2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: July 2022

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Executive Summary: Air Quality in Our Area

Air Quality in Tewkesbury Borough Council (TBC)

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 main pollutant of concern in Tewkesbury is nitrogen dioxide (NO_2). In December 2008, an Air Quality Management Area (AQMA) was designated for exceedance of the annual mean NO_2 Air Quality Strategy (AQS) objective of 40 µg/m^3. Details of the current AQMA are available online at https://uk-air.defra.gov.uk/aqma/details?aqma_ref=587. This AQMA location has a classic street canyon effect, giving rise to an exceedance of the annual mean AQS objective for the traffic generated pollutant NO_2. Other pollution sources, including commercial, industrial and domestic sources, also make a contribution to background pollution concentrations.

This report covers the monitoring period of 2021. The NO_2 annual mean concentration data is higher than 2020 but on average the levels are generally lower than in 2019. There are some year-to-year variations in concentrations, which are likely due to meteorological influences.

[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 2020

[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

The concentrations are below the threshold for requiring an AQMA, and have been under the threshold of 40 µg/m^3 since 2015. The latest technical guidance suggests that the concentrations should be below the threshold for a period of several years or more before the AQMA is revoked.

In July 2022 TBC Executive Committee approved the revocation of the AQMA, therefore an application will be submitted to revoke from the 1st August 2022. Tewkesbury AQMA Revocation report is presented in Appendix G: AQMA Revocation Assessment.

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[5] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[6] 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 AQMAs are designated due to elevated concentrations heavily influenced by transport emissions.

Following in-depth and extended consultation with all interested parties, an Air Quality Action Plan (AQAP), designed to address emission levels, was submitted to the Department for Environment, Food and Rural Affairs (DEFRA) for consultation in December 2010. The AQAP was approved for submission by Council in June 2011 and re-submitted to DEFRA in September 2011 with comments incorporated into the plan.

The AQAP made two final recommendations as follows:

- 5% reduction in overall traffic; and
- Remove all heavy goods vehicles (HGV's) exceeding 7.5 tonne.

These have been incorporated into traffic plans, introduced by the Gloucestershire County Council (GCC) and forms part of the Tewkesbury Town Master Plan.

[5] Defra. Clean Air Strategy, 2019

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

Highway improvement and safety works to High Street in Tewkesbury started in April 2012 and have been completed. Close scrutiny of the AQMA has continued to monitor the effectiveness of the scheme. The data from the recent monitoring periods, following completion of the improvement works, indicate a downward trend in NO_2.

GCC is responsible for strategies relating to traffic management across the County. Further details of these strategies can be found at http://www.gloucestershire.gov.uk/ltp3. The Overarching Transport Strategy is supported through the following policy documents; Bus, Cycle, Freight, Highways, Rail, and Think Travel.

Air quality issues are also routinely considered in response to planning consultations within the existing policy frame work and where appropriate planning conditions are included to require electric vehicle charging points into new developments and provision for safe storage of cycles. Section 106 agreements are secured where possible for Travel Plans and contributions to off-site mitigation to minimise emissions.

TBC has pledged to go Carbon Neutral by 2030. Moving forward this will evolve into CO2 reducing measures. Currently TBC has installed 4 electric car charging points in order to promote alternative fuels and encourage low emission vehicle take up. TBC is currently replacing its own vehicles with electric alternatives 2 out of 4 have currently been replaced.

As part of the wider adoption of electrification nationally Tewkesbury Borough Council and Gloucestershire County Council are co-ordinating the installation of electric vehicle charging points on streets and in public car parks.

Conclusions and Priorities

All monitored sites met the NO_2 annual mean AQS objective of 40 µg/m^3 in 2021. A sharp decrease was observed in NO_2 concentrations in 2020 at all monitoring locations, which is likely to be principally due to the COVID-19 pandemic and the associated restrictions affecting the local traffic flow. While the NO_2 levels observed have increased from 2020 levels but the levels are still lower than 2019. Although with some legal restrictions in place during early 2021 it is possible that there was some impact on overall NO_2.

It is unlikely that there was an exceedance of the hourly mean AQS objective in the last four years. The NO_2 annual mean concentrations within the existing AQMA have been below the

AQS objective since 2015, which provides a basis to revoke the existing AQMA as per Appendix G: AQMA Revocation Assessment.

Generally, concentrations of NO_2 are steadily declining year on year. This tends to indicate that the actions and measures within the AQAP have had a positive effect.

Priorities for the upcoming year include:

- Continue to monitor NO_2 concentration throughout the borough and consider relocation and/or deployment of additional diffusion tubes to identify areas of concern;
- Support changes to proposed M5 Junction 10 Improvement Scheme (Withybridge), which will help improve access to and from the motorway northbound and southbound to a new link road into Cheltenham;
- Revoke existing AQMA; and
- Continue to keep up to date with statutory reporting.

The main challenge to the improvement of air quality in the borough will be the extent of the on-going recovery phase following COVID-19's impact.

Local Engagement and How to get Involved

Members of the public can take simple measures to help improve air quality, the main ones being, where possible, making short trips and journeys on foot or by bike instead of by car. Traffic congestion can further be reduced by the general public through car sharing or by using public transport including the park and ride buses to access the city centre, although these are subject to social distancing rules.

TBC is part of the wider GCC Sustainable Transport Plan & Fund. This plan aims to achieve a modal shift to public transport, cycling & walking. The Gloucestershire initiative, Thinktravel, provides information and resources for sustainable travel in Gloucestershire. School Streets scheme is one of the schemes run by Thinktravel and aims to reduce volume of traffic outside school and monitor how air quality can impact positively on communities. Tewkesbury CofE Primary School is working with Thinktravel team to assist with the scheme. Further information on the initiative can be found here: www.thinktravel.info

One of the action plan measures is to improve the air quality information on the Council's website. There are ongoing works to provide easily accessible information on air quality, including a 'How you can help' section, which seeks to promote good practice for dust and smoke generating activities such as bonfires and wood fuel burning.

TBC currently provides information on air quality on our website at https://www.tewkesbury.gov.uk/air-quality, which includes the previous air quality reports, NO_2 tube results, information on the AQMA and links to other related information resources.

Further information on air quality can be found on Defra's Local Air Quality Management (LAQM) website.

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Tables

1 Local Air Quality Management

This report provides an overview of air quality in Tewkesbury Borough Council in 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 national Air Quality Strategy (AQS) 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 Tewkesbury Borough Council to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

Air Quality Management Areas

AQMAs are declared when there is an exceedance or likely exceedance of an AQS objective. After declaration, the authority should prepare an AQAP within 12 months setting out measures it intends to put in place in pursuit of compliance with the AQS objectives.

A summary of AQMAs declared by Tewkesbury Borough Council can be found in Table 2.1. The table presents a description of the 1 AQMA that is currently designated within Tewkesbury Borough Council. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMA and also the air quality monitoring locations in relation to the AQMA. The AQS objective pertinent to the current AQMA designation is the NO_2 annual mean.

In July 2022 TBC Executive Committee approved the revocation of the AQMA. An application will be submitted to revoke from the 1st August 2022. This is based on the compliance of the monitoring locations with the relevant AQS objective since 2015 (see Appendix A: Monitoring Results and Appendix G: AQMA Revocation Assessment).

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
Tewkesbury Town Centre AQMA	Declared 05/12/2008	NO_2 Annual Mean	An area encompassing Tewkesbury town centre, including the by-pass	No	41 µg/m^3	25.6 µg/m^3	Action Plan for Tewkesbury Town Centre	www.tewkesbury.gov.uk/airquality

☒ **Tewkesbury Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date.**

☒ **Tewkesbury Borough Council confirm that all current AQAPs have been submitted to Defra through the Report Submission Website.**

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

Defra's appraisal of the last submitted ASR, which was in 2020, concluded that on the basis of the evidence provided the conclusions reached were acceptable for all sources and pollutants. The following comments were made to support the development of future reports:

- Trends are clearly presented and discussed and a robust comparison with air quality objectives is provided.
- The diffusion tube mapping is comprehensive and clearly demonstrates the monitoring network and the AQMA boundaries.
- Annual mean NO2 concentrations have been well below the objective in the Tewkesbury Town Centre AQMA for a number of years and an assessment has been provided that supports the decision to revoke the AQMA. The decision to revoke the AQMA is supported.
- QA/QC procedures have all been applied and evidence of calculations is clear, this is an example of good practice and should be continued in future reports.
- The current AQAP is outdated, however as the AQMA is due to be revoked, there is no expectation to update the AQAP.
- The report includes reference to the Public Health outcomes Framework, this is welcomed and should be included in future ASRs.
- Comments from the previous appraisal were provided and have been addressed.

The Council has reviewed the comments from the previous appraisal report. The Council is proposing the revoke the AQMA based on the compliant NO_2 annual mean concentrations within the AQMA. In July 2022 TBC Executive Committee has approved the revocation of the AQMA as mentioned previously an application will be submitted to revoke from 1st August 2022. An update to AQPA will not be required due to the pending revocation of the AQMA. The Council will consider deployment of additional diffusion tubes to ensure continued compliance.

TBC has taken forward a number of direct measures in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Measures are included within Table 2.2, with the type of measure and the progress TBC has made in

recent years. 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 the Action Plan. Key completed measures are:

- 5% reduction in overall traffic;
- Remove all heavy goods vehicles (HGV's) exceeding 7.5 tonne; and
- Air Quality Action Day.
- Installation of 4 EV charging points
- Replacement of 2 council vehicles from fossil fuel to electric.

TBC's priorities for the coming year are:

- Continue to use air quality measures in TBC Taxi Licensing Policy
- Keep improving the air quality information on the TBC website
- Continue replacement of council vehicles from fossil fuels to electric.
- Continue plans to install public car park and on street electric charging points.
- Proceed with pledge to become carbon neutral by 2030.

Gloucester County Council's (GCC) Local Transport Plan[7] (LTP) (2020- 2041) sets the strategic transport vision for the county to 2041. The LTP is structured around a number of travel corridors, each of which have distinctive transport issues and opportunities set out in six spatial strategies entitled Connecting Place Strategies[8] (CPS), Tewkesbury being one of the CPS.

Policy LTP PD 0.1 – Reducing Transport Carbon Emissions and Adapting to Climate Change, aims to reduce transport carbon emissions by 2045 and improve air quality in the county by addressing travel demand, promoting the use of sustainable modes of transport and the uptake of ultra-low emission vehicles to tackle climate change. Other policies which also have impact on the air quality include: Policy LTP PD0.2 – Local Environmental

[7] Gloucestershire Local Transport Plan (2020-2041). Available at: https://www.gloucestershire.gov.uk/media/2105626/ltp-policy-document-final-v131.pdf

[8] Gloucestershire County Council. Connecting Place Strategies (CPS). Available at: https://www.gloucestershire.gov.uk/transport/gloucestershires-local-transport-plan-2020-2041/connecting-places-strategy-cps-areas-map/

Protection, Policy LTP PD 0.5 Community Health and Wellbeing and Policy LTP PD 1.6 – Transport Interchange Hubs.

The main challenges and barriers to implementation that the Council anticipates facing are likely to be related to the long-term effects of the COVID-19 pandemic which includes resource availability and increased service demands which are anticipated to continue to divert resources for a significant period and the associated short/ medium term financial cost implication of moving towards carbon neutral and electrification.

The measures stated above and in Table 2.2 have already helped achieve compliance in Tewkesbury Town Centre AQMA.

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	5% reduction in overall traffic	Transport Planning and Infrastructure	Other	2008	2013	Gloucestershire County Council	N/A	N/A	N/A	N/A	Implemented	N/A	Traffic volume	Complete	Implemented as part of the Tewkesbury High Street Road Safety Scheme
2	Remove all heavy goods vehicles (HGV's) exceeding 7.5 tonne	Traffic Management	Other	2008	2013	Gloucestershire County Council	N/A	N/A	N/A	N/A	Implemented	N/A	HGV numbers	Complete	Implemented as part of the Tewkesbury High Street Road Safety Scheme
3	Introduce air quality measures into Tewkesbury Borough Council Taxi Licensing Policy	Promoting Low Emission Transport	Taxi Licensing conditions	2018	Ongoing	Tewkesbury Borough Council	N/A	N/A	N/A	N/A	Planning	N/A	Improvement in age and euro standard of vehicles within the taxi fleet	Tewkesbury Borough Council Taxi Licensing Committee hold the final decision to approve the proposed changes	-
4	Air Quality Action Day	Public Information	Other	2018	2018	Tewkesbury Borough Council	N/A	N/A	N/A	N/A	Implemented	N/A	Attendance	Complete	-
5	Improvement of Air Quality information Tewkesbury Borough Council's Website	Public Information	Via the Internet	2018	Ongoing	Tewkesbury Borough Council	N/A	N/A	N/A	N/A	Planning	N/A	Improvements of Air Quality Information on the Council Website including a How you can help section	Delayed due to COVID-19	Improvements made although more work can be done
6	Installed 4 publicly accessible Electric Car Charging Points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2021	2021	Tewkesbury Borough Council & Gloucestershire County Council	N/A	NO	Not Funded	£10k - 50k	Completed	N/A	Usage of charging points	Complete	-
7	Tewkesbury Borough Council has pledged to become carbon neutral by 2030	Other	Other	2021	2030	Tewkesbury Borough Council	N/A	No	Not Funded		Implementation	N/A	Reduction in CO2	Ongoing	-
8	Replacing fossil fuel vehicles with electric vehicles	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	2021	Ongoing	Tewkesbury Borough Council	N/A	No	Not Funded	£10k - 50k	Implementation	N/A	Removing all fossil fuel council used vehicles	Ongoing	2 out of 4 vehicles have been replaced by electric models
9	Installation and utilisation of Electric Vehicle Charge Points in TBC owned public car parks and on street locations.	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2021	Ongoing	Tewkesbury Borough Council & Gloucestershire County Council	N/A	No	Not Funded		Implementation	N/A	Increased number of electric charging points	Ongoing	Cost of installing points

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

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

Particulates $PM_{2.5}$ are very fine particulates which are now considered to be a more significant health risk than the larger particulates PM_{10} (particulate matter with an aerodynamic diameter of 10 µm or less), as they penetrate further into the respiratory system and are less easily dislodged. Recognising this, the UK Public Health Outcomes Framework (PHOF) (Healthy Lives: Healthy People) includes an indicator relating to $PM_{2.5}$. In 2019 Tewkesbury had below the national average for the Public Health Framework Indicator, 'Fraction of mortality attributable to particulate air pollution'. The fractional value was 4.9% for Tewkesbury, lower than the national average[9] of 5.1%. The regional average for the South West region is slightly lower at 4.1%.

$PM_{2.5}$ is not yet incorporated into LAQM regulation within England. As such there is no statutory requirement on local authorities to review and assess $PM_{2.5}$ for LAQM purposes, and while $PM_{2.5}$ monitoring across the UK is desirable given the links to the Public Health Outcomes Framework, it is recognised that monitoring costs can be prohibitive on local authorities. The latest 2016 Technical Guidance suggests local authorities use results from the national network of $PM_{2.5}$ monitors to assess levels, and also provides a nationally derived factor of 0.7 that can be used to estimate $PM_{2.5}$ levels from any particulate PM_{10} monitors that local authorities may have installed.

An Air Quality and Health impact assessment workshop was held on the 16th January 2018 in Gloucestershire. The workshop's aim was to review the relationship between air quality

[9] Public Health Outcome Framework (2019), 'Health Protection'. Available at: https://fingertips.phe.org.uk/static-reports/public-health-outcomes-framework/at-a-glance/E12000009.html?area-name=Tewkesbury

and health in Gloucestershire, in aid of developing approaches to improve local air quality and its impact on the population's health.

The recommendations from the air quality and health system impact assessment are based on a review of the outputs from the process: evidence of relationship between air quality and health; data and epidemiology review for Gloucestershire; evidence review of intervention to improve air quality and/or mitigate its impact on health; and the outputs from the multi-stakeholder workshop. The recommendations were;

- To define a Gloucestershire strategy for air quality and health;
- To develop a model for partnership and collaboration to develop and oversee the agenda;
- To promote clean and accessible public transport;
- To strengthen air quality, health and active transport in planning and transport policies;
- To engage and educate the public on air quality and health;
- The promotion of active travel and interventions to facilitate its uptake;
- To support the uptake of electric vehicle use;
- To improve monitoring and information sharing across Gloucestershire; and
- To review public sector fleet/ contractor fleet to reduce emissions.

TBC is also going to continue to take the following measures to address $PM_{2.5}$:

- Work with GCC to identify area within the Local Transport Plan that will contribute towards a reduction in $PM_{2.5}$; and
- Work with TBC's health and well-being colleagues with a view to identifying and incorporating measures which will contribute towards a reduction in $PM_{2.5}$.

The Environment Act 2021 and the new founded Office of Environmental Protection (OEP) will see several changes in the future. The Environment Act 2021 requires the government to set at least one long-term target in each of the following areas: air quality; water; biodiversity; and resource efficiency and waste reduction. It also requires targets to be set for fine particulate matter (PM2.5).

The OEP will propose targets will deliver environmental outcomes in the areas where there are some of the greatest problems. Further developments and associated guidance in the future from the OEP will help steer what impact relevant targets will have.

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

This section sets out the monitoring undertaken in 2021 TBC and how it compares with the relevant AQS 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.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

There are currently no automatic monitoring sites within Tewkesbury.

3.1.2 Non-Automatic Monitoring Sites

TBC undertook non-automatic (i.e. passive) monitoring of nitrogen dioxide (NO_2) at 18 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.

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 33%), and distance correction. Further details on adjustments are provided in Appendix C.

3.1.3 Nitrogen Dioxide (NO_2)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the AQS objective of 40 µg/m^3. 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 dataset of monthly mean values for 2021 is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Across the monitoring network, all monitoring locations, including within the AQMA, met the NO_2 annual mean AQS objective of 40 µg/m^3. NO_2 levels on average decreased in 2017 and a further small decrease in 2018 but a slight increase on average in 2019. These year-to-year variations in concentrations are likely due to meteorological influences. However, the trend is that the concentrations are steadily declining year on year, as demonstrated in Figure A.1, which tends to indicate that the actions and measures within the Council's AQAP are having a positive effect.

2020 saw large decreases in levels at all sites. The effects of the COVID-19 lockdown and further restrictions have impacted the overall traffic flow, hence the changes.

2021 saw an increase over 2020 levels but on average are lower than 2019 levels. 2021 still saw a few restrictions and changes in law regarding people movement so it is expected that this also had an impact on 2021 levels.

Similarly to 2020 a lower national bias factor of 0.82 also contributed to a lower NO_2 annual mean concentration. A summary of bias adjustment factors used by TBC over the past five years is presented in Table C.1.

There were no recorded instances of annual means greater than 60 µg/m^3, which according to the empirical relationship stated in LAQM.TG(16) indicates that an exceedance of the 1-hour mean AQS objective is also unlikely at these sites.

3.1.4 Particulate Matter (PM_{10})

PM_{10} is currently not monitored in Tewkesbury Borough Council.

3.1.5 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ is currently not monitored in Tewkesbury Borough Council.

3.1.6 Sulphur Dioxide (SO_2)

SO_2 is currently not monitored in Tewkesbury Borough Council.

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)
1N	131 High Street	Roadside	389314	232807	NO_2	Yes, Tewkesbury Town Centre AQMA	0.0	1.5	No	4.0
2N	43 Oldbury Road	Roadside	389399	232788	NO_2	Yes, Tewkesbury Town Centre AQMA	0.0	1.5	No	3.0
5N	13-14 Barton Street	Roadside	389356	232705	NO_2	Yes, Tewkesbury Town Centre AQMA	0.0	1.5	No	4.0
6N	14 High Street	Roadside	389294	232806	NO_2	Yes, Tewkesbury Town Centre AQMA	0.0	1.5	No	4.0
14N	69 Sussex Gardens	Roadside	387915	217389	NO_2	No	0.0	7.0	No	2.0
15N	Comus Bamfurlong	Roadside	389714	221845	NO_2	No	0.0	3.0	No	1.5
16N	15 Withybridge Gardens	Roadside	390461	225544	NO_2	No	5.0	3.0	No	1.5
20N	Snowshill Hill Farm	Rural	412224	233012	NO_2	No	50.0	1.0	No	1.5
35N	21 High Street	Roadside	389283	232769	NO_2	Yes, Tewkesbury Town Centre AQMA	0.0	1.5	No	3.0
37N	101 Church Street	Roadside	389254	232670	NO_2	Yes, Tewkesbury Town Centre AQMA	1.0	2.0	No	3.0
38N	38 High Street	Roadside	389331	232950	NO_2	Yes, Tewkesbury Town Centre AQMA	0.0	1.5	No	3.0
41N	31 Barton St	Roadside	389462	232721	NO_2	Yes, Tewkesbury Town Centre AQMA	0.0	2.0	No	2.5
47N	65 Barton St	Roadside	389400	232600	NO_2	Yes, Tewkesbury Town Centre AQMA	0.0	2.0	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)
50N	3 North Street	Roadside	402476	228456	NO_2	No	0.5	1.5	No	2.0
52N	43 Stocken Close	Roadside	387570	216935	NO_2	No	0.0	12.0	No	2.0
53N	Ashchurch Road	Roadside	393281	233305	NO_2	No	57.0	5.0	No	2.0
55N	Stoke Road, Bishops Cleeve	Roadside	395123	227638	NO_2	No	25.0	5.0	No	1.8
56N	Tewkesbury CofE Primary School	Suburban	389622	232907	NO_2	Yes, Tewkesbury Town Centre AQMA	9.0	3.0	No	1.5

Notes:

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

(2) N/A if not applicable.

Table A.2 – 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)	2017	2018	2019	2020	2021
1N	389314	232807	Roadside	100	100.3	28.6	28.2	29.4	16.7	20.1
2N	389399	232788	Roadside	100	100.3	19.3	20.7	20.6	12.5	12.8
5N	389356	232705	Roadside	100	100.3	22.4	24.2	23.0	15.8	20.1
6N	389294	232806	Roadside	100	100.3	27.5	27.1	27.7	18.7	24.3
14N	387915	217389	Roadside	100	100.3	24.9	26.1	23.6	17.7	18.1
15N	389714	221845	Roadside	100	100.3	26.4	27.1	25.7	14.8	14.7
16N	390461	225544	Roadside	100	100.3	26.0	24.3	22.0	16.7	19.4
20N	412224	233012	Rural	100	100.3	6.0	6.4	5.5	3.9	4.0
35N	389283	232769	Roadside	100	100.3	35.9	32.0	32.3	22.3	25.6
37N	389254	232670	Roadside	91.7	91.2	24.0	22.8	22.7	15.5	18.5
38N	389331	232950	Roadside	100	100.3	26.4	24.5	23.4	16.9	19.0
41N	389462	232721	Roadside	91.7	92.1	34.2	32.9	30.2	20.2	24.9
47N	389400	232600	Roadside	100	100.3	28.9	26.9	27.4	19.1	20.0
50N	402476	228456	Roadside	100	100.3	22.0	22.2	20.4	12.1	14.1
52N	387570	216935	Roadside	100	100.3	25.9	23.4	21.2	16.0	17.0
53N	393281	233305	Roadside	91.7	91.2	22.7	22.0	19.4	14.7	16.1
55N	395123	227638	Roadside	100	100.3	30.9	19.0	18.8	14.3	14.8
56N	389622	232907	Suburban	83.3	84.1	N/A	N/A	N/A	N/A	9.0

☐ **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 AQS objective of 40 µg/m^3 are shown in **bold**.

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

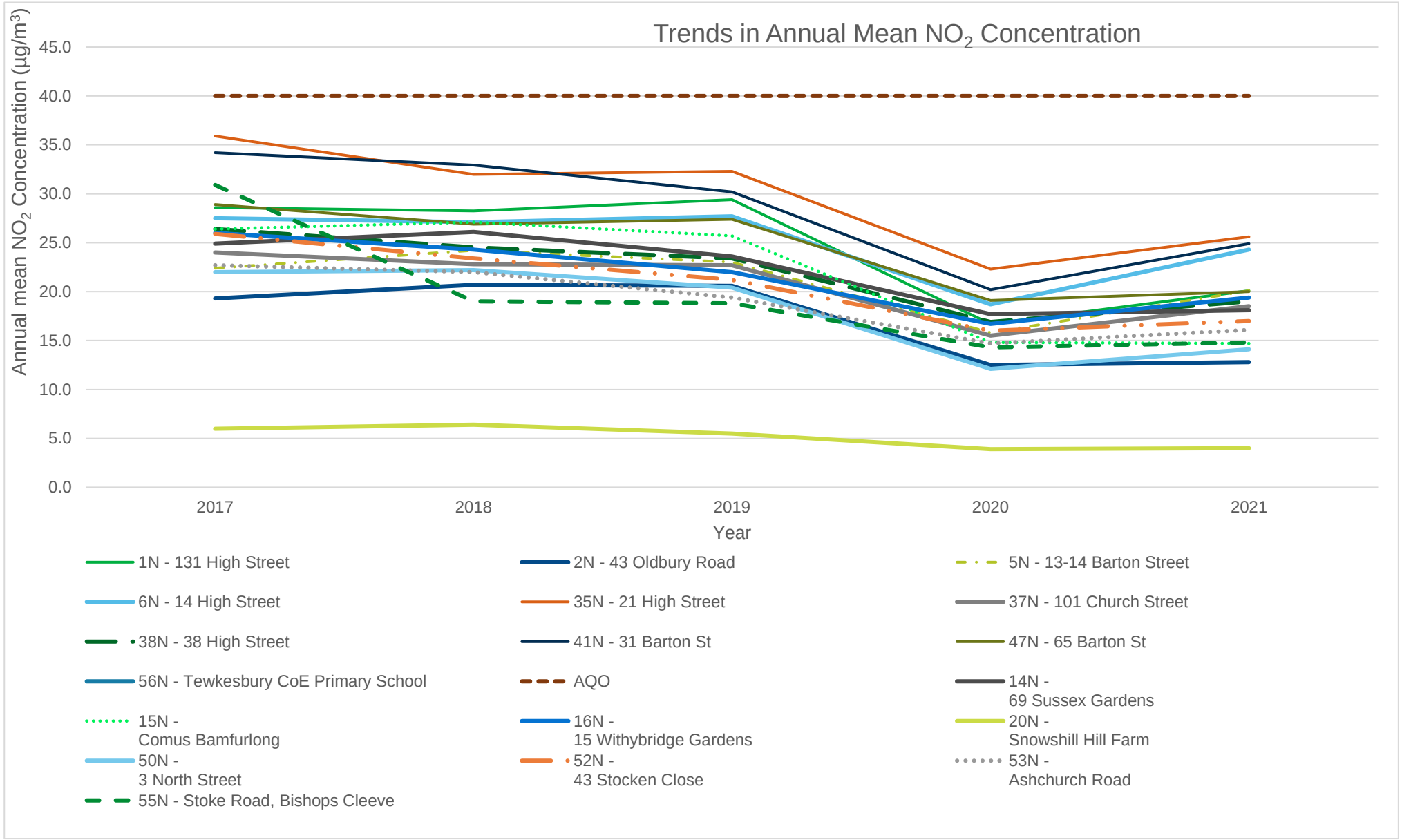
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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



Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m^3)

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 (0.82)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
1N	389314	232807	23.4	23.9	21.2	25.7	24.2	21.1	22.7	21.8	24.4	32.4	27.0	25.7	24.5	20.1	-	-
2N	389399	232788	19.7	17.2	15.0	17.0	12.0	11.6	12.6	12.1	16.3	16.7	20.9	15.8	15.6	12.8	-	-
5N	389356	232705	24.2	27.2	25.2	31.3	23.0	20.5	23.7	21.5	20.8	23.0	29.7	23.3	24.5	20.1	-	-
6N	389294	232806	33.3	28.0	27.7	30.7	26.5	28.5	29.9	26.4	28.9	31.7	36.2	28.6	29.7	24.3	-	-
14N	387915	217389	24.4	19.4	25.3	25.9	17.5	18.6	22.3	19.9	18.9	23.0	28.9	20.3	22.0	18.1	-	-
15N	389714	221845	23.2	14.6	18.9	14.8	34.7	13.0	13.8	12.2	16.8	20.3	11.7	21.1	17.9	14.7	-	-
16N	390461	225544	24.8	21.4	25.4	28.2	20.0	25.5	27.4	24.8	19.2	19.7	28.2	19.1	23.6	19.4	-	-
20N	412224	233012	7.9	7.1	4.2	5.4	3.4	4.1	3.7	4.2	3.7	3.6	6.2	5.7	4.9	4.0	-	-
35N	389283	232769	32.6	28.6	30.6	32.9	29.9	30.9	34.2	26.5	29.9	33.8	36.9	27.3	31.2	25.6	-	-
37N	389254	232670	23.0	23.5	20.4	26.1	21.5		23.6	22.0	21.3	21.2	23.9	22.4	22.6	18.5	-	-
38N	389331	232950	26.8	21.5	21.4	24.1	19.8	20.4	21.4	21.4	23.9	26.7	25.8	24.6	23.2	19.0	-	-
41N	389462	232721	33.5	32.2	32.9		22.6	30.7	33.0	29.6	31.5	28.3	32.6	27.4	30.4	24.9	-	-
47N	389400	232600	29.4	23.3	22.3	18.5	22.6	23.4	23.7	18.6	27.5	29.3	28.4	26.0	24.4	20.0	-	-
50N	402476	228456	17.3	15.2	16.0	21.2	15.4	17.2	20.0	16.3	14.4	13.8	21.7	17.6	17.1	14.1	-	-
52N	387570	216935	22.6	18.5	21.0	22.5	16.6	18.6	22.6	19.6	18.2	20.7	29.4	18.4	20.7	17.0	-	-
53N	393281	233305	22.6	19.6	20.0	23.5	18.7	13.4	19.5		17.8	17.5	27.0	16.8	19.7	16.1	-	-
55N	395123	227638	21.7	20.0	18.0	15.0	12.2	14.4	15.8	12.3	18.9	21.9	24.9	21.9	18.1	14.8	-	-
56N	389622	232907	17.0		11.7		7.0	7.4	8.1	7.5	11.6	13.0	14.6	12.6	11.0	9.0	-	-

☒ **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.**

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

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

☒ **Tewkesbury 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 AQS objective of 40 µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60 µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean AQS 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 Tewkesbury Borough Council in 2021

TBC has not identified any new sources relating to air quality within 2021

Additional Air Quality Works Undertaken by Tewkesbury Borough Council in 2021

TBC has not completed any additional works within 2021

QA/QC of Diffusion Tube Monitoring

All diffusion tubes, in 2021, were from Gradko and used a mixture of 50% TEA in acetone method. Gradko International Ltd is a UKAS accredited laboratory. Gradko participates in the AIR Proficiency Testing (PT) scheme for diffusion tubes, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL), which provides a Quality Assurance / Quality Control (QA/QC) framework for local authorities carrying out diffusion tube monitoring as a part of their local air quality management process.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within this 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_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.

TBC have applied a national bias adjustment factor to each year as TBC does not have local continuous data for local bias adjustment factor calculation. A factor of 0.82 was applied to

2021 monitoring. A summary of bias adjustment factors used by TBC over the past five years is presented in Table C.1.

The national bias adjustment factor 2021 was derived using the Diffusion Tube Bias Adjustment Factors Spreadsheet, the outputs for which are shown in Figure C.1.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	06/22	0.82
2020	National	03/21	0.82
2019	National	03/21	0.89
2018	National	03/21	0.89
2017	National	-	0.96

Figure C.1 DEFRA National Bias Adjustment Output for 2021

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 06/22

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of September 2022

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4:

Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	50% TEA in acetone	2021	UC	Falkirk Council	12	35	34	3.5%	G	**0.97**
Gradko	50% TEA in acetone	2021	UB	Falkirk Council	12	16	13	22.5%	G	**0.82**
Gradko	50% TEA in acetone	2021	SU	Redcar & Cleveland Borough Council	11	14	11	29.2%	G	**0.77**
Gradko	50% TEA in acetone	2021	R	Royal Borough of Windsor and Maidenhead	12	29	26	9.3%	G	**0.91**
Gradko	50% TEA in acetone	2021	R	Royal Borough of Windsor and Maidenhead	11	26	25	7.2%	G	**0.93**
Gradko	50% TEA in acetone	2021	R	Sandwell MBC	12	37	28	31.4%	G	**0.76**
Gradko	50% TEA in Acetone	2021	UB	Sandwell Metropolitan Borough Council	11	23	19	22.2%	G	**0.82**
Gradko	50% TEA in acetone	2021	UB	Middlesbrough	12	18	14	32.6%	G	**0.75**
Gradko	50% TEA in acetone	2021	R	London Borough of Richmond upon Thames	12	24	21	15.1%	G	**0.87**
Gradko	50% TEA in acetone	2021	B	London Borough of Richmond upon Thames	9	16	13	21.5%	G	**0.82**
Gradko	50% TEA in acetone	2021	KS	Marylebone Road Intercomparison	10	52	41	24.2%	G	**0.81**
Gradko	50% TEA in acetone	2021	R	Reading Borough Council	12	30	26	15.9%	G	**0.86**
Gradko	50% TEA in acetone	2021	R	Merton Council	9	50	32	55.4%	G	**0.64**
Gradko	50% TEA in acetone	2021	UB	Wandsworth Council	11	29	26	9.8%	G	**0.91**
Gradko	50% TEA in acetone	2021	R	LB Newham	11	29	23	26.6%	G	**0.79**
Gradko	50% TEA in acetone	2021	KS	London Borough of Croydon	12	48	39	23.4%	G	**0.81**
Gradko	50% TEA in acetone	2021		**Overall Factor[3] (16 studies)**				**Use**		**0.82**

NO_2 Fall-off with Distance from the Road

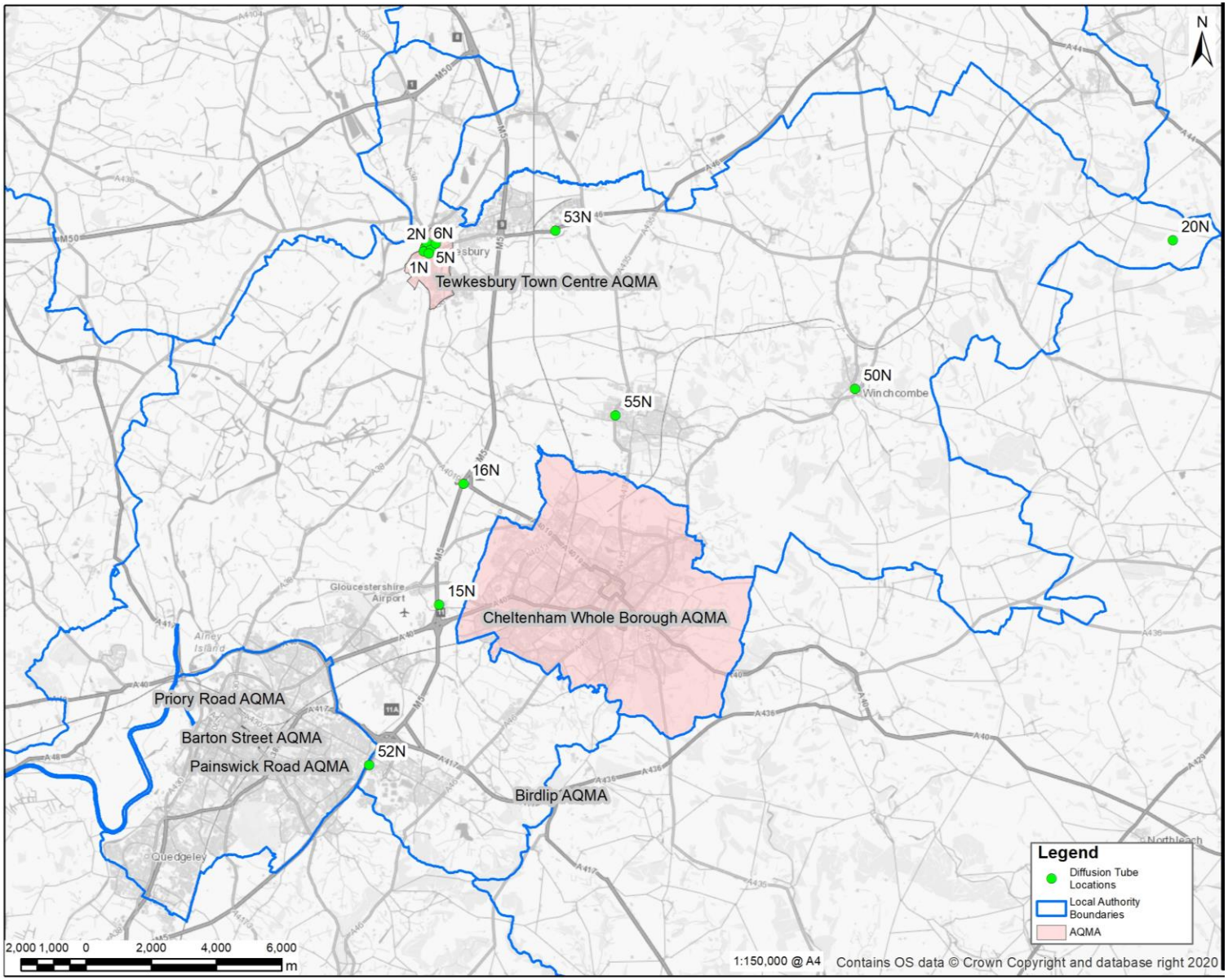
Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website.

No NO_2 monitoring locations within Tewkesbury Borough Council required distance correction in 2021 as all were well below 36 µ

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

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

Figure D.2 – Map of Non-Automatic Monitoring Site- Wider Area



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[10]

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

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

Appendix F: Continued 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. Defra 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 AQS objective for NO_2 is considered unlikely.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[11] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which represents an absolute reduction of between 10 to 20 µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK.

2021 levels are higher than 2020 levels but on average lower than 2019 levels. This could be due to a number of reasons, such as overall lower traffic levels, changes in behaviour as well as meteorological conditions.

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

[11] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

Impacts of COVID-19 on Air Quality within Tewkesbury Borough Council

Impact of COVID-19 on TBC's local air quality include:

- Early 2021 England went into lockdown so this could have had an impact of NO_2.
- Although COVID-19 restrictions changed substantially throughout 2021 it is possible that the restrictions and government advice had a longer term travel impact so 2021 may not be a true reflection of air quality trends.

Opportunities Presented by COVID-19 upon LAQM within Tewkesbury Borough Council

Opportunity emerged as a consequence of COVID-19 include:

- Pandemic restrictions and lockdown caused lowered traffic flows and in turn caused lower NO_2 concentrations which had positive impacts on the local air quality. The NO_2 concentrations were already below the threshold before the pandemic but the data shows how low these can be further improved if the reduced traffic continues.

No adjustments have been made to the 2021 data as there was only minimal gaps in the records. These were due to loss of tube to vandalism, spiders in the tube or collapse of the holder. Therefore, no annualisation adjustments are required. Table F.1 demonstrates the criteria should data adjustments be required in like 2020.

Table F.1 - Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: High
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

Appendix G: AQMA Revocation Assessment

This appendix provides an assessment of air quality in the Tewkesbury Town Centre AQMA and presents the evidence to support its revocation.

Consideration will be given to:

- The monitoring data obtained over a number of years within the AQMA;
- The projected roadside NO_2 concentration;
- Local and national trends in NO_2 emissions; and
- Local and regional factors that may impact on the AQMA.

Review & Assessment

Part IV of the Environment Act 1995 (the Act) introduced the Local Air Quality Management regime that places a legal duty on local authorities to regularly review and assess air quality in their areas against AQS objective levels. The AQS objective levels for England are set out in the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002 and are shown in Table E.1.

Local authorities must declare an AQMA where any of the AQS objectives are exceeded and subsequently set out the measures they intend to put in place to secure compliance with the AQS objectives under an AQAP.

With effective implementation of the Action Plan and national policies aimed at reducing the emission of pollutants it is expected that the air quality within AQMAs should improve to a point that concentrations will remain below the AQS objectives. A revocation of an AQMA can then be formally declared by Order under section 83 of the Environment Act.

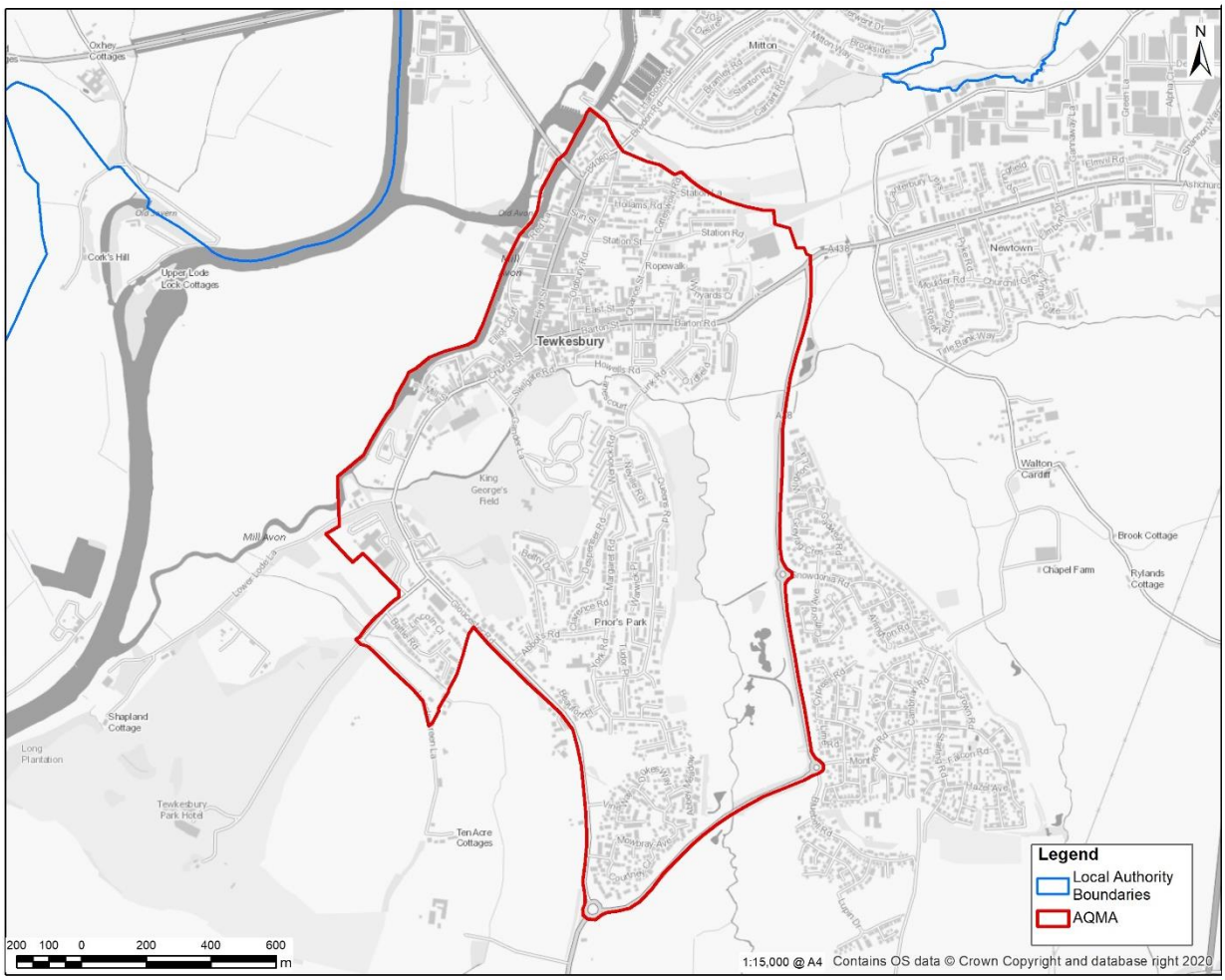
Each year an ASR must be prepared by local authorities detailing the strategies employed to improve air quality and any progress that has been made. Comments made by Defra in relation to Tewkesbury's ASR 2020 support the Council's plans to revoke Tewkesbury Town Centre AQMA, if pollution levels remain more than 10% below the AQS objective.

Tewkesbury Town Centre AQMA

Tewkesbury Town Centre AQMA was declared in 2008 in order to address traffic related NO_2 concentrations in excess of the annual mean AQS objective. The AQMA encompasses

Tewkesbury town centre, along with area enclosed by A438 in the north, Gloucester Road on the west and A38 in the south and east (Figure G.1).

Figure G.1 Tewkesbury Town Centre AQMA



Revoking an AQMA: The Legal Framework & Guidance

The Environment Act 1995

Section 83 (2b) of the Environment Act (1995) states that an AQMA:

"…..may, as a result of a subsequent air quality review, be revoked by such an order, if it appears on that subsequent air quality review that the air quality standards and objectives are being achieved, and are likely throughout the relevant period to be achieved, within the designated area".

Statutory Guidance

Guidance on the requirements for revoking an AQMA are set out in statutory guidance LAQM PG16 and LAQM TG 16.

PG 16 states that:

- *"An AQMA can be revoked where a review demonstrates that air quality objectives are being met and will continue to do so. The guidance suggests that monitoring results should have been below national objective levels for 3 years or more prior to revocation.*
- *A copy of the revocation should be submitted to Defra and other statutory consultees and made publicly available to ensure the public and local businesses are aware of the situation. It is expected that the local authority will take the relevant action imposed by the Order within four months following receipt of comments from Defra."*

TG 16 states that:

- *"In some instances detailed modelling to revoke an AQMA may not be necessary and an AQMA may be amended or revoked following a screening assessment or on the basis of robust monitoring evidence.*
- *Pollutant concentrations may vary significantly from one year to the next, due to the influence of meteorological conditions, and it is important that authorities avoid cycling between declaring, revoking and declaring again, due simply to these variations."*

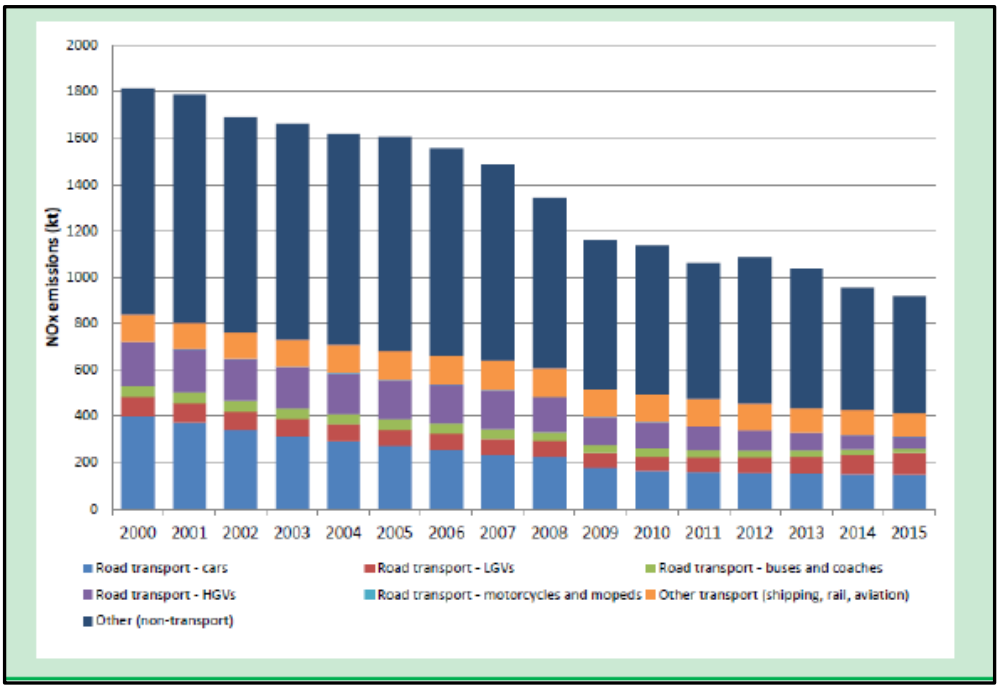
Therefore, before revoking an AQMA on the basis of measured pollutant concentrations, the Council needs to be reasonably certain that any future exceedances (that might occur in more adverse meteorological conditions) are unlikely. For this reason, it is expected that authorities will need to consider measurements carried out over several years or more, national trends in emissions, as well as local factors that may affect the AQMA, including measures introduced as part of the AQAP, together with information from national monitoring on high and low pollution years.

National Influence

National strategies, policies and plans have and will continue to influence local polluting emissions. Total UK emissions of NO_x fell by almost 70% between 1970 and 2015 and by

over 19% between 2010 and 2015[12]. Figure G.2 shows the reduction for each source sector with cars having the largest proportion of transport emissions. It also shows an increasing proportion of Light Goods Vehical (LGV) emissions from 2010 above that of 2000 which mirrors the increasing proportion of LGVs in the local traffic fleet.

Figure G.2 Annual UK Nitrogen Oxides Emissions Since 2000



Future influence on emissions is considered in a revised Clean Air Strategy[5] with a major transport emission objective that states:

"*We will end the sale of new conventional petrol and diesel cars and vans by 2040. We will position the UK as the best place in the world to develop, manufacture and use zero exhaust emissions vehicles and, during the transition, we will ensure that the cleanest conventional vehicles are driven on our roads'".*

This transition to ultra-low and zero emission vehicles present the largest reductions in future polluting emissions.

[12] DEFRA, July 2017 'UK Plans for Tackling Roadside NO_2 Concentrations'

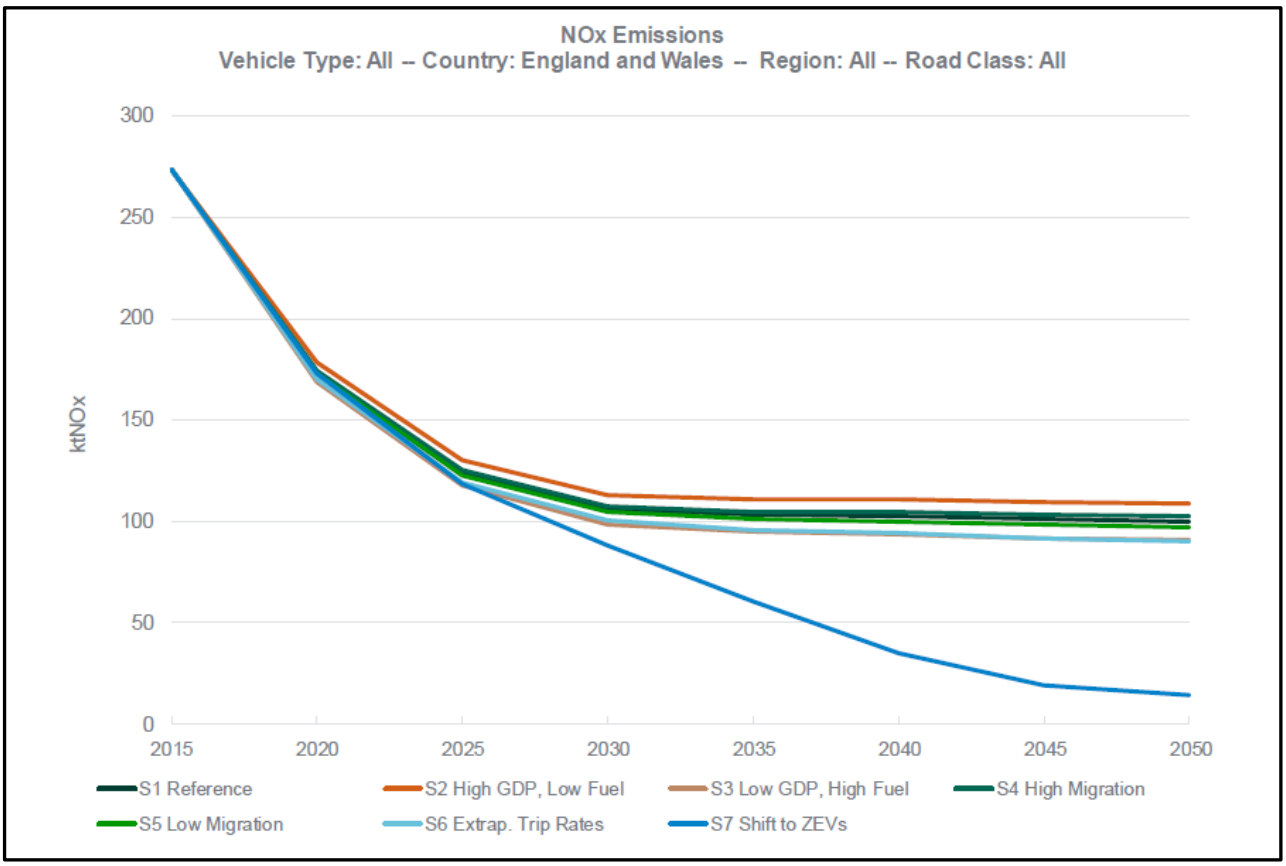
Department for Transport (DfT) road traffic forecasts[13] provide future numbers, compositions and emissions based on seven scenarios linked to changing population, economic and social well-being and technological changes. The findings include:

- From 2015, traffic is forecast to grow by between 17% and 51% by 2050;
- Traffic growth on the Strategic Road Network (SRN) ranges between growth of 32% and 66% by 2050;
- Forecast growth on principal roads and minor roads is between 10%-47% and 11%-50% respectively;
- Car traffic is forecast to grow between 11% and 48% by 2050, whilst LGV traffic is forecast to continue growing significantly in all scenarios (between 23% and 108%);
- HGV traffic growth is forecast to be lower than other vehicle types, with growth ranging from 5% to 12% by 2050;
- Congestion is forecast to grow as a result of increases in traffic. The proportion of traffic in congested conditions in 2050 is forecast to range from 8% to 16% depending on the scenario, compared to 7% in 2015; and
- 'There is great uncertainty around the possible impact of transport technology on road traffic demand and it is unclear how far our existing understanding of the drivers of demand will continue to apply'.

In terms of future transport emissions, the national transport model (NTM) produces forecasts of emissions of Carbon Dioxide (CO_2), NO_x and PM_{10} measured at the tailpipe (though this does not capture any upstream emissions produced) as shown in Figure G.3. Scenarios 1-6 take account of the impact of committed transport policies to reduce emissions from road travel whilst scenario 7 assumes a higher level of ULEV uptake, assuming 97% of cars and LGVs are ZEVs by 2050 and almost all cars and LGVs sold from 2040 have zero emissions at tailpipe. For NO_x emissions the forecast shows a decline of between 60% and 95% by 2050 (Figure G.3). Despite the predicted increase in vehicle numbers the introduction of low emission vehicles is likely to lead to continued reduction in NO_2 levels from transport.

[13] Department for Transport (DfT), July 2018 'Road Traffic Forecast 2018 Moving Britain Forward'

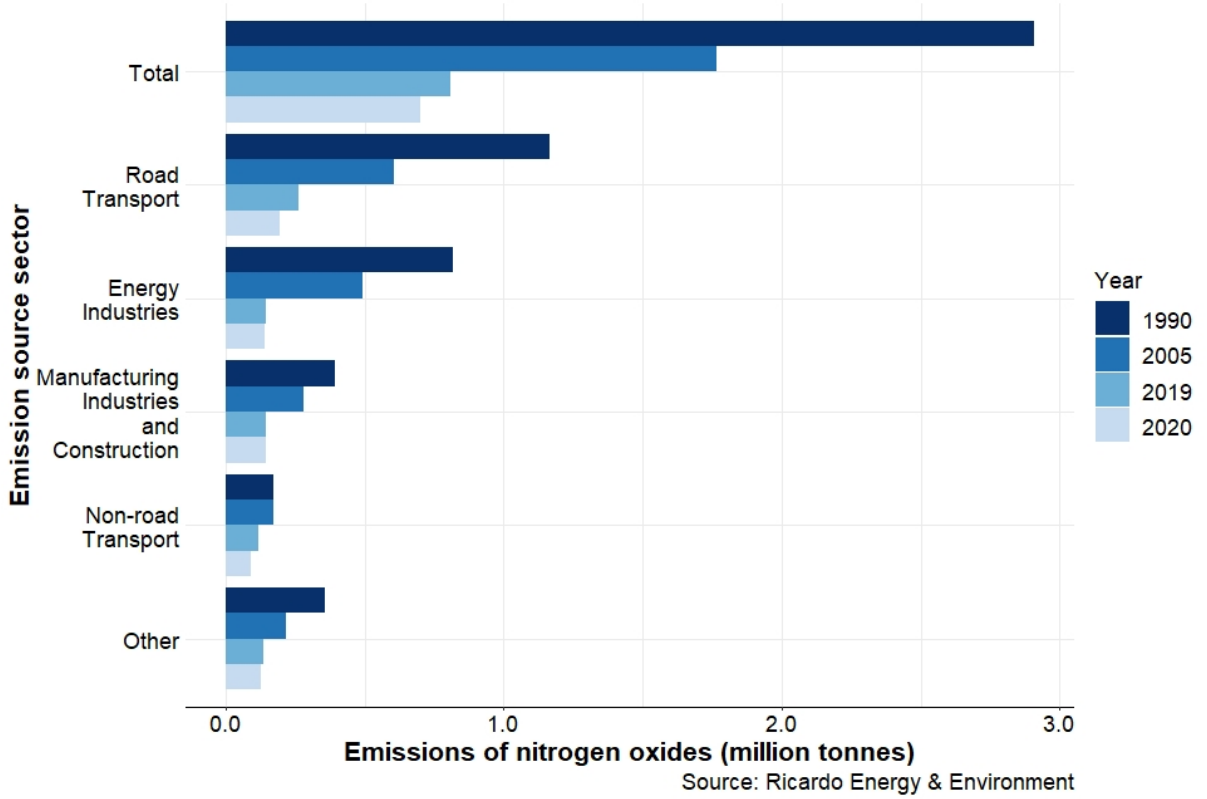
Figure G.3 Forecast NO_x Road Traffic Emissions for England & Wales (kt)



Road transport accounted for 28 per cent of emissions of nitrogen oxides in the UK in 2020, and other forms of transport (aviation, rail, and shipping) accounted for 13 per cent. There is a downward trend in emissions from road transport due to the replacement of older vehicles in the vehicle fleet with newer vehicles that meet stricter emissions standards. Annual emissions from road transport have fallen by 67 per cent between 2005 and 2020 (Figure G4), and other forms of transport have reduced annual emissions by 46 per cent over the same period[14]

[14]Concentrations of nitrogen dioxide. Available at: https://www.gov.uk/government/statistics/air-quality-statistics/ntrogen-dioxide

Figure G.4 UK annual emissions of nitrogen oxides by 2020 major emissions sources: 1990, 2005, 2019 and 2020



In 2021, the annual mean NO2 concentration at the roadside increased by an average of 1.9 µg/m^3, rising by 8% from 2020. This is likely a result of increased road traffic following the removal of lockdown restrictions. Concentrations are still 20% lower than concentrations in 2019, after falling to the lowest point in the time series in 2020.

Throughout 2021, monthly mean concentrations of NO2 at roadside monitoring sites were consistently lower than the 2017-2019 average. Between February and October 2021, concentrations of NO2 at roadside monitoring sites were on average 14% higher than concentrations throughout the same period in 2020. This is likely a result of increased road traffic following the removal of lockdown restrictions.

For the remaining months in 2021, concentrations were at similar levels to 2020, though in December 2021, concentrations fell below the 2020 average for the same period. This

may be partially explained by strong westerly winds throughout December 2021, blowing clean air into the UK from the Atlantic[15].

Regional Influence

Gloucester County Council's (GCC) Local Transport Plan[7] (LTP) (2020- 2041) sets the strategic transport vision for the county to 2041. The LTP is structured around a number of travel corridors, each of which have distinctive transport issues and opportunities set out in six spatial strategies entitled Connecting Place Strategies[8] (CPS), Tewkesbury being one of the CPS.

A 'Link and Place' Spectrum[16] approach was applied with the aim to identify travel focused strategy areas based on connections, moving away from a district based perspective. Each CPS area sets out priorities based on strategic, major and local schemes. LTP schemes represent the transport priorities for Gloucestershire and into bordering counties, rather than a commitment by the County Council to funding. Priorities identified in this LTP provide the basis for future funding bids, as opportunities arise, and discussions with funding partners, such as government, Gloucestershire Local Enterprise Partnership (GFirst LEP), Public Health, statutory bodies, transport operators, District Councils, Parish & Town Councils, developers and the private sector.

Policy LTP PD 0.1 – Reducing Transport Carbon Emissions and Adapting to Climate Change, aims to reduce transport carbon emissions by 2045 and improve air quality in the county by addressing travel demand, promoting the use of sustainable modes of transport and the uptake of ultra-low emission vehicles to tackle climate change.

Some of the measures proposed by Policy LTP PD 0.1 include:

- Work in partnership with District Councils, neighbouring authorities, the GFirst LEP, Western Gateway Sub-National Transport Body, Highways England, Homes England and Department for Transport and any other necessary government bodies, to seek

[15]Emissions of air pollutants in the UK – Nitrogen oxides (NOx). Available at https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-nitrogen-oxides-nox

[16] Gloucestershire County Council. Annex 4.0 Gloucestershire Local Transport Plan- Link and Place Spectrum.. Available at: https://www.gloucestershire.gov.uk/media/2103355/annex-40-ltp-link-and-place-spectrum-final-v10.pdf

investment in sustainable transport and active travel infrastructure as funding opportunities arise.

- Work towards electric vehicle charging points being provided at interchange hubs and other key locations.
- Work with public transport providers to accelerate the change to clean vehicles.
- Encourage behaviour change to reduce travel demand, promote sustainable transport modes and develop lower-emission driving. This will align closely with our policy of influencing travel behaviour change through the Thinktravel programme.
- Resolve to implement and strengthen the Gloucestershire Sustainable Energy Strategy and the Climate Change Strategy, by embedding the principles of a transition towards a circular economy.
- Resolve to deliver on the recommendations following the County Council's declaration of a climate change emergency, through the development of a 'Carbon Reduction Pathway', and by identifying a climate change resilience adaptation strategy including risk mitigation.
- Develop and maintain a comprehensive bus network supported by interchange hubs across rural and urban areas, to improve connectivity within and across the county boundary.
- Developers are required to design and implement their development to deliver sustainable transport, with appropriate connectivity to the existing transport network, good access to public transport, and a high permeability to walk, cycle and be mobility friendly.

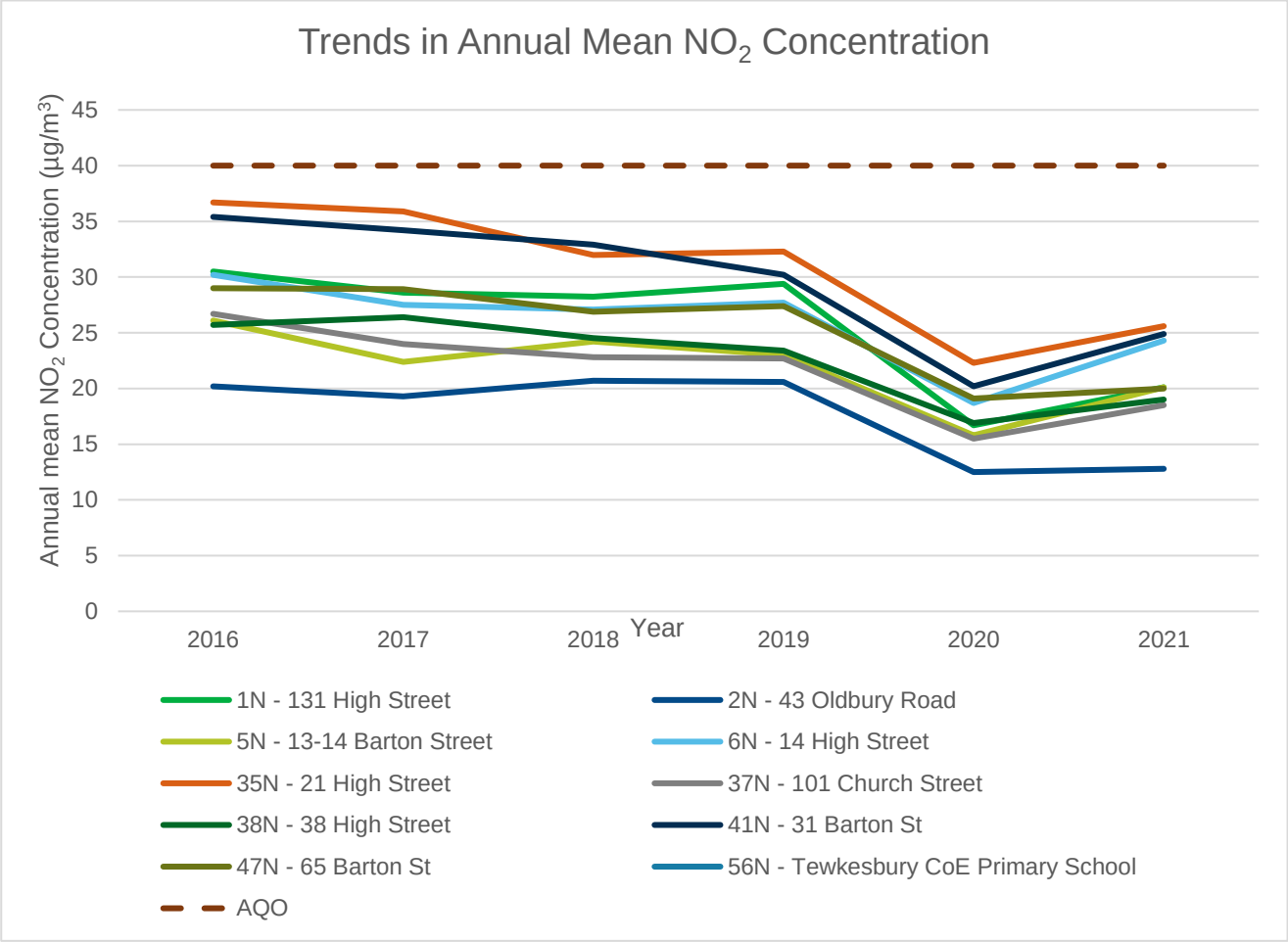
Other policies which also have impact on the air quality include: Policy LTP PD0.2 – Local Environmental Protection, Policy LTP PD 0.5 Community Health and Wellbeing and Policy LTP PD 1.6 – Transport Interchange Hubs.

Air Quality within Tewkesbury Town Centre AQMA

A comparison of the annual mean AQS objective for NO_2 against the ratified monitoring results for the past 6 years from the diffusion tubes located within Tewkesbury Town Centre AQMA can be seen in

Figure G.4.

Figure G.4 Tewkesbury Town Centre AQMA NO_2 Diffusion Tube Monitoring Trend



As can be seen from

Figure G.4, NO_2 results from the nine monitoring locations within the AQMA have been consistently below the annual mean AQS objective of 40 µg/m³ for 6 straight years. Furthermore, given that the concentrations have consistently been below 60 µg/m³ it is safe to assume that the hourly mean AQS objective has also not been exceeded during this period.

Predicted Trends

To provide confidence that compliance with the objective will continue into the future, and to account for the potentially anomalous concentrations monitored within 2020 and the potential impact of various restrictions throughout 2021, DEFRA's Roadside NO_2 Projection

factors[17] (Table G.2) have been used, based on the 2019 monitoring data, to predict concentrations for future years (2021-2025). The adjustment factors applied for Tewkesbury were the 'Rest of UK HDV=<10%'. The projected results for the diffusion tube locations within the AQMA are presented in Table G.1.

Table G.1 Projected Annual NO_2 mean concentration

Site	Monitored Annual NO_2 mean concentration ($\mu g/m^3$)	Projected Annual NO_2 mean concentration ($\mu g/m^3$)				
	2019	2021	2022	2023	2024	2025
1N-131 High Street	29.4	26.3	24.9	23.6	22.3	21.1
2N-43 Oldbury Road	20.6	18.5	17.5	16.6	15.7	14.8
5N-13-14 Barton Street	23.0	20.7	19.5	18.5	17.5	16.6
6N-14 High Street	27.7	24.8	23.5	22.2	21.0	19.9
35N-21 High Street	32.3	29.0	27.4	25.9	24.5	23.3
37N-101 Church Street	22.7	20.3	19.2	18.2	17.2	16.3
38N-38 High Street	23.4	21.0	19.8	18.8	17.8	16.9
41N-31 Barton St	30.2	27.1	25.6	24.3	23.0	21.8
47N-65 Barton St	27.4	24.6	23.2	22.0	20.9	19.8

From Table G.1, it can be observed that the forecasted concentrations of NO_2 decrease over the five year period. The Government's commitment to net zero emissions by 2050 and the adoption of the Road to Zero transport strategy are expected to deliver significant further reductions in emissions from road transport. In its publication "Road Traffic Forecasts

[17] DEFRA Roadside No2 Projection Factors. Available at: https://laqm.defra.gov.uk/tools-monitoring-data/roadside-no2-projection-factor.html

2018"[18] the Department of Transport has predicted that vehicular emissions of NO_2 will fall between 60% and 90%. In turn, this provides confidence that the Tewkesbury Town Centre AQMA can be revoked without concern that the objective concentration will be exceeded, unless significant new sources arise, at which point the NO_2 concentrations will be assessed again. The Council will continue its existing monitoring regime in order to observe this.

Table G.2 DEFRA's Roadside NO_2 Projection Factors

Projecting Annual Mean Roadside NO_2 Concentrations to Future Years						
	Adjustment Factor to be Applied					Worked Example
Year	Central London	Inner London	Outer London	Rest of UK (HDV = <10%)	Rest of UK (HDV >10%)	
2018	1.000	1.000	1.000	1.000	1.000	The measured NO_2 concentration at a roadside site in Outer London in 2019 is 44.5µg/m^3. The projected concentration for 2021 would be: 44.5 x (0.829/0.945) = 39.0µg/m^3. Roadside locations are typically within 1 to 5 metres of the kerbside, but may extend up to 15 metres depending upon the road configuration and traffic flow.
2019	0.813	0.909	0.945	0.953	0.942	
2020	0.766	0.811	0.878	0.906	0.889	
2021	0.740	0.767	0.829	0.855	0.835	
2022	0.715	0.727	0.775	0.807	0.785	
2023	0.696	0.693	0.738	0.765	0.743	
2024	0.676	0.661	0.695	0.724	0.703	
2025	0.660	0.634	0.657	0.686	0.667	
2026	0.652	0.616	0.630	0.653	0.637	
2027	0.645	0.598	0.606	0.622	0.610	
2028	0.638	0.580	0.582	0.595	0.587	
2029	0.632	0.563	0.560	0.571	0.566	
2030	0.626	0.546	0.542	0.550	0.549	

[18] Department of Transport. Road Traffic Forecasts 2018. Available at: https://www.gov.uk/government/publications/road-traffic-forecasts-2018

Summary, Conclusion and Recommendation

This assessment sets out the evidence relied upon by TBC in seeking to revoke the Tewkesbury Town Centre AQMA.

Part IV of the Environment Act 1995 requires Local Authorities to review air quality in its area and assess whether AQS objectives will be achieved. Where it has been shown that the AQS objectives will not be achieved Local Authorities must declare an AQMA and put an AQAP in place to bring air quality within acceptable levels.

Where it can be subsequently demonstrated that AQS objectives are being and will continue to be met a Local Authority can revoke an AQMA by Order under the Environment Act 1995.

The Tewkesbury Town Centre AQMA was designated in 2008 following exceedance of the annual mean NO_2 AQS objective linked to emissions from road traffic. Since that time, monitoring has shown a continued reduction in pollutant values and concentrations have now been consistently below the AQS objectives for a number of years.

National, regional and local policies have influenced the reduction in polluting emissions within the AQMA and it is reasonable to expect that further reductions will be achieved through the increasing use of ultra-low and zero emission vehicles.

Having considered the historical monitoring data associated with the Tewkesbury Town Centre AQMA, national trends in emissions and any likely impacts on the air quality within the AQMA the Council is satisfied that the AQMA can be revoked. Whilst NO_2 concentrations within the Tewkesbury AQMA have been consistently below the AQS objective concentration for 6 years, it has also been demonstrated that this is likely to continue into the future.

The Tewkesbury Town Centre AQMA be revoked at the earliest opportunity. A draft Revocation Order is presented in Appendix H: Draft AQMA Revocation Order, which provided DEFRA grants approval via the appraisal process, will be on the 1st August 2022.

Appendix H: Draft AQMA Revocation Order

Tewkesbury Borough Council Order 2021

Environment Act 1995 Part IV Section 83(2)(b)

Order Revoking an Air Quality Management Area

Tewkesbury Borough Council, in exercise of the powers conferred on it by Section 83(2)(b) of the Environment Act 1995 hereby makes the following order:

1. This Order shall revoke the area known as the Tewkesbury Town Centre AQMA (as shown in the attached map) declared for the Nitrogen dioxide (NO_2) - Annual Mean on 05/12/2008.
2. This Order shall come into force on 1st August 2022.

The Common Seal of Tewkesbury Borough Council

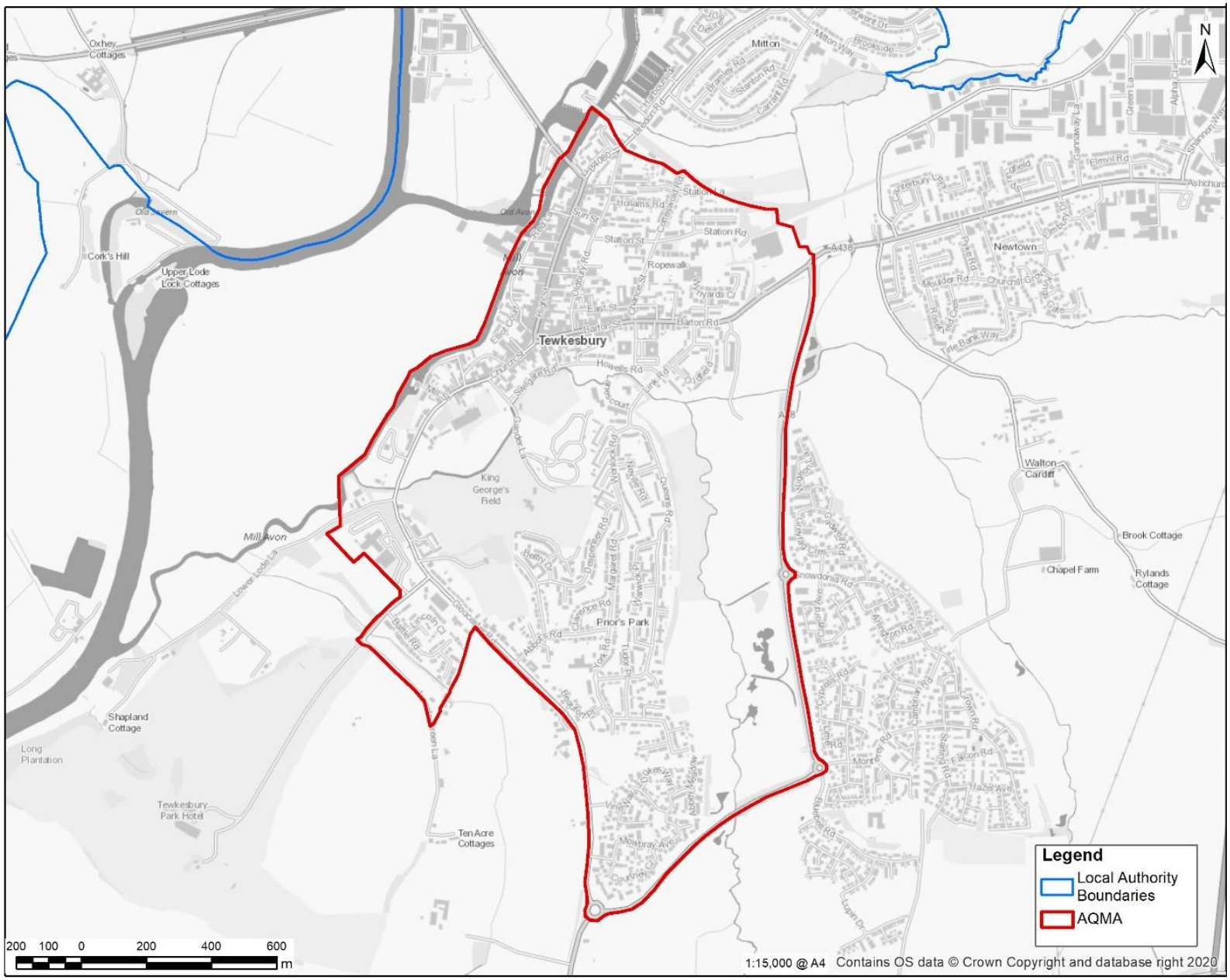
Was hereunto affixed

In the presence of:

……..

Dated:

……..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Local Authority Boundaries
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Mitton
Newtown
Walton Cardiff
Prior's Park
King George's Field
Mill Avon
Old Avon
A438
A38
Oxhey Cottages
Cork's Hill
Upper Lode Lock Cottages
Shapland Cottage
Long Plantation
Tewkesbury Park Hotel
Ten Acre Cottages
Brook Cottage
Chapel Farm
Rylands Cottage

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'
AQEG	Air Quality Expert Group
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
AURN	Automatic Urban and Rural Network
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
GCC	Gloucestershire County Council
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PHOF	Public Health Outcomes Framework
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
TBC	Tewkesbury Borough Council

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