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: September 2023

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Executive Summary: Air Quality in Our Area

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].

Air Quality in Tewkesbury Borough Council (TBC)

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. However, due to continuous improvements in NO_2 levels and no exceedances of the objective level in since 2015 the AQMA within Tewkesbury has now been revoked as of the 1st August 2022.

Further details of the revoked AQMA can be found at https://ukair.defra.gov.uk/aqma/details?aqma_ref=587.

The conclusions from annual Government reports regarding Tewkesbury Borough Council have consistently shown good air quality.

Results are below objective levels and continue to show a general downwards trend each year. While there is no requirement to declare an AQMA, Tewkesbury Borough Council are committed to improving air quality and monitoring using the diffusion tube network.

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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

This report covers the monitoring period of 2022. The NO_2 annual mean concentration data for 2022 shows a downward trend of NO_2 at over half of sites monitored compared to 2021 data. The remainder of the sites monitored demonstrated the same NO_2 levels or marginal increase in the NO_2 levels compared to 2021 data. There are some year-to-year variations in concentrations, which are likely due to meteorological influences.

2022 data is considerably lower compared to pre-pandemic 2019 levels.

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[5] 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 National Air Quality Strategy, will provide more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[6] 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.

The air quality in TBC is generally good and diffusion tube monitoring will continue. If the results of monitoring indicate an upward trend with exceedance(s) of the air-quality objective then TBC will take the steps required by the Local Air Quality Management (LAQM) Policy Guidance[7].

Historic actions such as reducing overall traffic and removing heavy goods vehicles have long since been incorporated into traffic plans, introduced by the Gloucestershire County Council (GCC) and forms part of the Tewkesbury Town Master Plan.

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

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

[7] Defra. Local Air Quality Management Policy Guidance (PG22) August 2022

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, provision for safe storage of cycles and encouraging cycle routes. 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 and in turn have an impact on improving overall air quality. In 2022 a solar canopy over the council car park within Tewkesbury.

4 electric car charging points have been installed in order to promote alternative fuels and encourage low emission vehicle take up. TBC is currently replacing its own vehicles with electric alternatives.
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.

As an employer Tewkesbury Borough Council has introduced 2 salary sacrifice schemes for ULEVs and push bikes. These schemes are designed to help encourage staff to use low emission transport.

Conclusions and Priorities

All monitored sites met the NO_2 annual mean AQS objective of 40 µg/m^3 in 2022. Recorded 2022 data levels remain very similar to 2021 but continue to show an overall downward trend. With some very minor increases at several sites. Levels are still considerably lower than 2019.

It is unlikely that there was an exceedance of the hourly mean AQS objective in the last five years. Tewkesbury AQMA has been revoked to reflect the NO_2 annual mean being under the AQS since 2015

Generally, concentrations of NO_2 are steadily declining year on year. This tends to indicate that the actions and measures within the old 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;
- 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 continuing recovery following COVID-19, the cost-of-living crisis and the behavioural changes as a result of the cost-of-living crisis.

Local Engagement and How to get Involved

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 schools 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

GCC provide information for all residents of the county to access and how they can reduce their impact on the climate, carbon footprint and impact on air quality. Further information can be found at: https://www.gloucestershire.gov.uk/planning-and-environment/climate-change/greener-gloucestershire-climate-dashboard/what-can-you-do/

Residents can also calculate their air pollution footprint, create a personalised clean air planner, use how to guides to reduce air pollution and view air quality forecasts by visiting

Clean Air Hub which works in partnership with Clean Air Day. Further information can be found at: https://www.cleanairhub.org.uk/home

The Nationally, the Energy Saving Trust provides advice on fuel saving, energy saving at home, car buying advice, low carbon travel and much more which all have the added benefits of reducing an individual's contribution to air pollution.
Additional information can be found at: https://energysavingtrust.org.uk/

Locally, Severn Wye Energy Agency a sustainability charity working across Wales and the West of England. Offer advice, guidance, and support on a range of matters relating to sustainability, energy conservation, energy efficiency and fuel poverty etc which the public can access. Additional information can be found at: https://severnwye.org.uk/

All front-line Tewkesbury Borough Council staff are required to attend training relating to fuel poverty and energy use in the home. Which in turn allows staff to give information to local residents on fuel poverty support and how to reduce energy use in the home which have the added benefits of reducing an individual's contribution to air pollution.

Members of the public can get involved with air quality by participating in the Clean Air Day events. Further information regarding Clean Air Day and how to get involved can be found at: https://www.actionforcleanair.org.uk/.

The Environmental Protection Team can provide advice to internal departments, external agencies, and public enquiries regarding air quality in accordance with relevant legislation.

Residents of Tewkesbury Borough Council are increasingly aware of the impact of air quality in the UK and local area. Local residents actively report incidents of unauthorised or problematic burning from commercial and residential premises. This type of public knowledge and information sharing is welcomed by officers. It provides a mechanism for further education and awareness raising with the public regarding individual actions and their impact on local air quality.

TBC provides information on air quality which includes the previous air quality reports, NO_2 tube results and links to other related information resources. Additional information can be found at: https://www.tewkesbury.gov.uk/air-quality

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Tewkesbury Borough Council with the support and agreement of the following officers and departments:

Shaun Yemm-James – Environmental Health Officer
Environmental Health Department

This ASR has been approved by:

Tewkesbury Borough Council - Clean and Green Lead Member – Councillor Sarah Hands

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 the Environmental Health Team at:

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1 Local Air Quality Management

This report provides an overview of air quality in Tewkesbury 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 Tewkesbury 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 18 months. The AQAP should specify how air quality targets will be achieved and maintained and provide dates by which measures will be carried out.

Tewkesbury Borough Council does not have any current AQMAs in place.
On the 1st August 2022 Tewkesbury AQMA was revoked.

Please see appendix F – Figure F.1 AQMA Revocation Order and F.2 AQMA Map

A local Air Quality Strategy is currently being considered to prevent and reduce polluting activities. It is likely this will be a Gloucestershire wide Strategy working alongside the other local Councils in Gloucestershire

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

Defra's appraisal of last year's ASR, which was 2022, concluded that on the basis of the evidence provided by the local authority the conclusions reached are 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. It would be beneficial to see the comparison and trends of NO_2 data for only monitoring locations within the AQMA. However as noted the AQMA is to be revoked.
- The diffusion tube mapping is comprehensive and clearly demonstrates the monitoring network. AQMA boundaries are also clearly shown on the map.
- Annual mean NO2 concentrations have been well below the objective in the Tewkesbury Town Centre AQMA for a number of years now. The Council have applied to revoke the AQMA and the AQMA revocation assessment and draft revocation order are presented as appendices within the report. This is welcomed and the Council should move forward with the revocation.
- Although the AQAP is out of date as it was adopted in 2011, as the AQMA is to be revoked it is considered that the development of a new AQAP is no longer necessary.
- Although detail is provided for measures to addressed PM2.5, much of the discussion within the report is based upon a workshop held in January 2018 and no update of those proposals are presented within the report. Further detail on progress of the measures and ideas detailed would be welcomed.
- It is not clear within the ASR if the diffusion tube monitoring has been undertaken in accordance with the Defra Diffusion Tube Calendar.
- Section on the Local Responsibilities and Commitment have been removed from the ASR. The ASR template should be followed, and sections should not be removed unless instructed. It should also be noted that in the paragraph below "Individual Pollutants" it states that annualisation should be undertaken where annual mean data is below 75% and greater than 33%.

TBC has review comments from the previous appraisal report and has provided feedback below to the comments raised above.

Points 1 to 4 – These points primarily relate to the AQMA which has now been revoked. The Tewkesbury AQMA has now been revoked which was agreed by TBC executive committee and the revocation was supported by Defra. As the AQMA has been revoked an updated AQAP is not required. TBC will continue monitoring with diffusion tubes and deploy more tubes as required.

Point 5 – Discussions on PM2.5 have now been updated.

Point 6 – This report now makes it clear if the Defra Diffusion Tube Calendar has been used. The Defra diffusion Tube Calendar has been used for this report.

Point 7 – The section on the Local Responsibilities and Commitment has been retained and updated accordingly. The figure regarding annualization was a typo and has been amended in this report.

Tewkesbury Borough Council has taken forward a number of direct measures during the current reporting year of 2022 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1. 2 measures are included within Table 2.1, with the type of measure and the progress Tewkesbury Borough Council have made during the reporting year of 2022 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.1.

More detail on these measures can be found in the Action Plan. Key completed measures are:

- Introduction of Staff Car Salary Sacrifice scheme for ULEVs.
- Introduction of Staff Push Bike Salary Sacrifice scheme

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.

It is expected that the air quality measures in TBC Taxi Licensing Policy will be completed in 2023 providing there are no delays. While the majority of remaining priorities will be ongoing over the longer term.

Gloucester County Council's (GCC) Local Transport Plan[8] (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[9] (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 Protection, Policy LTP PD 0.5 Community Health and Wellbeing and Policy LTP PD 1.6 – Transport Interchange Hubs.

The principal challenges and barriers to implementation that TBC anticipates facing are the continuing COVID-19 recovery challenges and the cost-of-living crisis along with the associated behavioural change. All of which will have a substantial impact on resource availability and increased service demands which are anticipated to continue to divert resources for a significant period. The cost increases associated with the cost-of-living crisis are likely to have major implications both on TBC and the wider population. In addition to the general short to medium financial cost of moving towards carbon neutral and electrification/ Ultra Low Emissions.

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

[9] 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/

The measures stated above and in Table 2.1 have already helped achieve compliance in Tewkesbury Town Centre AQMA and the subsequent revocation of the AQMA.

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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	Completed	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	Completed	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	Implementation	N/A	Improvement in age and euro standard of vehicles within the taxi fleet	Ongoing - TBC is currently undergoing a consultation to introduce a minimum of Euro 6 Standard and minimum vehicles age standard.	Initial delayed due to COVID and resources. Huge backlash for Taxi owners that do not meet the proposed standards.
4	Air Quality Action Day	Public Information	Other	2018	2018	Tewkesbury Borough Council	N/A	N/A	N/A	N/A	Completed	N/A	Attendance	Complete	Development has started
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	Ongoing	Initially delayed due to COVID and resources.
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 - Longer term project	In 2022 a solar panel canopy was erected above TBC car park. Approx 90m long, 12.5m wide. Feeding power to council building and leisure centre

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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
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	£100k - £500k	Implementation	N/A	Removing all fossil fuel council used vehicles	Ongoing - 2 out of 4 vehicles have been replaced by electric models.	Progress has been slowed due to cost and vehicle availability.
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 - Working with GCC to identify and install new chargers	Cost of installing points
10	Introduction of Staff Car Salary Sacrifice scheme for ULEVs.	Promoting Low Emission Transport	Other	2022	Ongoing	Tewkesbury Borough Council	N/A	No	Not Funded	N/A	Completed	N/A	N/A	Complete	Dependant of Staff uptake of the scheme. The is aim to encourage low emission transport
11	Introduction of Staff Push Bike Salary Sacrifice scheme.	Promoting Travel Alternatives	Promotion of cycling	2022	Ongoing	Tewkesbury Borough Council	N/A	No	Not Funded	N/A	Completed	N/A	N/A	Complete	Dependant of Staff uptake of the scheme. The is aim to encourage low emission transport

2.3 $PM_{2.5}$ – 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 $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

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.

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

• Tewkesbury Borough Council works closely with other local authorities within GCC particularly holding regular air quality meetings to discuss latest developments and partnership working.
• Continue working closely with GCC to identify areas within the Local Transport Plan that will contribute towards a reduction in $PM_{2.5}$
• Work with TBC's health and well-being colleagues with a view to identifying and incorporating measures which will contribute towards a reduction in $PM_{2.5}$
• Continue to increase the procurement of council electric vehicles across the Borough.
• Continue working with GCC to identify and install new public car chargers
• Continued regulation of industrial processes under the Environmental Permitting Regulations to ensure that emissions to atmosphere are controlled and utilise best practise for the industry sector.
• Utilisation of the planning regime to identify new sources of $PM_{2.5}$ and apply relevant planning conditions to ensure emissions to the air are controlled and minimised.

The UK Public Health Outcomes Framework has reported new 2021 data for the D01 – Fraction of mortality attributable to air pollution using a new method. See Table 2.2 below.

The new indicator is defined as the fraction of annual all-cause adult mortality attributable

to particulate air pollution (concentrations of total $PM_{2.5}$). It can be viewed as the mortality burden associated with long-term exposure to particulate air pollution at current levels, expressed as the percentage of annual deaths from all causes in those aged 30 and over.

Table 2.2 - 2021 UK Public Health Outcomes Framework, D01 – Fraction of mortality attributable to air pollution

	Tewkesbury	Region	England
Fraction %	5.36	5.12	5.50

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While Tewkesbury Borough Council does not currently monitor $PM_{2.5}$. Using DEFRA 2018 background mapping data it has been possible to calculate the maximum annual mean $PM_{2.5}$ concentration for Tewkesbury Borough. While the DEFRA figures are based on 2018 data and is modelled this is the most current data available related to $PM_{2.5}$ levels. The highest annual mean $PM_{2.5}$ concentration within Tewkesbury Borough is 10.1 ug/m^3 The annual mean $PM_{2.5}$ concentrations vary between 7.34 ug/m^3 and 10.1 ug/m^3

Below are the targets for $PM_{2.5}$;

- Air Quality Standards Regulations 2010 - An annual average of 20 µg/m^3 for $PM_{2.5}$.

- The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 require that in England by the end of 2040:
  -An annual average of 10 µg/m^3 for $PM_{2.5}$ is not exceeded at any monitoring station.
  -Population exposure to $PM_{2.5}$ is at least 35% less than in 2018.

- The Environmental Improvement Plan 2023 for England set interim targets that by January 2028:
  -An annual average of 12 µg/m^3 for $PM_{2.5}$ is not exceeded at any monitoring station.
  -Population exposure to $PM_{2.5}$ is at least 22% less than in 2018

[10] Public Health Outcomes Framework - at a glance summary. Public Health Outcomes Framework - at a glance summary (phe.org.uk)

[11]

The annual mean $PM_{2.5}$ concentrations within Tewkesbury Borough are well below current targets and close to or below future targets.

[11] Particulate matter (PM10/PM2.5) - GOV.UK (www.gov.uk)

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

This section sets out the monitoring undertaken within 2022 by Tewkesbury 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

There have been no significant changes in relating to monitoring other than the revocation of the AQMA on 1st August 2022. Diffusion tube monitoring will continue to monitor NO_2 levels. A new diffusion tube monitoring site has been set up (Known as 57N).

3.1.1 Automatic Monitoring Sites

There are currently no automatic monitoring sites within Tewkesbury.

3.1.2 Non-Automatic Monitoring Sites

Tewkesbury Borough Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 19 sites during 2022. Table A. in Appendix A presents the details of the non-automatic sites.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

Error! Reference source not found.2 Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/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 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.

All monitoring data presented has been properly ratified and corrected for bias. No data has been annualised or correct for distance.

As mentioned previously within this report the Tewkesbury AQMA has now been revoked. Please Appendix D. This revocation was due to continuing reduction of overall NO_2 levels and was supported by Defra. While the AQMA designation has gone the passive diffusion tube network to monitor NO_2 will remain, and additional monitoring locations will be added as required.

Across the monitoring network, all monitoring locations, including the former AQMA, met the NO_2 annual mean AQS objective of 40 µg/m^3. Levels have remained under 40 µg/m^3 since 2015.

The highest recorded NO_2 level of all the network in 2022 was 35N at 25.1 µg/m^3. This is 0.5 µg/m^3 lower than the highest recorded level in 2021 at the same location.

Overall NO_2 levels for 2022 show a decrease in NO_2 levels compared to 2021 data. Over half the sites registered a decrease in NO_2 levels, 2 sites have remained the same as 2021 and the remaining sites showed a very minor increase (Less than 0.7 µg/m^3) compared to 2021 data.

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 implemented within the Council's former AQAP are continuing to have a positive effect.

Levels remain substantially lower compared to pre-pandemic 2019 levels.

A summary of bias adjustment factors used by TBC over the past five years is presented in

The national bias adjustment factor 2022 was derived using the Diffusion Tube Bias Adjustment Factors Spreadsheet, the outputs for which are shown in **Error! Reference source not found.**.

Table C.. A lower national bias factor of 0.82 also contributed to a lower NO_2 annual mean concentration.

There were no recorded instances of annual means greater than 60 µg/m^3, which according to the empirical relationship stated in LAQM.TG22 indicates that an exceedance of the 1-hour mean AQS objective is also unlikely at these sites.

Particulate Matter (PM_{10})

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

Particulate Matter ($PM_{2.5}$)

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

Sulphur Dioxide (SO_2)

SO_2 is currently not monitored in Tewkesbury Borough Council.

4 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	NO2	No	0.0	1.5	No	4.0
2N	43 Oldbury Road	Roadside	389399	232788	NO2	No	0.0	1.5	No	3.0
5N	13-14 Barton Street	Roadside	389356	232705	NO2	No	0.0	1.5	No	4.0
6N	14 High Street	Roadside	389294	232806	NO2	No	0.0	1.5	No	4.0
14N	69 Sussex Gardens	Roadside	387915	217389	NO2	No	0.0	7.0	No	2.0
15N	Comus Bamfurlong	Roadside	389714	221845	NO2	No	0.0	3.0	No	1.5
16N	15 Withybridge Gardens	Roadside	390461	225544	NO2	No	5.0	3.0	No	1.5
20N	Snowshill Hill farm	Rural	412224	233012	NO2	No	50.0	1.0	No	1.5
35N	21 High Street	Roadside	389283	232769	NO2	No	0.0	1.5	No	3.0
37N	101 Church Street	Roadside	389254	232670	NO2	No	1.0	2.0	No	3.0

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)
38N	38 High Street	Roadside	389331	232950	NO2	No	0.0	1.5	No	3.0
41N	31 Barton St	Roadside	389462	232721	NO2	No	0.0	2.0	No	2.5
47N	65 Barton St	Roadside	389400	232600	NO2	No	0.0	2.0	No	2.0
50N	3 North Street	Roadside	402476	228456	NO2	No	0.5	1.5	No	2.0
52N	43 Stocken Close	Roadside	387570	216935	NO2	No	0.0	12.0	No	2.0
53N	Ashchurch Road	Roadside	393281	233305	NO2	No	57.0	5.0	No	1.8
55N	Stoke Road, Bishops Cleeve	Roadside	395123	227638	NO2	No	25.0	5.0	No	1.8
56N	Tewkesbury CoE Primary School	Suburban	389622	232907	NO2	No	9.0	3.0	No	1.5
57N	15 Kestrel Way	Suburban	391805	234256	NO2	No	0.0	5.0	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 2022 (%) [2]	2018	2019	2020	2021	2022
1N	389314	232807	Roadside	100	100.0	28.2	29.4	16.7	20.1	20.7
2N	389399	232788	Roadside	91.7	92.3	20.7	20.6	12.5	12.8	12.5
5N	389356	232705	Roadside	100	100.0	24.2	23.0	15.8	20.1	18.9
6N	389294	232806	Roadside	91.7	84.6	27.1	27.7	18.7	24.3	24.9
14N	387915	217389	Roadside	100	100.0	26.1	23.6	17.7	18.1	17.7
15N	389714	221845	Roadside	91.7	90.4	27.1	25.7	14.8	14.7	14.0
16N	390461	225544	Roadside	100	100.0	24.3	22.0	16.7	19.4	18.1
20N	412224	233012	Rural	100	100.0	6.4	5.5	3.9	4.0	4.1
35N	389283	232769	Roadside	100	100.0	32.0	32.3	22.3	25.6	25.1
37N	389254	232670	Roadside	83.3	82.7	22.8	22.7	15.5	18.5	18.5
38N	389331	232950	Roadside	100	100.0	24.5	23.4	16.9	19.0	19.2
41N	389462	232721	Roadside	100	100.0	32.9	30.2	20.2	24.9	24.4

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
47N	389400	232600	Roadside	100	100.0	26.9	27.4	19.1	20.0	20.1
50N	402476	228456	Roadside	100	100.0	22.2	20.4	12.1	14.1	12.5
52N	387570	216935	Roadside	100	100.0	23.4	21.2	16.0	17.0	16.5
53N	393281	233305	Roadside	91.7	92.3	22.0	19.4	14.7	16.1	16.1
55N	395123	227638	Roadside	100	100.0	19.0	18.8	14.3	14.8	14.3
56N	389622	232907	Suburban	100	100.0	**N/A**	**N/A**	**N/A**	9.0	9.5
57N	391805	234256	Suburban	100	100.0	**N/A**	**N/A**	**N/A**	**N/A**	13.8

☐ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**
(No annualization required)

☒ **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**.

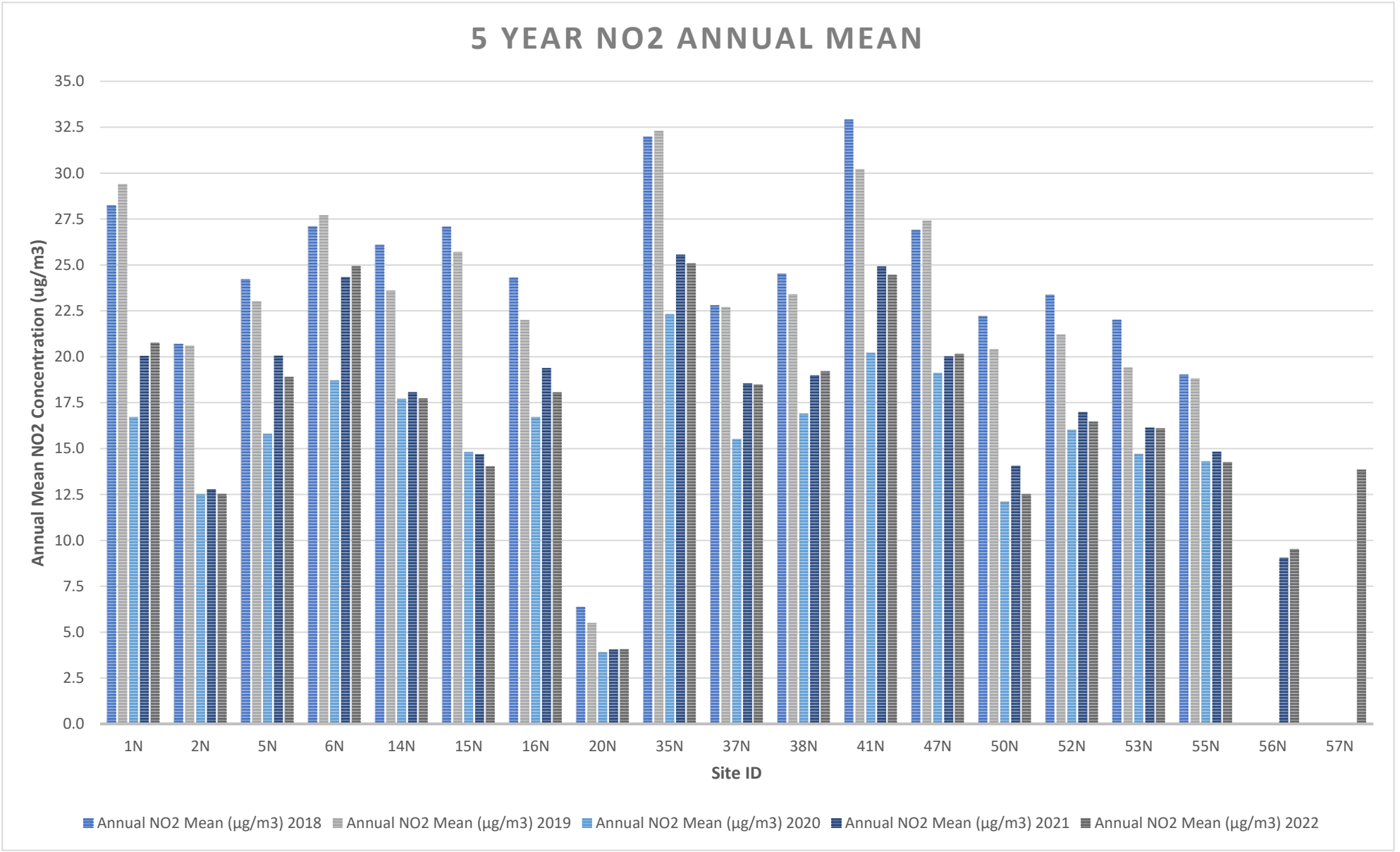
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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



5 Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO_2 2022 Diffusion Tube Results (µg/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
1N	389314	232807	30.9	18.4	28.8	25.4	17.4	20.1	22.1	25.8	24.4	25.8	30.2	34.4	25.3	20.7	-	
2N	389399	232788	18.6	12.2	17.2	13.0	12.0	10.9	12.3	N/A	15.4	16.9	17.3	22.0	15.3	12.5	-	
5N	389356	232705	31.6	19.2	26.5	22.1	19.5	18.4	21.8	24.0	23.7	19.0	22.4	28.4	23.0	18.9	-	
6N	389294	232806	39.9	N/A	27.0	27.5	29.2	26.4	30.4	29.3	29.4	30.3	N/A	34.5	30.4	24.9	-	
14N	387915	217389	27.5	15.3	24.6	19.9	18.3	15.4	19.5	22.2	26.9	16.6	28.4	24.8	21.6	17.7	-	
15N	389714	221845	24.9	19.1	16.1	12.0	16.3	12.5	14.5	13.9	15.4	N/A	21.9	21.6	17.1	14.0	-	
16N	390461	225544	27.7	22.0	24.3	22.7	20.5	18.3	22.9	29.0	23.2	14.5	17.3	21.8	22.0	18.1	-	
20N	412224	233012	6.4	3.7	6.8	4.2	3.3	2.9	3.4	5.3	4.7	3.9	5.7	9.1	5.0	4.1	-	
35N	389283	232769	42.3	25.1	27.5	27.0	29.5	25.1	29.1	31.1	30.8	28.8	32.6	38.0	30.6	25.1	-	
37N	389254	232670	26.1	18.4	24.0	N/A	19.5	18.8	22.7	25.9	N/A	19.5	22.7	27.8	22.5	18.5	-	
38N	389331	232950	31.7	20.3	22.8	20.9	21.4	18.9	22.4	22.3	20.8	23.2	25.0	31.3	23.4	19.2	-	
41N	389462	232721	37.5	24.9	33.7	31.5	28.1	23.6	28.0	33.4	26.7	25.7	29.9	34.7	29.8	24.4	-	
47N	389400	232600	32.3	22.5	25.0	19.9	23.0	18.9	22.6	20.3	22.6	27.3	29.4	30.9	24.6	20.1	-	
50N	402476	228456	22.6	13.4	12.3	12.5	15.9	13.2	16.1	18.7	14.4	10.9	15.5	17.2	15.2	12.5	-	
52N	387570	216935	30.4	19.7	20.5	18.2	20.1	13.8	20.8	21.5	21.3	12.3	19.9	22.6	20.1	16.5	-	
53N	393281	233305	30.4	15.4	21.1	18.9	11.3	N/A	19.2	24.2	19.6	13.7	19.5	22.6	19.6	16.1	-	
55N	395123	227638	30.5	17.9	17.0	7.8	16.7	12.9	14.9	14.1	16.6	18.2	19.6	22.4	17.4	14.3	-	
56N	389622	232907	19.1	9.6	12.9	5.0	7.5	6.6	9.4	10.2	11.1	12.7	14.8	20.6	11.6	9.5	-	

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
57N	391805	234256	25.9	16.9	13.5	12.6	15.3	11.7	14.8	14.1	17.2	16.9	18.0	25.7	16.9	13.8	-	

☐ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1**
(No erroneous data identified)

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

(Annualization not required)

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

☐ **Where applicable, data has been distance corrected for relevant exposure in the final column.**
(Distance Correction not required)

☒ **Tewkesbury 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.

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

New or Changed Sources Identified Within Tewkesbury Borough Council During 2022

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

Additional Air Quality Works Undertaken by Tewkesbury Borough Council During 2022

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

QA/QC of Diffusion Tube Monitoring

All diffusion tubes, in 2022, 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.

Changeover of the diffusion tubes was completed in accordance with the 2022 national calendar. Diffusion tubes are deployed in accordance with LAQM Guidance to ensure correct installation over the specified exposure time period.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Tewkesbury Borough Council recorded data capture of 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

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.

Tewkesbury Borough Council have applied a national bias adjustment factor of 0.82 to the 2022 monitoring data. A summary of bias adjustment factors used by Tewkesbury Borough Council over the past five years is presented in

The national bias adjustment factor 2022 was derived using the Diffusion Tube Bias Adjustment Factors Spreadsheet, the outputs for which are shown in **Error! Reference source not found.**.

Table C.1.

The national bias adjustment factor 2022 was derived using the Diffusion Tube Bias Adjustment Factors Spreadsheet, the outputs for which are shown in **Error! Reference source not found.**.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	National	06/23	0.82
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 2022

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 06/23

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 spreadhseet 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 2023

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[5] (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	2022	KS	Marylebone Road Intercomparison	12	52	42	23.0%	G	**0.81**
Gradko	50% TEA in acetone	2022	R	City Of London	11	61	53	15.2%	G	**0.87**
Gradko	50% TEA in acetone	2022	UB	City Of London	12	28	23	21.4%	G	**0.82**
Gradko	50% TEA in acetone	2022	KS	London Borough of Croydon	12	41	37	11.1%	G	**0.90**
Gradko	50% TEA in Acetone	2022	R	Royal Borough of Windsor and Maidenhead	12	30	26	13.9%	G	**0.88**
Gradko	50% TEA in Acetone	2022	R	Royal Borough of Windsor and Maidenhead	12	27	27	-1.0%	G	**1.01**
Gradko	50% TEA in Acetone	2022	R	Sandwell MBC	12	34	27	27.1%	G	**0.79**
Gradko	50% TEA in Acetone	2022	UB	Sandwell MBC	12	21	19	11.9%	G	**0.89**
Gradko	50% TEA in Acetone	2022	UB	Norwich City Council	11	11	9	12.0%	G	**0.89**
Gradko	50% TEA in acetone	2022		**Overall Factor[3] (15 studies)**				**Use**		**0.82**

NO_2 Fall-off with Distance from the Road

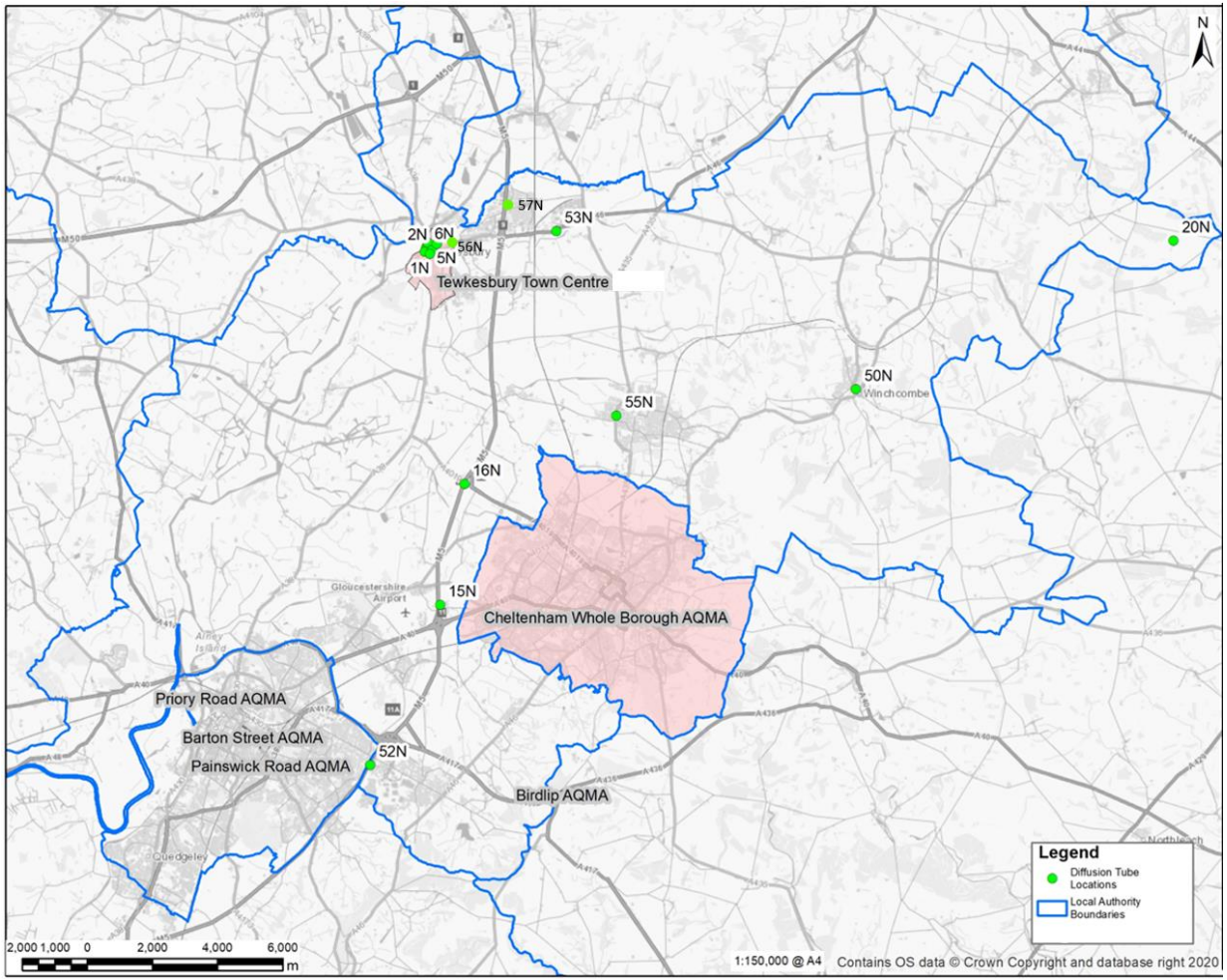
Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM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

No diffusion tube NO_2 monitoring locations within Tewkesbury Borough Council required distance correction in 2022 .

7 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 – Whole Borough



8 Appendix E: Summary of Air Quality Objectives in England

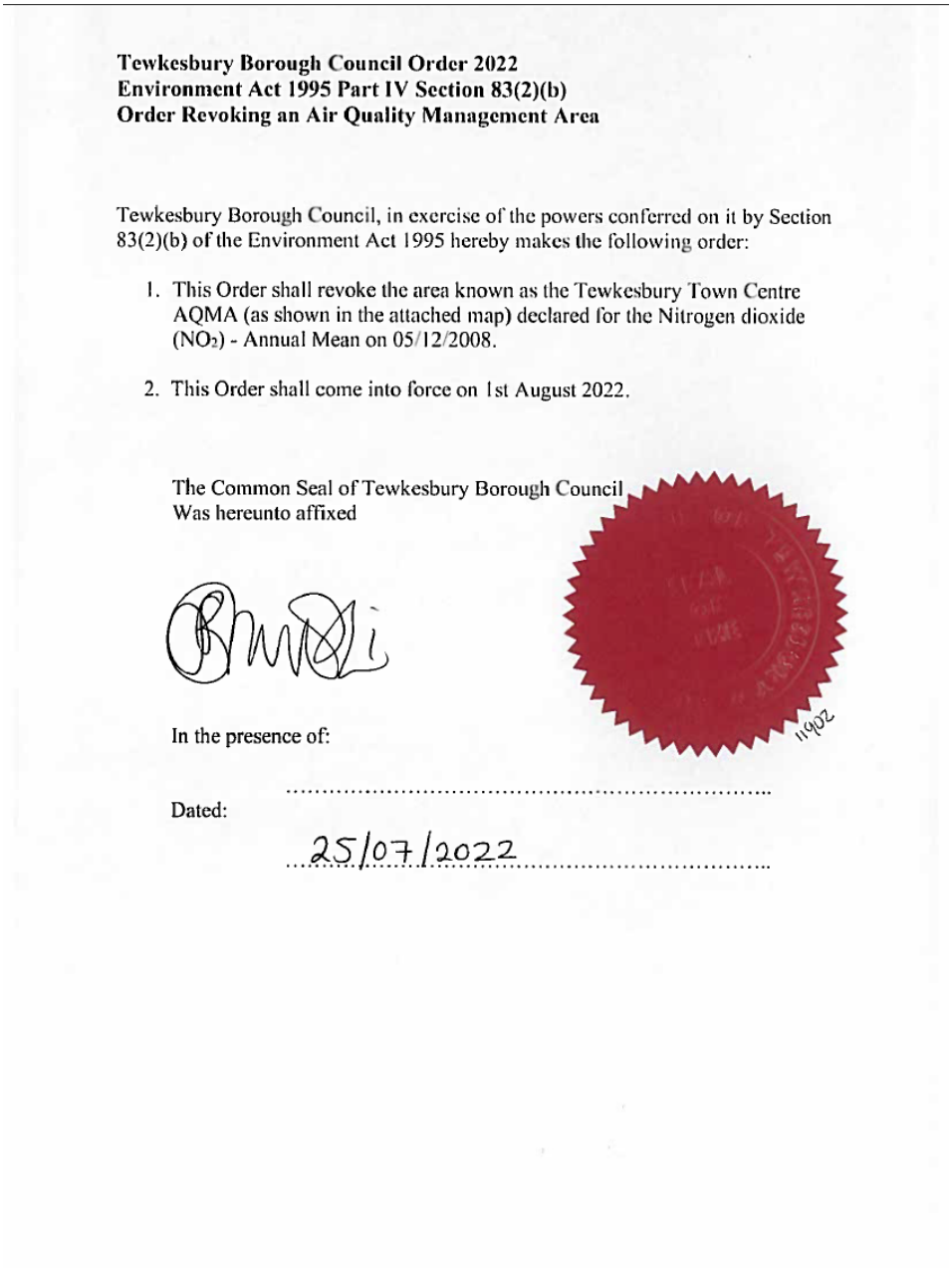
Table E.1 – Air Quality Objectives in England[12]

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

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

9 Appendix F: Revocation of Tewkesbury AQMA

Figure F.2 – AQMA Revocation Order



Tewkesbury Borough Council Order 2022
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.

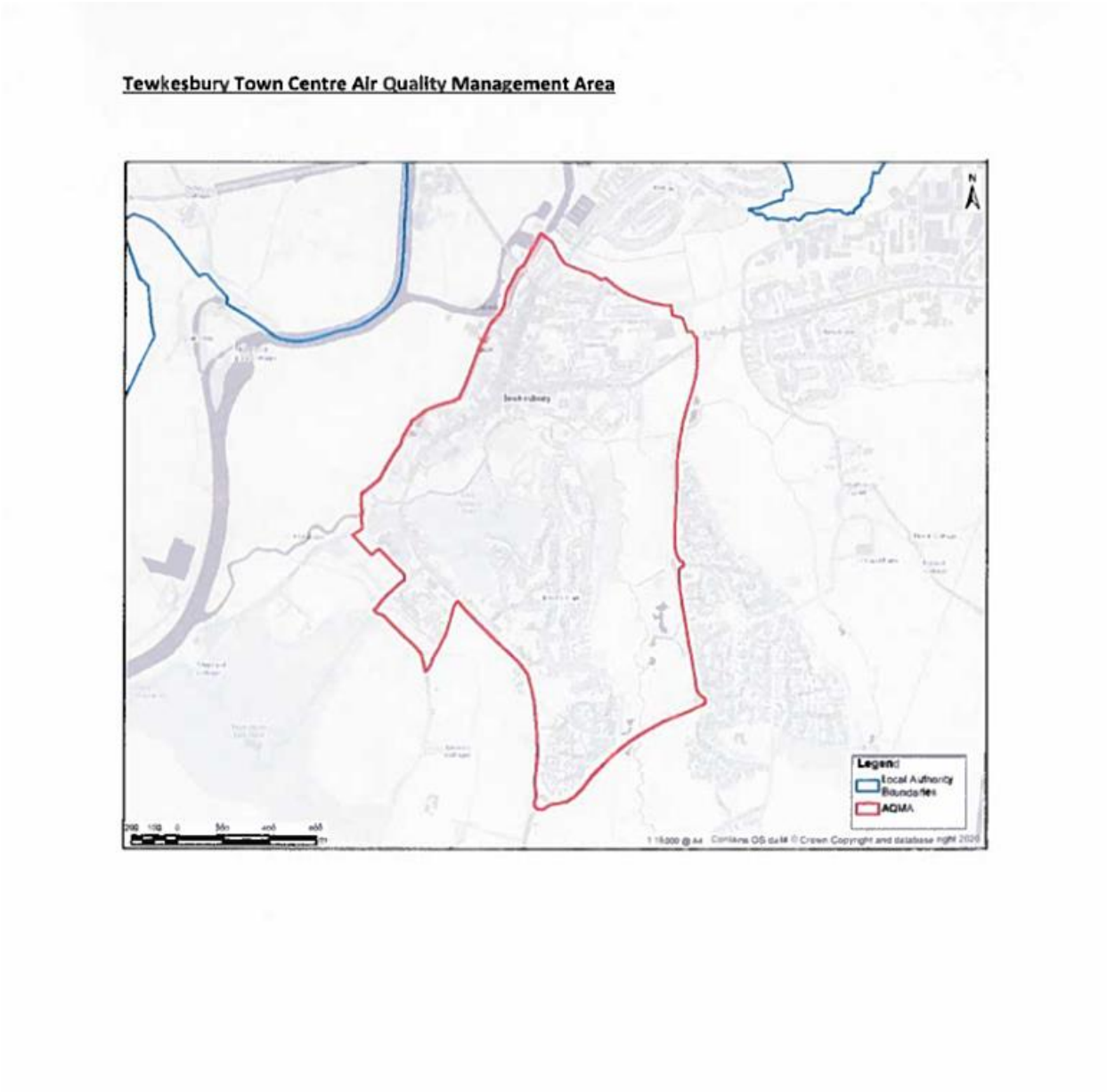
2. This Order shall come into force on 1st August 2022.

The Common Seal of Tewkesbury Borough Council
Was hereunto affixed

In the presence of:

Dated: 25/07/2022

Figure F.2 – AQMA Map



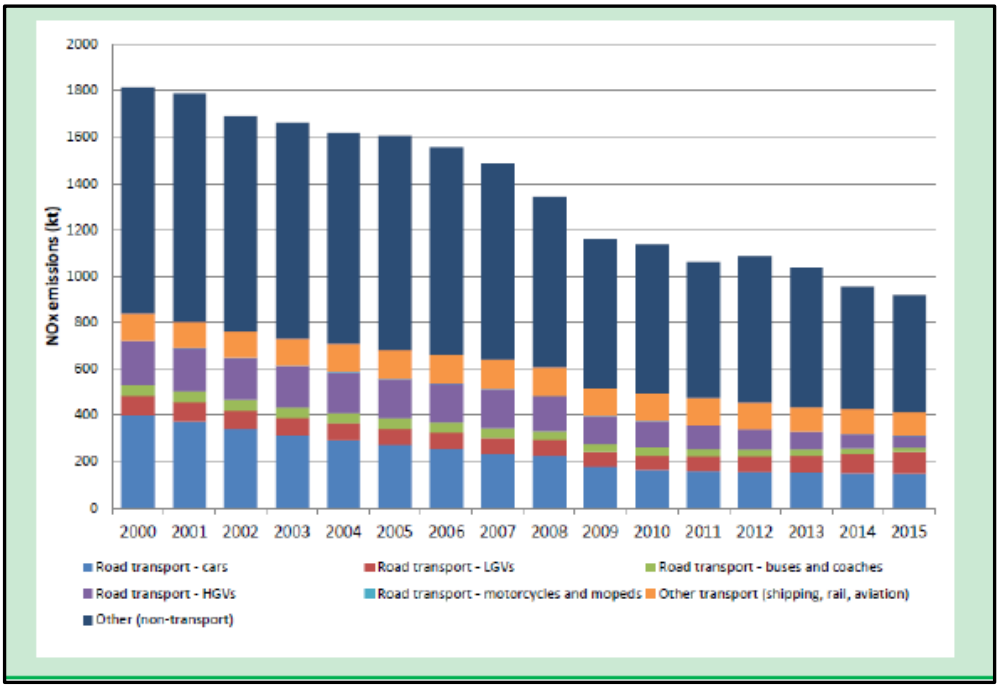
10 Appendix G:

Additional Information related to air quality

10.1 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[13]. Figure G. 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.1 Annual UK Nitrogen Oxides Emissions Since 2000



Future influence on emissions is considered in a revised Clean Air Strategy**Error! Bookmark not defined.** with a major transport emission objective that states:

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

"*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.

Department for Transport (DfT) road traffic forecasts[14] 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:

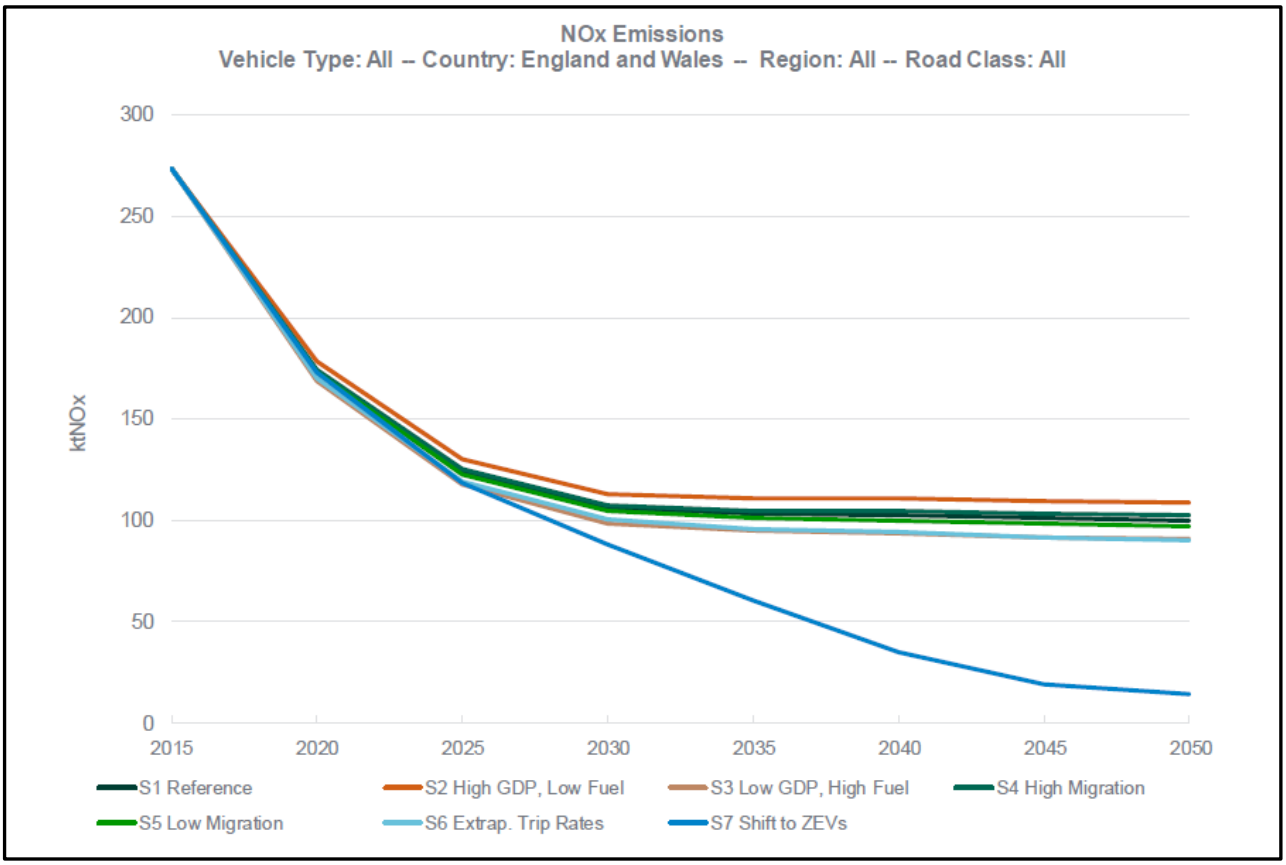
- From 2015, traffic is forecast to grow by between 17% and 51% by 2050;
- Traffic growth on the Strategic Road Network (SRN) ranges between growth of 32% and 66% by 2050;
- Forecast growth on principal roads and minor roads is between 10%-47% and 11%-50% respectively;
- Car traffic is forecast to grow 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.. 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

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

between 60% and 95% by 2050 (Figure G.). 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.

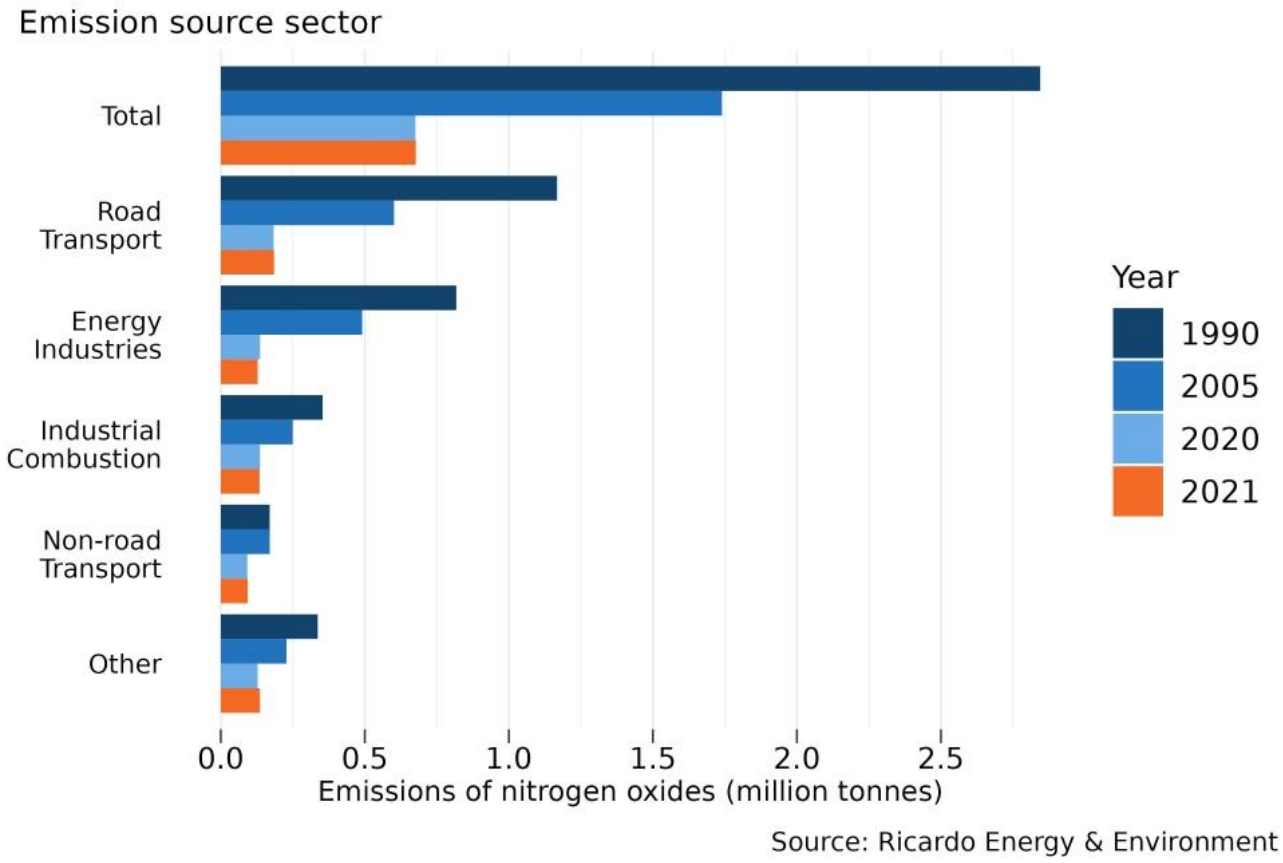
Figure G.2 Forecast NO_x Road Traffic Emissions for England & Wales (kt)



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[15]

Figure G.3 UK annual emissions of nitrogen oxides by 2020 major emissions sources: 1990, 2005, 2020 and 2021



[16]

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

[16] 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

10.2 Regional Influence

Gloucester County Council's (GCC) Local Transport Plan[8] (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[9] (CPS), Tewkesbury being one of the CPS.

A 'Link and Place' Spectrum[17] 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 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.

[17] 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

- 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.

10.3 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[18] (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

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

Tewkesbury were the 'Rest of UK HDV=<10%'. The projected results for the diffusion tube locations within the former 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 2018"[19] 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	

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

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

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.