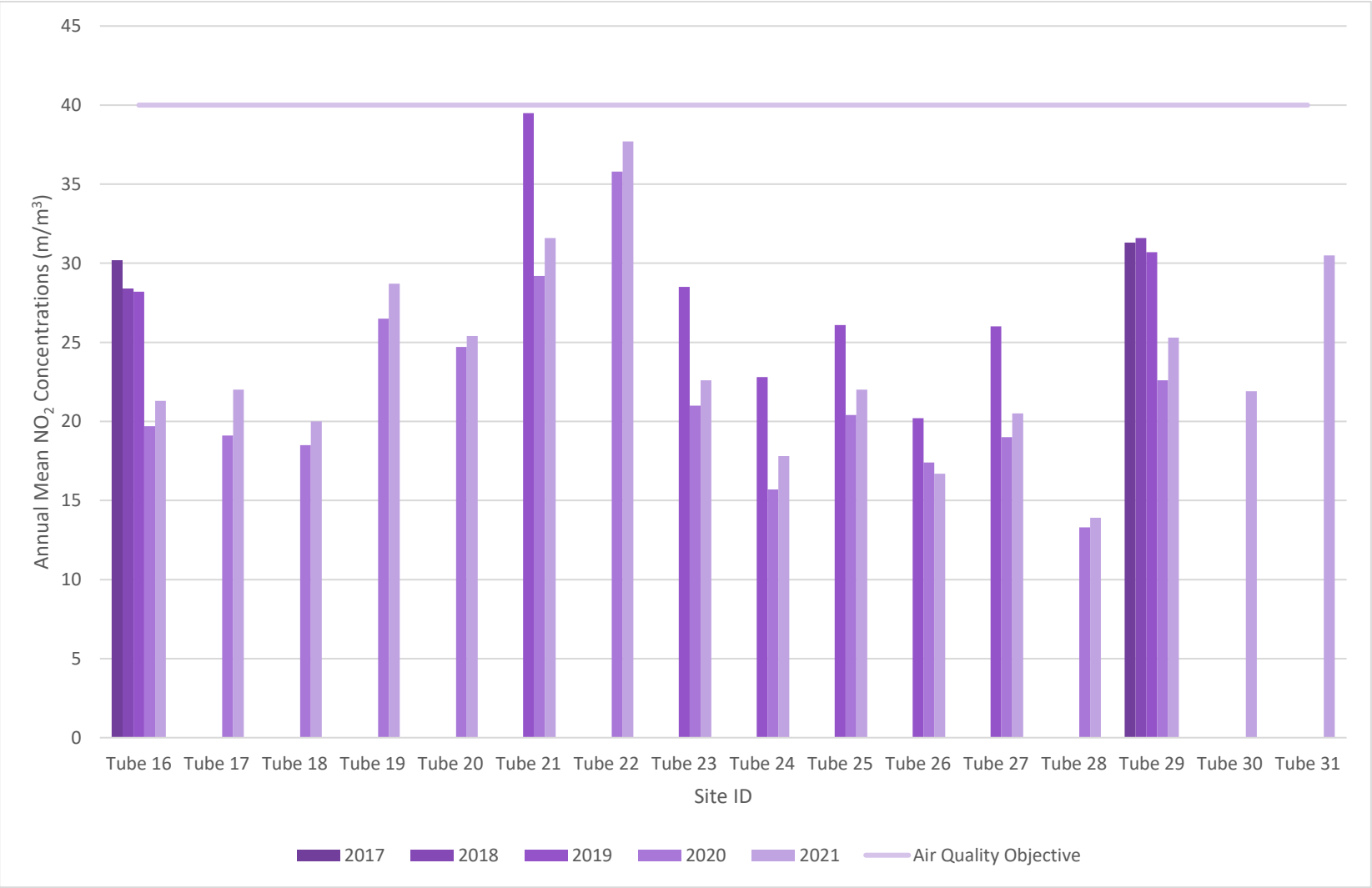
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

Tubes 1 to 15



Tubes 16 to 31



Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
Tube 1	430762	298747	22.2	21.4	17.6	17.8		13.3	14.3	12.0	18.6	17.5	19.1	18.8	17.5	14.7		
Tube 2	427374	299431	24.6	18.5	17.8	18.0	14.8	14.7	15.3	13.0	17.8	14.2	22.1	18.0	17.4	14.6		
Tube 3	427835	299652	24.1	20.0		17.3	14.9		14.9		18.2				18.2	14.0		
Tube 4	426183	302564	33.3	23.6	26.5			22.3				26.2	30.4	26.4	27.0	19.8		
Tube 5	426195	300310	29.2	31.1	29.9	27.7	27.4	23.6	24.3	23.7	31.6	28.9	31.5	27.3	28.0	23.5		
Tube 6	426178	300108	36.1	30.8	34.2	28.6	31.1		25.8	26.1	34.5	30.1	36.6	27.0	31.0	26.0		
Tube 7	426055	300164	29.2	24.3	26.2	20.1	25.0	20.7	22.1	20.5	30.0		30.2	25.5	24.9	20.9		
Tube 8	426136	300075	50.9	44.7	59.6	45.4	54.8	46.3	46.7	45.2	61.2	48.7	54.8	52.3	50.9	**42.7**	34.3	
Tube 9	426025	300135	52.9	48.3	45.6	40.0		30.8	43.3	39.0	51.5	31.6	44.1	37.6	42.3	35.5		
Tube 10	425943	300172	43.1	48.6	48.0	50.0	49.3	37.1	44.8	37.5	52.7	42.1	52.4	38.9	45.4	38.1	32.2	
Tube 11	425811	300263	31.8					20.5	22.7	18.4	30.3	25.2	27.2	24.5	25.1	20.7		
Tube 12	420380	295902	22.6	18.1	20.8	16.2	13.6	13.3	13.7	13.8	16.1	19.6	24.1	22.4	17.9	15.0		
Tube 13	418186	292959	26.1	23.2	20.8	19.4		14.5		14.0	22.1	18.3	19.6	21.4	19.9	16.7		
Tube 14	418060	290943	32.8	28.9	25.9	27.6	25.1	22.3	22.8	23.1	28.8	25.0	28.6	26.3	26.4	22.2		
Tube 15	419854	287041	41.6	36.6	37.5	29.7	35.0	29.0	29.9	27.3	40.8	39.8	45.5	34.2	35.6	29.9		
Tube 16	420027	287360	30.9	25.3	28.0	19.5	20.6	18.3	20.0	19.4	27.4	29.4	36.5	28.6	25.3	21.3		
Tube 17	420120	288627	32.0	25.6	24.3	20.1	25.1	20.9	24.8	20.8	31.6	25.0	37.9	25.9	26.2	22.0		
Tube 18	420042	289079	31.5	23.2	25.6	22.0	21.5	15.9	18.8	17.5	27.2	29.8	29.8	22.8	23.8	20.0		
Tube 19	419983	289095	39.9	33.0	39.1	28.7	33.4	31.4	31.9	28.7	38.5	34.0	33.9	36.9	34.1	28.7		
Tube 20	419969	289197	37.6	30.3	32.2	31.1	28.7	25.2	30.2	23.7	32.0	29.2	33.6	29.0	30.2	25.4		
Tube 21	420024	289176	45.3	41.2	39.4	39.4	37.8	33.1	33.2	30.6	43.7	36.9	36.8	34.1	37.6	31.6		
Tube 22	420040	289199	44.1	47.7		46.2	47.9	36.3	41.6	33.2	61.8	40.0	46.8	48.0	44.9	37.7	30.4	
Tube 23	424876	291320	28.1	28.1	24.4	28.0	26.9	26.3	28.2	22.5	32.8	25.1	27.3	25.3	26.9	22.6		
Tube 24	428051	287239	23.4	22.7		21.0	20.6		21.5	17.3	23.5	19.1	22.6	20.6	21.2	17.8		
Tube 25	432733	293402	31.1	25.8	28.9	25.7	26.6	21.6	23.1	21.0	29.7	23.3	30.5	26.8	26.2	22.0		
Tube 26	432560	293767		23.4	20.2	20.3	19.2							24.8	21.6	16.7		
Tube 27	430940	297759	20.3	27.2			22.6		22.4	20.2	27.7		42.7	25.4	26.1	20.5		
Tube 28	430717	297825	22.4	20.0	16.3	15.8	14.1	14.1	14.2	11.8	16.8	15.6	19.1	17.9	16.5	13.9		
Tube 29	430912	297773	35.2	32.5	32.8	29.5	31.2	27.0	30.9	22.0	33.6	24.8	35.1	27.1	30.1	25.3		
Tube 30	417832	292974		30.8	27.4	28.0	23.5	21.6		20.8	26.4	24.3	31.2	27.3	26.1	21.9		
Tube 31	417920	293071		41.4	36.2	38.2	36.5	36.0	38.2	26.6	44.8	34.2	38.8	29.0	36.4	30.5		

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1.**

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

☒ **National bias adjustment factor used.**

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

☒ **North Warwickshire Borough Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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

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 North Warwickshire Borough Council During 2021

North Warwickshire Borough Council has not identified any new sources relating to air quality within the reporting year of 2021.

Additional Air Quality Works Undertaken by North Warwickshire Borough Council During 2021

Two additional diffusion tube locations were utilised for monitoring during 2021. These were Tube 30 located on Coleshill Road, Curdworth and Tube 31 located on Kingsbury Road, Curdworth. The location for Tube 30 was selected because of anecdotally reported congestion during busy periods and Tube 31 was located on a road anecdotally reported to have a high volume of HDV traffic.

QA/QC of Diffusion Tube Monitoring

Gradko International Ltd were the supplier used for diffusion tubes in 2021 and the method of preparation was 20% TEA in water.

Gradko International Ltd is UKAS accredited (ISO: 17025) and participates in the AIR NO2 PT scheme15. This scheme forms an integral part of the UK NO2 Network's QA/QC and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). In the most recent AIR NO2 PT rounds AR049 and AR050 for January to February 2022 and May to June 2022 respectively Gradko International Ltd achieved a 100% satisfactory score for both rounds[12].

[12] Summary of Laboratory Performance in AIR NO2 Proficiency Testing Scheme (May 2020 – June 2022). LAQM Helpdesk June 2022

Monitoring was completed in adherence with the 2021 Diffusion Tube Monitoring Calendar.

Diffusion Tube Annualisation

If annualisation was required for any non-automatic monitoring sites, the sites requiring annualisation should be clearly defined along with details of the calculation method undertaken provided in Table C.2. Annualisation is required for any site with data capture less than 75% but greater than 25%.

Tubes 3,4,11,26 and 27 required annualisation as the data capture was less than 75% but greater than 25%. The annualisation tool version 1.0 was used to calculate annualisation factors.

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[13] provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

North Warwickshire Borough Council have applied a national bias adjustment factor of 0.84 based on 34 studies from spreadsheet version 06/22 to the 2021 monitoring data. A summary of bias adjustment factors used by North Warwickshire Borough Council over the past five years is presented in Table C.1.

[13] Local Air Quality Management Technical Guidance LAQM.TG16. April 2021.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	06/22	0.84
2020	National	06/21	0.81
2019	National	03/19	0.92
2018	National	- (1)	0.93
2017	National	- (1)	0.89

(1) Version of Spreadsheet not known

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

Diffusion tubes 8, 10 and 22 recorded NO_2 concentrations greater than 36µg/m^3 and were not located at the point of relevant exposure and therefore required a fall-off with distance calculation. The output data from the LAQM NO_2 fall-off with distance calculator, is presented in Table C.3.

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Walsall Woodlands	Annualisation Factor West Bromwich Kenrick Park	Annualisation Factor Northampton Spring Park	Annualisation Factor Site 4 Name	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
Tube 3	0.9083	0.9395	0.9030	-	0.9169	18.2	16.7	
Tube 4	0.9029	0.9225	0.7977	-	0.8744	27.0	23.6	
Tube 11	1.0166	1.0130	0.9208	-	0.9835	25.1	24.7	
Tube 26	0.9217	0.9392	0.8982	-	0.9197	21.6	19.8	
Tube 27	0.9520	0.9695	0.8814	-	0.9343	26.1	24.4	

Table C.3 – NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
Tube 8	2.0	6.0	42.7	10.0	34.3	
Tube 10	2.0	4.0	38.1	11.4	33.8	
Tube 22	2.0	14.0	37.7	15.3	27.5	

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

Figure D.1 – Maps of Non-Automatic Monitoring Sites

Tube 1 Atherstone

Tube 2 Grendon

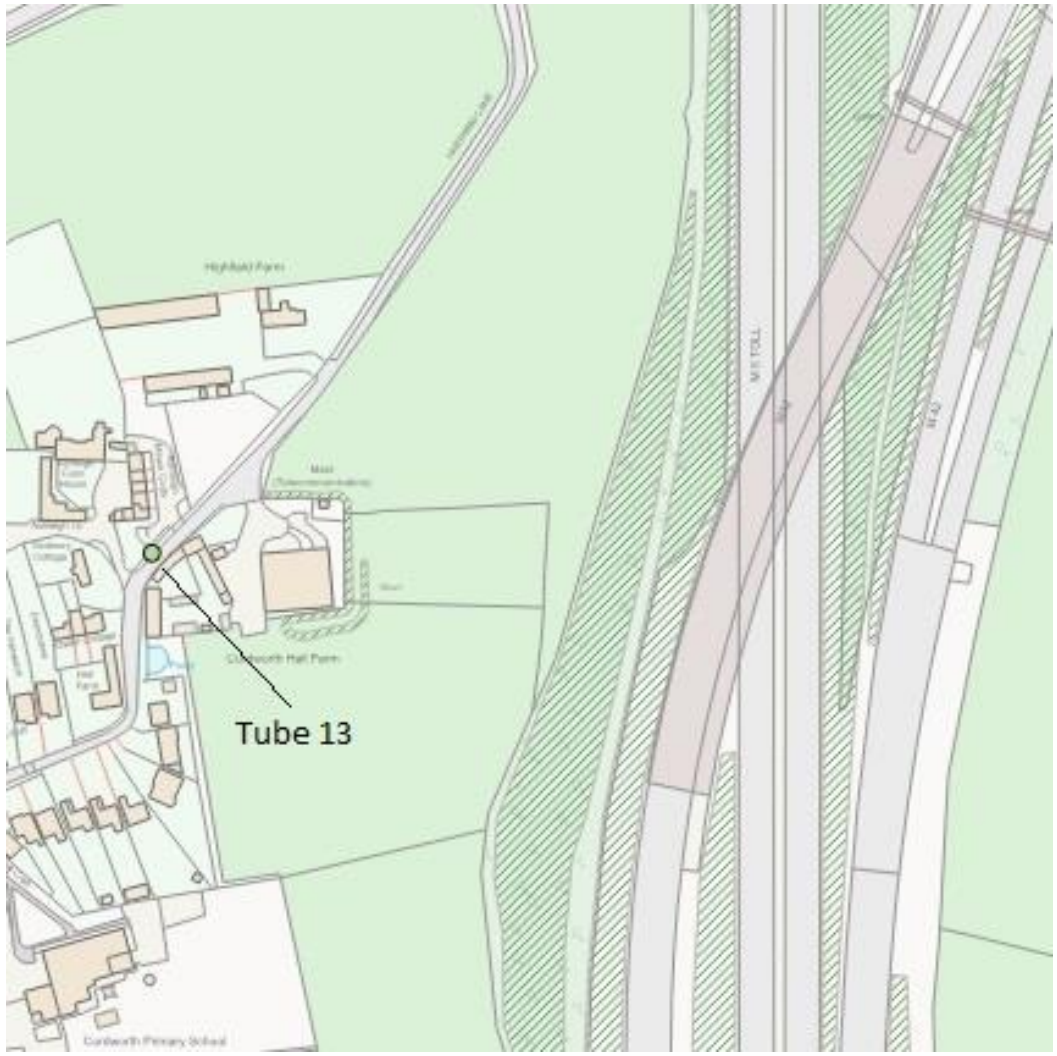
Tube 3 Grendon

Tube 4 Polesworth

Tubes 5 to 11 Dordon

Tube 12 Kingsbury

Tube 13 Curdworth



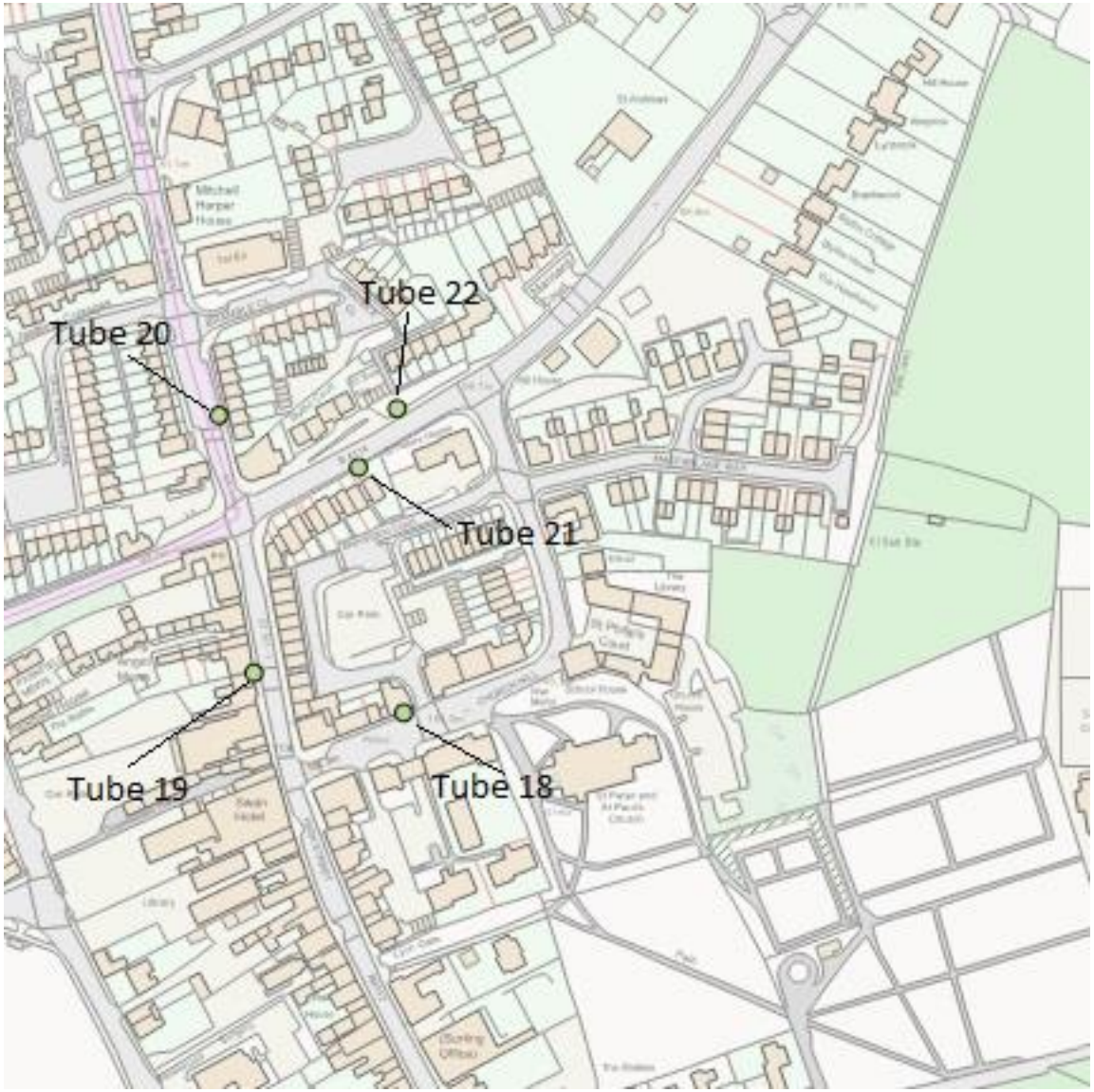
Tube 14 Water Orton

Tube 15 Coleshill

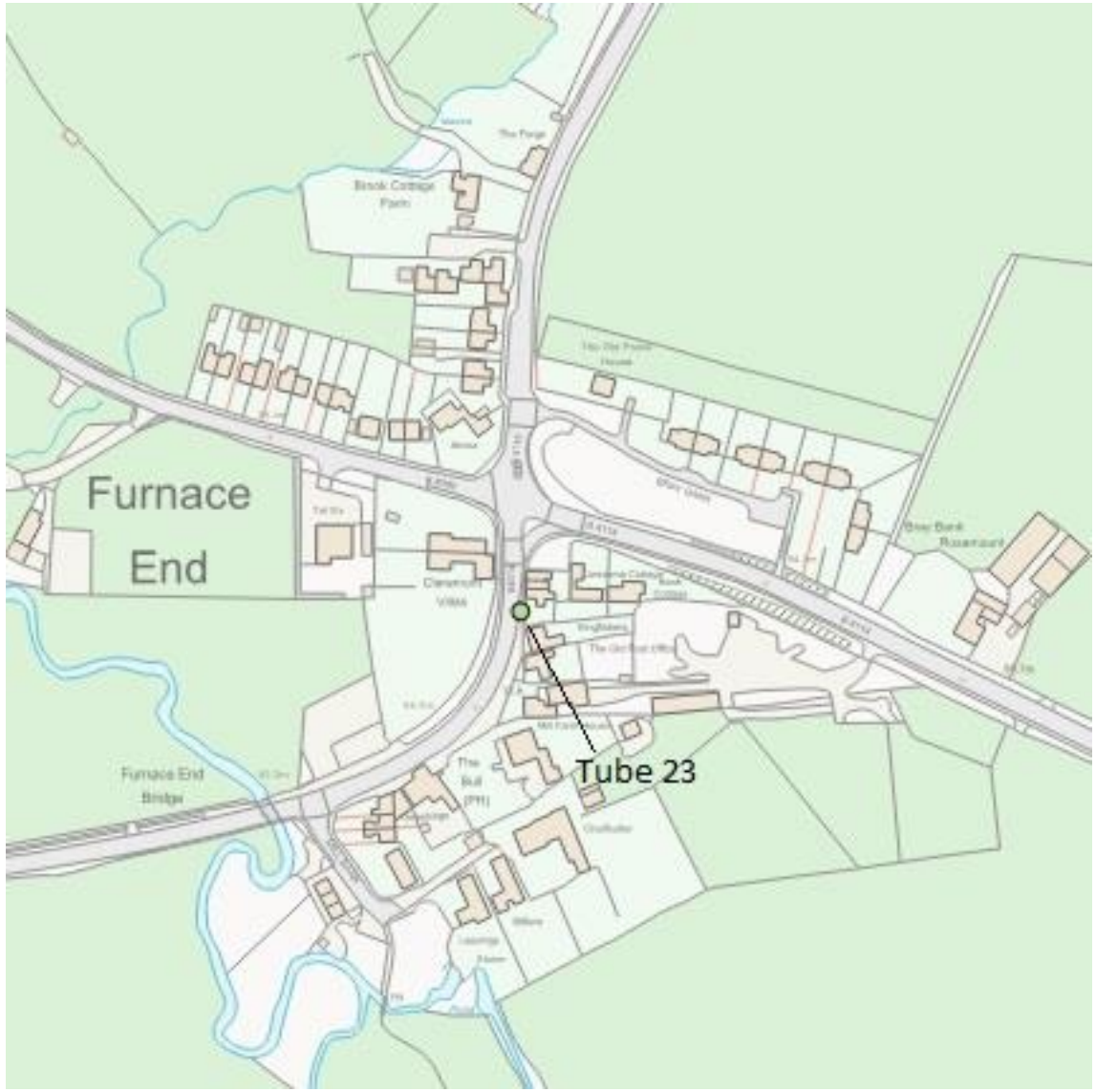
Tube 16 Coleshill

Tube 17 Coleshill

Tubes 18 to 22 Coleshill



Tube 23 Furnace End

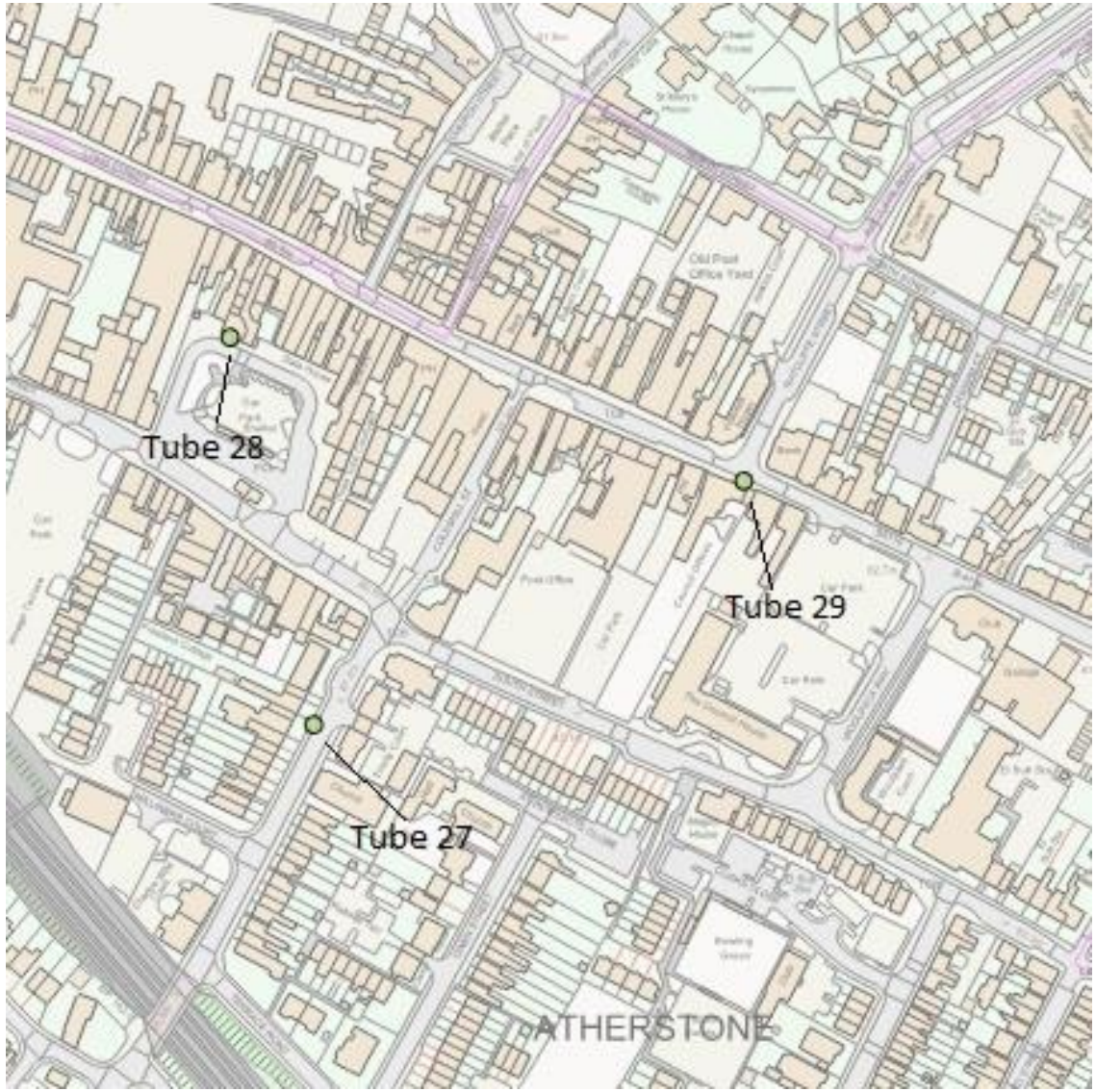


Tube 24 Fillongley

Tube 25 Hartshill

Tube 26 Hartshill

Tube 27 to 29 Atherstone



Tubes 30 and 31 Curdworth


Chantry
Industrial
Estate
Tube 31
93.7m
Shelter
Shelter
Track
Greenacres
Redwood Ho
Caleta
86.7m
A 4097
A 4097
Tube 30
Tel
Ex
83.3m
ESS
PO

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[14]

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO_2)	40µg/m^3	Annual mean
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM_{10})	40µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO_2)	125µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO_2)	266µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
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 National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

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