North Warwickshire Borough Council

2023 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management, as amended by the Environment Act 2021

Date: 29 September 2023

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Report Reference Number	NWBCASR2023
Date	29 September 2023

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 29,000 to 43,000 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. Particulate Matter (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].

As established in the Environment Act 2021, legally binding regulations were released on Particle Matter.

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 require that in England by the end of 2040:

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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, January 2023

[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

- An annual average of 10 µg/m3 for PM2.5 is not exceeded at any monitoring station.
- Population exposure to PM2.5 is at least 35% less than in 2018.

The Environmental Improvement Plan 2023 for England has set intermit targets that by January 2028:

- An annual average of 12 µg/m3 for PM2.5 is not exceeded at any monitoring station.
- Population exposure to PM2.5 is at least 22% less than in 2018.

Local Authorities are now required to take preventative action thorough a local Air Quality Strategy. North Warwickshire Borough Council are in the early stages of producing their strategy.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan[6] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The Road to Zero[7] details 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[8] 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.

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[6] Defra. Environmental Improvement Plan 2023, January 2023

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

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

North Warwickshire Borough Council adopted a new Local Plan on 29 September 2021 and updated in September 2023[9] which includes:

LP29 Development Considerations

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

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

As part of the Local Transport Plan[10], 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 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)[11]. A consultation report and revised LCWIP will be taken to the County Council's Cabinet later in 2023.

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.

In Partnership with Public Health at County Council, North Warwickshire Borough council are exploring funding air quality monitoring systems with a focus on monitoring particulate matter 2.5.

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.

[9] North Warwickshire Borough Council. Adopted Local Plan 2021. September 2023.

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

[11] Warwickshire County Council Warwickshire Local Cycling and Walking Infrastructure Plan (LCWIP) 2023

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. In the year 2022, Environmental Health at North Warwickshire Borough Council receive 73 smoke complaints. This is down from 106 complaints received in 2021.

North Warwickshire Borough council submitted a joint bid with local authorities to the 2022 Air Quality grant scheme. Despite being unsuccessful with the bid, the local authorities have gained useful learning of the process and expectations.

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). 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 Milen Woldeab, 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 Milen Woldeab, Senior Pollution Control Officer at:

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1 Local Air Quality Management

This report provides an overview of air quality in North Warwickshire Borough Council during 2022. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. 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. North Warwickshire Borough Council have reviewed their monitoring strategy in recent years, with 19 new sites installed in 2020 and another additional two sites installed in 2021. This is commended, the Council should continue to review their monitoring network on a regular basis, continue close monitoring in these locations, and install/decommission sites where relevant to identify new hotspots.

2. Tube 8 has seen exceedances of the annual mean NO2 objective in 2019 and 2020. Whilst concentrations are not expected to exceed the objective at relevant exposure, the Council should continue close monitoring of this location and work towards improving air quality here.

3. The report refers to the Public Health Outcomes Framework and makes an explicit reference to the local indicator D.01, comparing it to the reginal and national indicator values. The Council have some measures which specifically target PM2.5 concentrations. This is welcomed.

4. There is one minor inconsistency in the reporting of data capture. In Table B.1, Tube 13 appears to have 10 months of data, representing a data capture of 83.3%, however in Table A.2 data capture for Tube 13 is reported as 66.7%. It is assumed the data capture in Table A.2 is erroneous and should be corrected.

5. Annualisation is reported to have been calculated using the Defra Annualisation Tool v1. Whilst this is not incorrect, the Annualisation Tool was released in 2020, and the Council is recommended to use the newer Defra Diffusion Tube Processing Tool with version 2 released in March 2022. This can be found at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/diffusion-tube-data-processing-tool. The Council is reminded to ensure they are using the latest version of all tools and spreadsheets.

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 2022 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. A review of the Air Quality SPD is being considered to address Particulate Matter in more detail.

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 was updated on September 2023 which includes:

LP29 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 Plan and can be seen in full at http://apps.warwickshire.gov.uk/api/documents/WCCC-630-116. In accordance with the Environment Act 2021, North Warwickshire Borough Council will be producing an Air Quality Strategy.

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:

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. In the year 2022, Environmental Health at North Warwickshire Borough Council receive 73 smoke complaints. This is down from 106 complaints received in 2021.

North Warwickshire Borough council submitted a joint bid with local authorities to the 2022 Air Quality grant scheme. Despite being unsuccessful with the bid, the local authorities have gained useful learning of the process and expectations.

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), local authorities are expected to work towards reducing emissions and/or concentrations of PM2.5 (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM2.5 has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The Public Health Outcomes Framework[12] includes a new indicator relating to the impact of particulate pollution on human health relating to the period 2021 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 for North Warwickshire is 5.2% for 2021. This is comparable to the regional average for the West Midlands (5.5%) and the national English average (5.5%).

The modelled background level provided by Defra for North Warwickshire are modelled to be between 7.5µg/m_3 and 10.07µg/m_3 for 2022, with the annual mean for 2022 being 8.3µg/m_3.
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):
• PM2.5 Interim targets of 35 / 25 / 15 / 10, and a guideline level of 5 µg/m_3
As established in the Environment Act 2021, legally binding regulations were released on Particle Matter.

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 require that in England by the end of 2040:

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

- An annual average of 10 µg/m3 for PM2.5 is not exceeded at any monitoring station.
- Population exposure to PM2.5 is at least 35% less than in 2018.

The Environmental Improvement Plan 2023 for England has set intermit targets that by January 2028:

- An annual average of 12 µg/m3 for PM2.5 is not exceeded at any monitoring station.
- Population exposure to PM2.5 is at least 22% less than in 2018.

Local Authorities are now required to take preventative action thorough a local Air Quality Strategy. North Warwickshire Borough Council are in the early stages of producing their strategy.

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.

North Warwickshire Borough council have various Smoke Control Areas 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. These areas are considered when investigating smoke complaints. This helps control and reduce PM2.5 emissions in these areas.

In Partnership with Public Health at County Council, North Warwickshire Borough council are exploring funding air quality monitoring systems with a focus on monitoring particulate matter 2.5.

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

This section sets out the monitoring undertaken within 2022 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 2018 and 2022 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

This section sets out the monitoring undertaken within 2022 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 2018 and 2022 to allow monitoring trends to be identified and discussed.

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 2022. Table A.1 in Appendix A presents the details of the non-automatic sites. Tube 29 was discontinued as Environmental Health no longer had access to the building/location.

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)

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 2022 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. Tube 29 has been removed as the council no longer had access to the location.

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 2022 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	NO2	No	9.0	1.0	No	2.0
Tube 2	Penmire Close Grendon	Suburban	427374	299431	NO2	No	11.0	1.0	No	2.0
Tube 3	Spon Lane Grendon	Suburban	427835	299652	NO2	No	15.0	1.0	No	2.0
Tube 4	Bridge St Polesworth	Kerbside	426183	302564	NO2	No	2.0	1.0	No	2.0
Tube 5	(Top) Long St Dordon	Kerbside	426195	300310	NO2	No	4.0	1.0	No	2.0
Tube 6	(Bottom) Long St Dordon	Kerbside	426178	300108	NO2	No	3.0	0.0	No	2.0
Tube 7	New St Dordon	Roadside	426055	300164	NO2	No	3.0	2.0	No	2.0
Tube 8	11 Watling St	Roadside	426136	300075	NO2	No	4.0	2.0	No	2.0
Tube 9	55 Watling St Dordon	Roadside	426025	300135	NO2	No	4.0	2.0	No	2.0
Tube 10	65 Watling St Dordon	Roadside	425943	300172	NO2	No	2.0	2.0	No	2.0
Tube 11	Old Ambulance Station Dordon	Roadside	425811	300263	NO2	No	23.0	14.0	No	2.0
Tube 12	Kingsbury Water Park	Rural	420380	295902	NO2	No			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 13	Farthing Lane Curdworth	Kerbside	418186	292959	NO2	No	6.0	0.0	No	2.0
Tube 14	Maud Rd Water Orton	Kerbside	418060	290943	NO2	No	13.0	1.0	No	2.0
Tube 15	Coleshill Heath Rd Coleshill	Other	419854	287041	NO2	No			No	2.0
Tube 16	Coventry Rd Coleshill	Roadside	420027	287360	NO2	No	12.0	14.0	No	2.0
Tube 17	Parkfield Road Coleshill	Roadside	420120	288627	NO2	No	8.0	2.0	No	2.0
Tube 18	Church Hill Coleshill	Kerbside	420042	289079	NO2	No	0.1	1.0	No	2.0
Tube 19	High St Coleshill	Roadside	419983	289095	NO2	No	0.1	2.0	No	2.0
Tube 20	55 High St Coleshill	Kerbside	419969	289197	NO2	No	4.0	0.5	No	2.0
Tube 21	Blythe Rd A Coleshill	Kerbside	420024	289176	NO2	No	5.0	1.0	No	2.0
Tube 22	Blythe Rd B Coleshill	Roadside	420040	289199	NO2	No	14.0	2.0	No	2.0
Tube 23	Coleshill Rd Furnace End	Kerbside	424876	291320	NO2	No	6.0	1.0	No	2.0
Tube 24	Coventry Rd Fillongely	Kerbside	428051	287239	NO2	No	8.0	1.0	No	2.0
Tube 25	Victoria Rd Hartshill	Kerbside	432733	293402	NO2	No	9.0	1.0	No	2.0
Tube 26	Church Rd Hartshill	Kerbside	432560	293767	NO2	No	4.0	1.0	No	2.0
Tube 27	Coleshill Rd Atherstone	Kerbside	430940	297759	NO2	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 28	Taxi Rank Atherstone	Other	430717	297825	NO2	No			No	2.0
Tube 30	Long St Atherstone	Roadside	430912	297773	NO2	No	2.0	1.0	No	2.0
Tube 31	Coleshill Rd Curdworth	Kerbside	417832	292974	NO2	No	8.0	1.0	No	2.0
Tube 32	Kingsbury Rd Curdworth	Roadside	417920	293071	NO2	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.

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 2022 (%) [2]	2018	2019	2020	2021	2022
Tube 1	430762	298747	Kerbside		100.0		19.8	14.0	14.7	14.3
Tube 2	427374	299431	Suburban		92.3	22.6	17.3	13.8	14.6	12.5
Tube 3	427835	299652	Suburban		49.7		18.0	13.6	14.0	14.2
Tube 4	426183	302564	Kerbside		15.4		24.9	20.6	19.8	-
Tube 5	426195	300310	Kerbside		84.6		29.4	22.5	23.5	19.6
Tube 6	426178	300108	Kerbside		82.7			25.2	26.0	25.0
Tube 7	426055	300164	Roadside		100.0	29.9	28.6	20.6	20.9	21.3
Tube 8	426136	300075	Roadside		100.0		**46.8**	35.0	**42.7**	**40.6**
Tube 9	426025	300135	Roadside		100.0			35.1	35.5	36.7
Tube 10	425943	300172	Roadside		100.0			35.4	38.1	36.3
Tube 11	425811	300263	Roadside		100.0			23.7	20.7	22.9
Tube 12	420380	295902	Rural		100.0	21.7	20.1	14.1	15.0	15.3
Tube 13	418186	292959	Kerbside		100.0	22.1	18.6	15.4	16.7	14.9

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 2022 (%) [2]	2018	2019	2020	2021	2022
Tube 14	418060	290943	Kerbside		100.0	32.5	26.8	20.9	22.2	21.9
Tube 15	419854	287041	Other		100.0		34.1	27.8	29.9	30.1
Tube 16	420027	287360	Roadside		92.6	28.4	28.2	19.7	21.3	23.8
Tube 17	420120	288627	Roadside		83.0			19.1	22.0	25.4
Tube 18	420042	289079	Kerbside		100.0			18.5	20.0	19.7
Tube 19	419983	289095	Roadside		100.0			26.5	28.7	30.3
Tube 20	419969	289197	Kerbside		100.0			24.7	25.4	26.9
Tube 21	420024	289176	Kerbside		82.7		39.5	29.2	31.6	31.4
Tube 22	420040	289199	Roadside		92.3			35.8	37.7	37.9
Tube 23	424876	291320	Kerbside		82.4		28.5	21.0	22.6	24.8
Tube 24	428051	287239	Kerbside		100.0		22.8	15.7	17.8	17.4
Tube 25	432733	293402	Kerbside		92.6		26.1	20.4	22.0	22.1
Tube 26	432560	293767	Kerbside		51.9		20.2	17.4	16.7	19.4
Tube 27	430940	297759	Kerbside		82.7		26.0	19.0	20.5	21.1

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 2022 (%) (2)	2018	2019	2020	2021	2022
Tube 28	430717	297825	Other		92.3			13.3	13.9	14.3
Tube 30	430912	297773	Roadside		69.2	31.6	30.7	22.6	25.3	18.4
Tube 31	417832	292974	Kerbside		100.0				21.9	21.8
Tube 32	417920	293071	Roadside		84.9				30.5	30.9

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22**

☒ **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.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

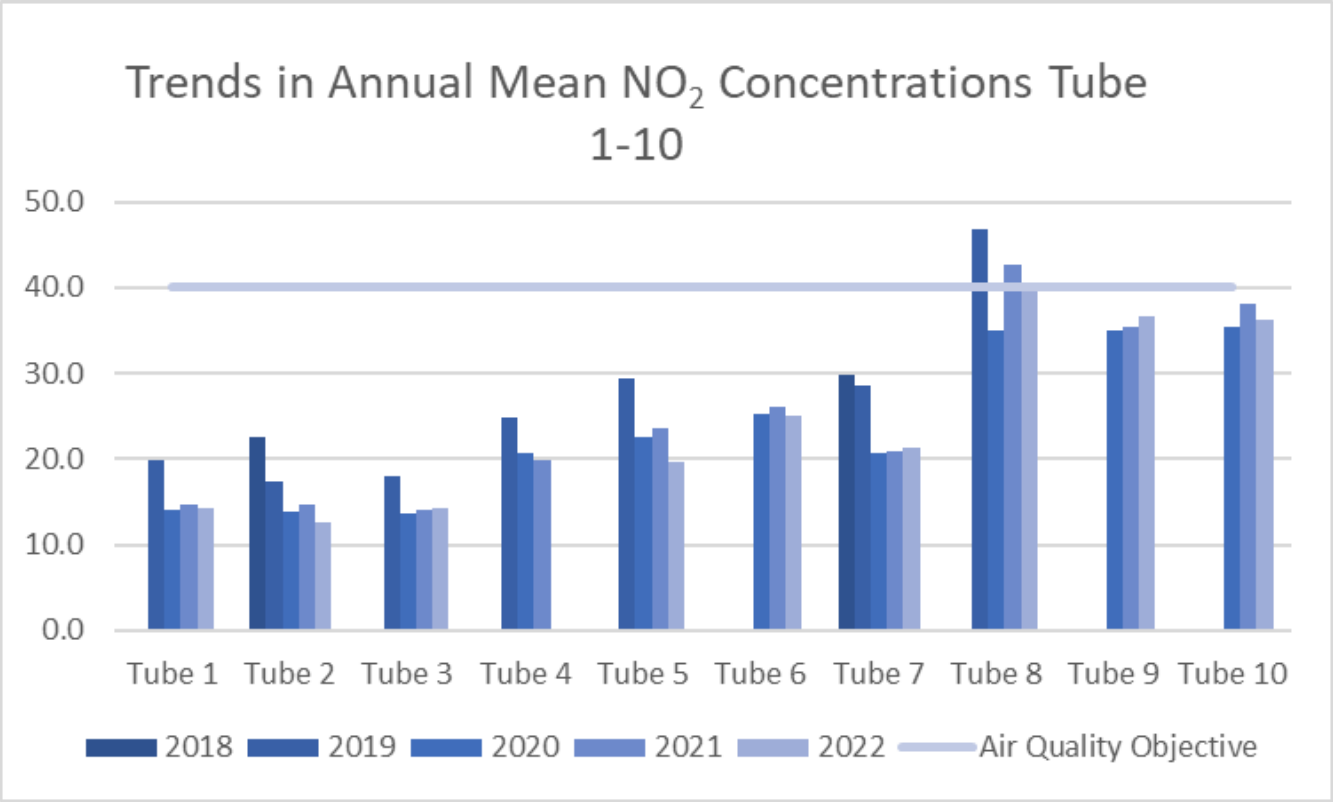
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

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

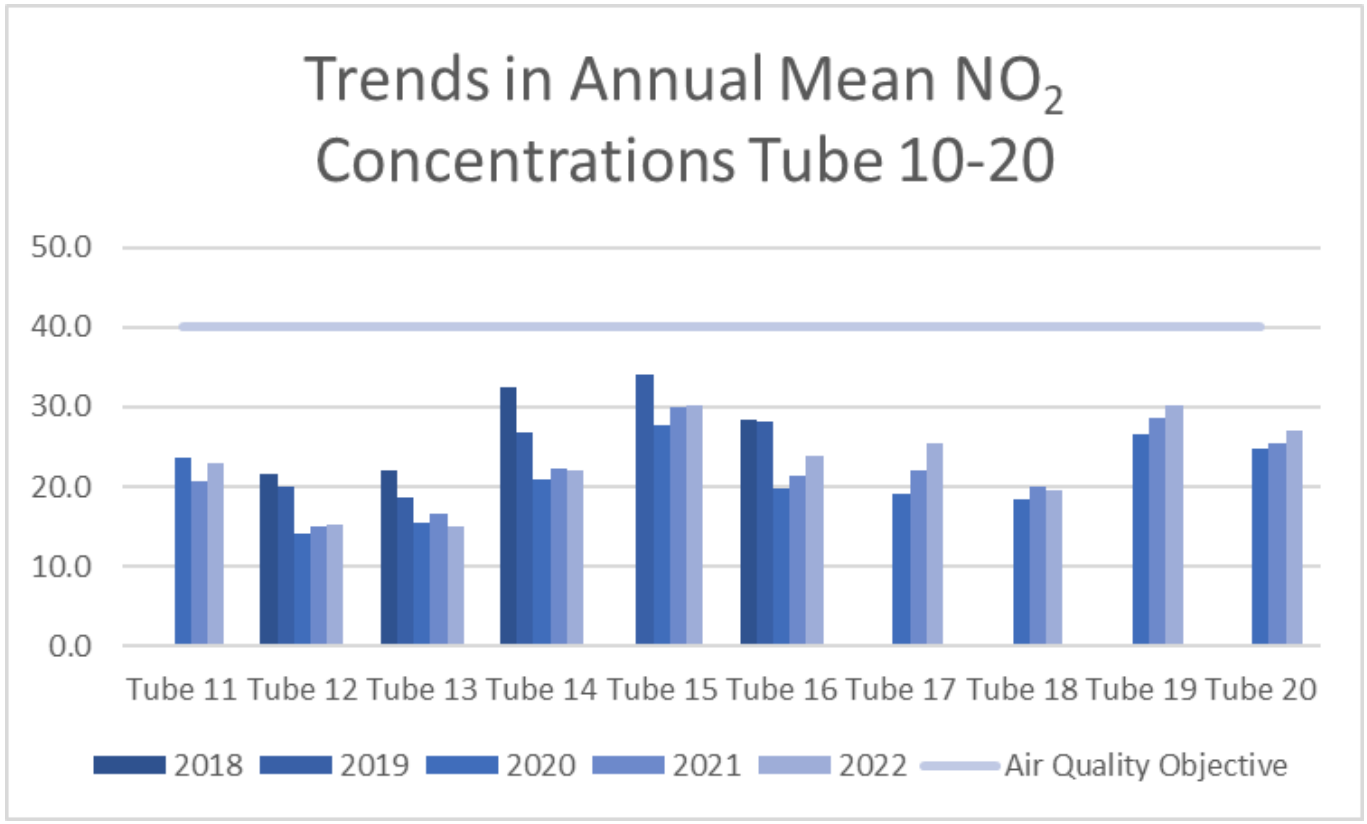
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

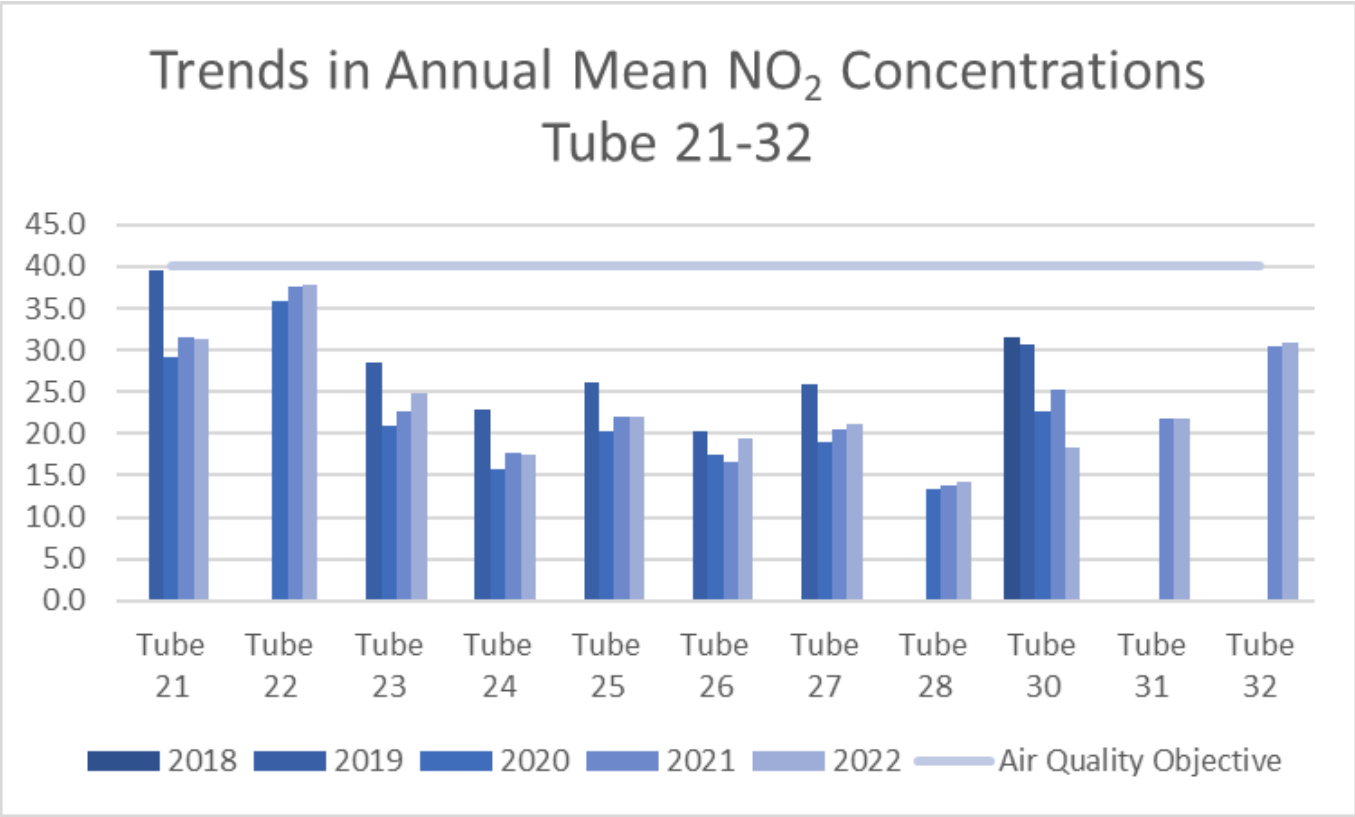
Tubes 1 to 10



Tubes 10 to 20



Tubes 21 to 32



Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO_2 2022 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 <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
Tube 1	430762	298747	25.3	14.9	24.9	5.4	15.4	15.0	13.9	15.3	16.5	17.7	18.4	21.6	17.0	14.3	-	
Tube 2	427374	299431	25.0	12.9	22.8	16.7	11.6	8.9	12.1		0.6	13.8	17.3	22.1	14.9	12.5	-	
Tube 3	427835	299652	24.0	18.2			12.4	11.4	12.2					24.3	17.1	14.2	-	
Tube 4	426183	302564									25.2		27.8		-	-	-	
Tube 5	426195	300310		25.6	31.7	25.8	23.6	20.7	20.5	25.2	0.6	27.0		32.7	23.4	19.6	-	
Tube 6	426178	300108	37.7	30.5	35.3	26.9	26.0	24.0	24.3		28.2		32.5	32.8	29.8	25.0	-	
Tube 7	426055	300164	38.2	25.8	28.1	19.1	21.7	20.5	22.6	20.4	24.0	25.5	27.5	31.0	25.4	21.3	-	
Tube 8	426136	300075	62.0	56.0	43.7	45.2	43.4	46.3	50.9	48.3	48.0	43.7	46.5	46.2	48.3	**40.6**	32.6	
Tube 9	426025	300135	54.6	34.0	50.7	41.7	41.7	36.8	39.9	49.4	45.4	42.5	43.9	43.9	43.7	36.7	29.8	
Tube 10	425943	300172	61.5	36.6	48.5	45.7	34.4	37.4	45.0	45.2	42.3	35.4	42.1	43.9	43.2	36.3	32.2	
Tube 11	425811	300263	44.4	30.6	30.1	18.0	20.8	20.1	22.4	21.7	23.1	28.9	34.9	32.8	27.3	22.9	-	
Tube 12	420380	295902	27.7	20.9	18.8	15.0	14.7	13.1	14.2	15.5	15.0	18.4	20.7	25.3	18.3	15.3	-	
Tube 13	418186	292959	24.1	16.9	25.1	16.7	13.5	11.6	14.8	17.4	16.8	15.7	18.2	22.8	17.8	14.9	-	
Tube 14	418060	290943	34.6	22.0	37.7	25.0	19.1	17.5	21.1	25.9	26.5	15.9	34.0	34.3	26.1	21.9	-	
Tube 15	419854	287041	47.7	40.6	38.6	29.2	31.9	31.8	34.0	31.0	34.2	27.6	42.8	40.6	35.8	30.1	-	
Tube 16	420027	287360	39.0	31.0	25.6	21.9	21.1	24.9		21.6	24.8	37.3	30.8	33.5	28.3	23.8	-	
Tube 17	420120	288627	42.7	32.8	32.0	23.6		21.7	24.0		27.2	27.4	37.6	33.2	30.2	25.4	-	
Tube 18	420042	289079	32.8	22.4	25.2	18.7	17.5	17.7	18.7	20.2	22.6	29.7	25.7	29.8	23.4	19.7	-	
Tube 19	419983	289095	48.0	35.1	37.5	33.7	32.3	34.5	35.1	34.7	40.5	21.5	39.3	40.7	36.1	30.3	-	
Tube 20	419969	289197	38.9	26.9	37.9	28.3	25.5	24.2	27.2	30.2	31.7	36.9	35.8	41.2	32.1	26.9	-	
Tube 21	420024	289176	40.8	30.4	42.9	31.3			3.5	47.0	40.2	30.5	54.3	53.3	37.4	31.4	-	
Tube 22	420040	289199	52.3	47.5	57.7	47.8	39.2	43.7	44.1	33.4	37.1	50.0		43.1	45.1	37.9	26.6	
Tube 23	424876	291320	33.5	23.6			24.9	24.5	27.3	31.9	31.9	33.7	31.4	32.2	29.5	24.8	-	
Tube 24	428051	287239	26.2	15.6	27.1	18.0	18.0	15.2	18.0	20.0	17.9	26.0	22.9	24.0	20.7	17.4	-	

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 <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
Tube 25	432733	293402	38.6	27.0	31.1	24.3	22.2	21.5		22.4	25.7	18.3	28.9	29.1	26.3	22.1	-	
Tube 26	432560	293767		25.0		8.8			24.6		27.0	22.7		33.7	23.6	19.4	-	
Tube 27	430940	297759	36.8		26.4	22.4	19.7	18.9	23.1	24.0	24.5		25.8	29.3	25.1	21.1	-	
Tube 28	430717	297825	25.0	12.6	20.8	13.5	12.3	11.5	14.3		18.3	15.6	18.6	25.5	17.1	14.3	-	
Tube 30	430912	297773	37.8	26.1	33.0	25.1	23.5					15.6	18.9	24.5	25.6	18.4	-	
Tube 31	417832	292974	34.6	25.0	32.8	26.4	20.2	18.5	20.0	22.5	22.1	25.6	28.4	35.2	25.9	21.8	-	
Tube 32	417920	293071	48.0	30.2	46.4	34.5	28.5	32.6			36.7	32.9	38.9	38.9	36.7	30.9	-	

☒ **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.TG22**

☐ **Local bias adjustment factor used**

☒ **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 2022 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 2022

North Warwickshire Borough Council has not identified any new sources relating to air quality within the reporting year of 2022.

Additional Air Quality Works Undertaken by North Warwickshire Borough Council During 2022

North Warwickshire Borough Council has not completed any additional works within the reporting year of 2022.

QA/QC of Diffusion Tube Monitoring

Gradko International Ltd were the supplier used for diffusion tubes in 2022 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[13].

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

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 **Error! Reference source not found.**. Annualisation is required for any site with d ata capture less than 75% but greater than 25%.

Tubes 3, 26 and 30 required annualisation as the data capture was less than 75% but greater than 25%. The Diffusion Tube Data Processing Tool Version 3.0 was used to calculate annualisation factors.

Table C.1 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor <Site 1 Name>	Annualisation Factor <Site 2 Name>	Annualisation Factor <Site 3 Name>	Annualisation Factor <Site 4 Name>	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
Tube 3	1.0049	0.9592	1.0099		0.9913	17.1	16.9
Tube 26	1.0070	0.9888	0.9429		0.9796	23.6	23.1
Tube 30	0.8660	0.8502	0.8506		0.8556	25.6	21.9

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 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.TG22 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.2.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	National	06/23	0.84
2021	National	06/22	0.84
2020	National	06/21	0.81
2019	National	03/19	0.92
2018	National	- (1)	0.93

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, 9, 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.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	40.6	9.7	32.6	
Tube 9	2.0	6.0	36.7	9.7	29.8	
Tube 10	2.0	4.0	36.3	10.9	32.2	
Tube 22	2.0	16.0	37.9	14.7	26.6	

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

Figure D.1 – Map of Non-Automatic Monitoring Site

Tube 1 Atherstone

Tube 2 Grendon

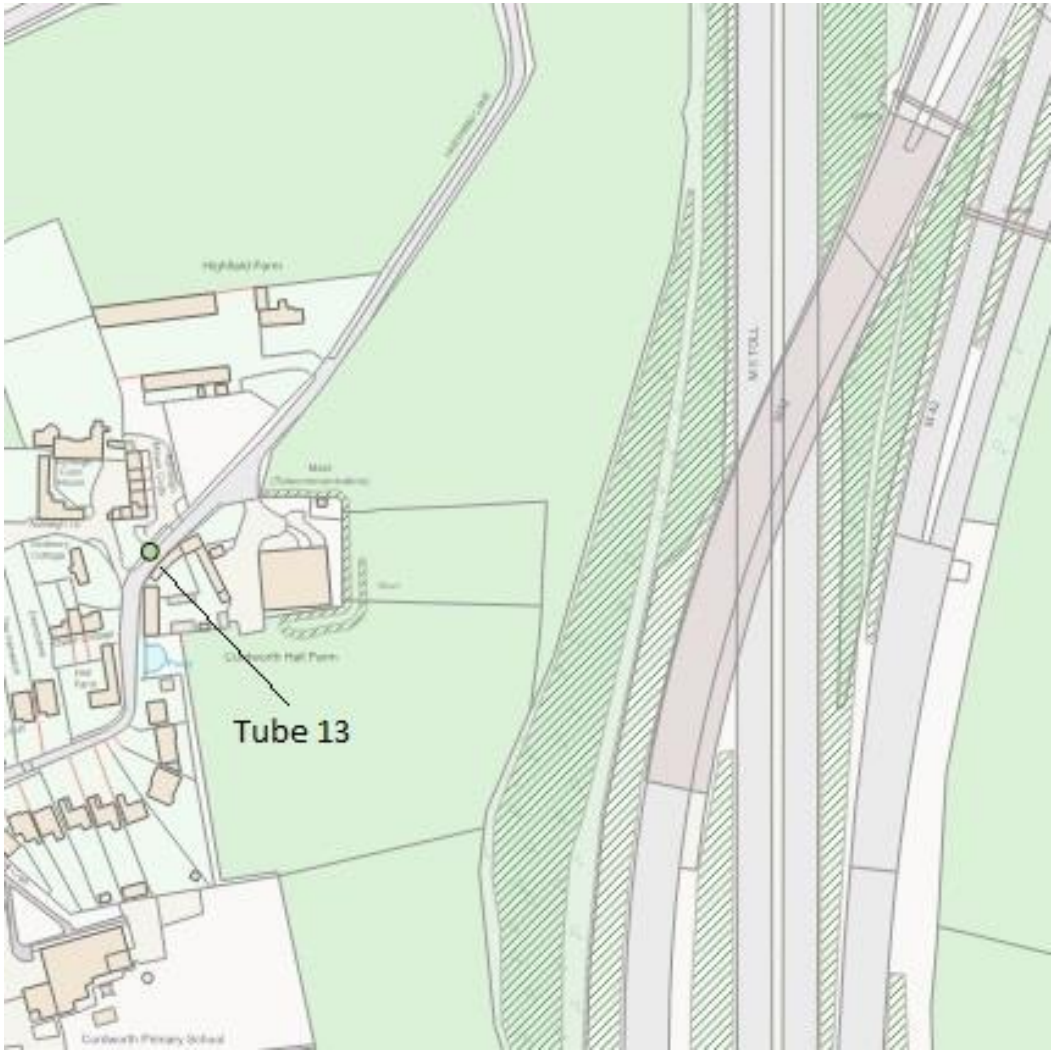
Tube 3 Grendon

Tube 4 Polesworth

Tubes 5 to 11 Dordon

Tube 12 Kingsbury

Tube 13 Curdworth



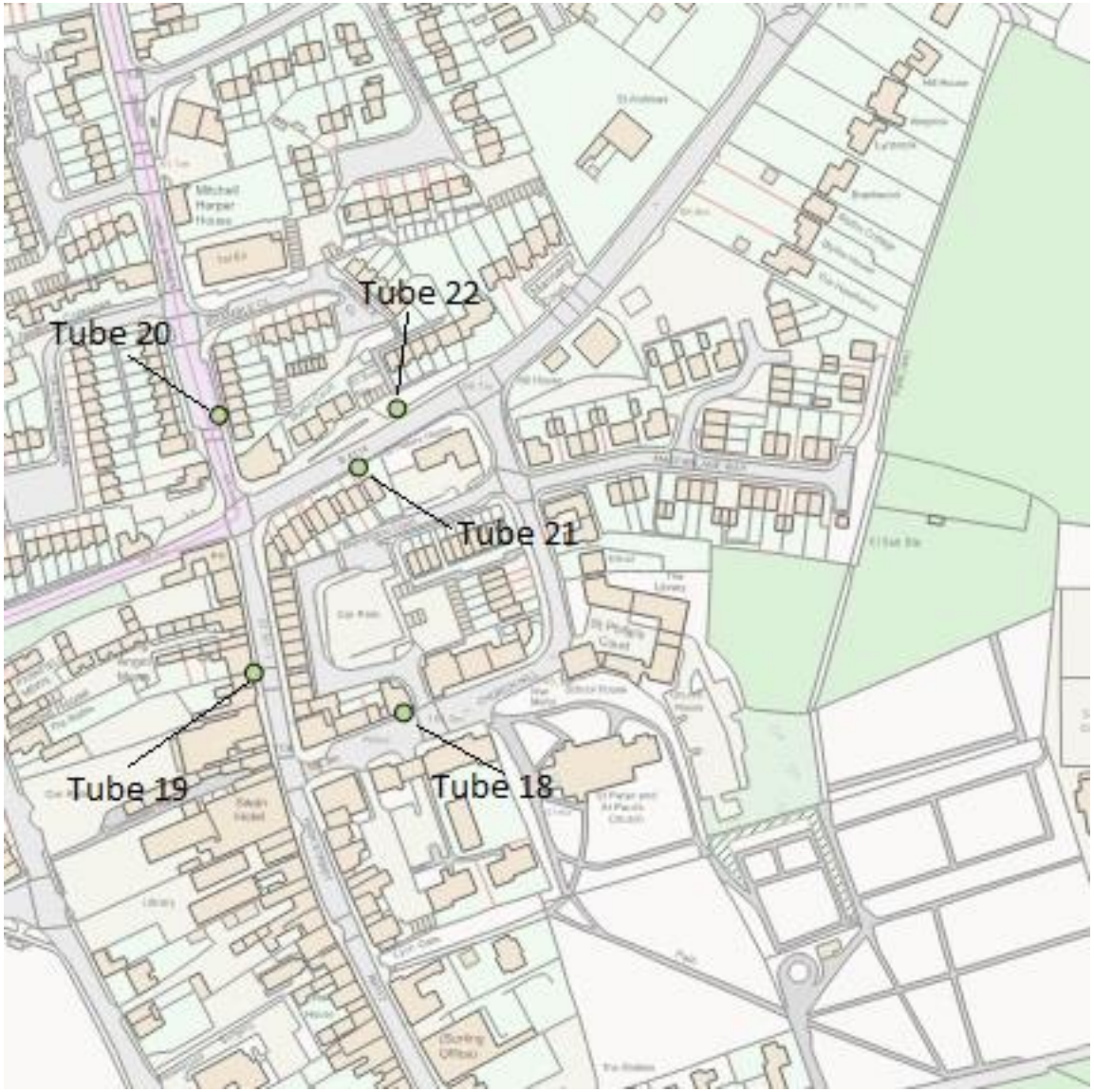
Tube 14 Water Orton

Tube 15 Coleshill

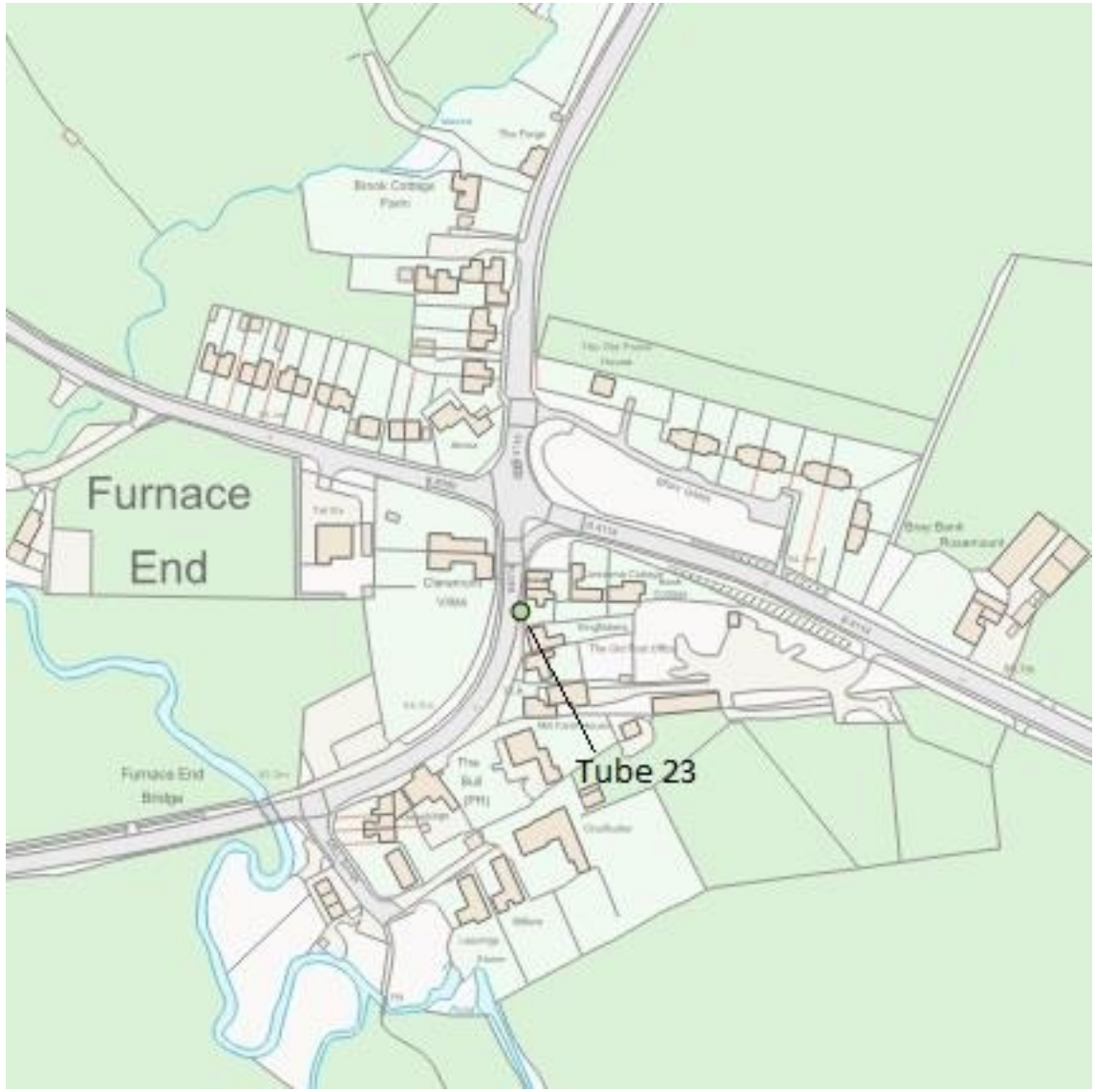
Tube 16 Coleshill

Tube 17 Coleshill

Tubes 18 to 22 Coleshill



Tube 23 Furnace End

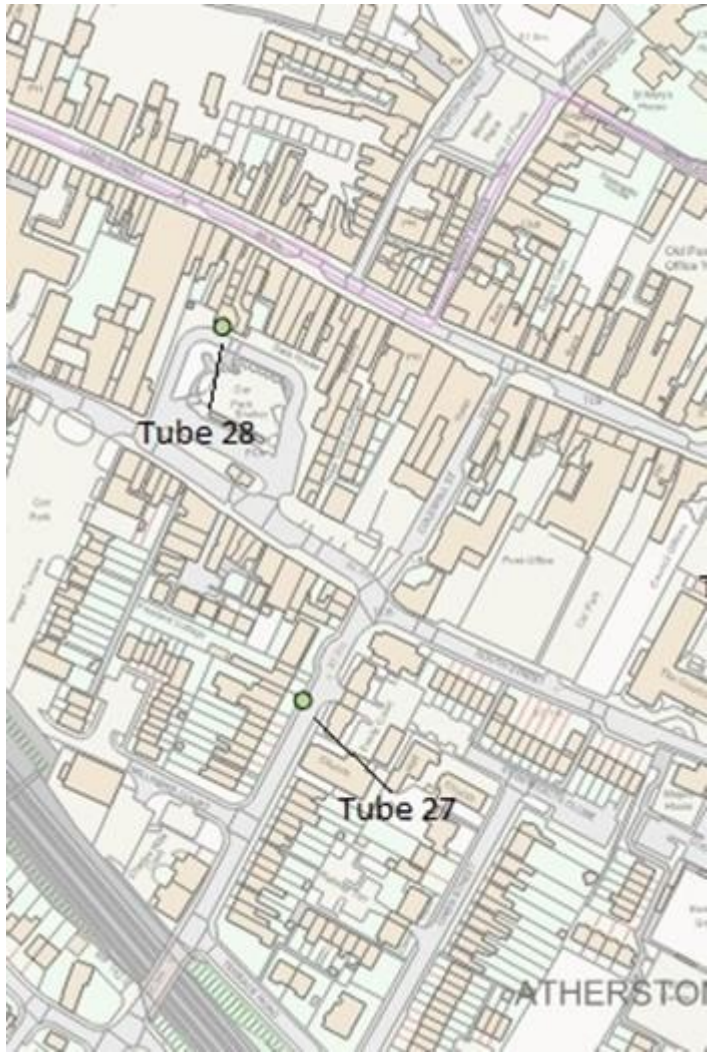


Tube 24 Fillongley

Tube 25 Hartshill

Tube 26 Hartshill

Tube 27 to 28 Atherstone



Tubes 30 and 32 Curdworth

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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