



# 2021 Air Quality Annual Status Report (ASR)

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

Date: June 2021

<b>Information</b>	<b>Worcestershire Regulatory Services</b>
<b>Local Authority Officer</b>	Neil Kirby
<b>Department</b>	Technical Services
<b>Address</b>	Wyre Forest House Finepoint Way Kidderminster Worcestershire DY11 7WF
<b>Telephone</b>	01905 822799
<b>E-mail</b>	wrsenquiries@worcsregservices.gov.uk
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## Executive Summary: Air Quality in Our Area

### Air Quality in Redditch Brough Council

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas<sup>1,2</sup>.

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

Worcestershire Regulatory Services (WRS) have been responsible for managing (monitoring and reporting of) local air quality in the six Worcestershire District Councils since April 2011.

There are currently no Air Quality Management Areas (AQMAs) in the Redditch Borough Council area. Concentrations continue to fall below the annual mean objective for nitrogen dioxide at measured locations.

Monitoring across the Redditch Borough area focuses on nitrogen dioxide (NO<sub>2</sub>) via a network of passive diffusion tubes, the tubes are located in the main urban centre of Redditch. No changes were made to monitoring locations for the 2020 monitoring year.

Monitoring results within the Redditch Borough area demonstrate that there were no exceedances of the NO<sub>2</sub> air quality objective of 40µg/m<sub>3</sub> in 2020. Results show there were decreases in NO<sub>2</sub> concentrations at all monitoring locations in 2020; this is consistent with trends across Worcestershire. This is likely to be have been caused by the reduction in

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

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

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

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

traffic during the 'lockdowns' in 2020 caused by the Covid-19 pandemic (See Appendix F for details)

There is no discernible upward or downward trend in concentrations over the 5-year period 2016- 2020.

No annual means greater than 60ug/m<sup>3</sup> have been recorded indicating that it is very unlikely that there have been any exceedances of the 1-hour mean objective for NO<sub>2</sub> at any monitoring sites.

## Actions to Improve Air Quality

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

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

In 2013, WRS produced a countywide Air Quality Action Plan (AQAP) for Worcestershire which was adopted by Redditch Borough Council on 15<sup>th</sup> October 2013. WRS have produced two updates to the AQAP, the latest in September 2016. For details of all measures completed, in progress or planned, please refer to the 'Air Quality Action Plan Progress Report for Worcestershire April 2015-2016'. A copy of this, the previous update, and the AQAP are available to view or download at:

<http://www.worcsregservices.gov.uk/pollution/air-quality/air-quality-action-plan.aspx>

In 2014, WRS set up the Worcestershire Air Quality Steering Group and sub-groups

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

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

to facilitate progressing implementation of prioritised actions identified in the AQAP.

To date the Redditch Borough area does not form a specific part of the AQAP as there is no current AQMA in the area. However, the general actions to improve air quality detailed in the AQAP apply across Worcestershire as a whole, including the Redditch Borough area.

Redditch Borough Council has published a strategy for ultra-low emission vehicles to help inform the development of appropriate infrastructure in the area to enable more people to use ultra-low emission vehicles (ULEVs). The document is available at:

<https://www.redditchbc.gov.uk/living/getting-around/electric-vehicles.aspx#strategy>

In 2020 Redditch Borough Council in collaboration with micro-mobility operator Bird started running an e-scooter trial across Redditch Town Centre as part of the Department for Transport's e-scooter trials. Information on the scheme can be found at:

[e-scooters - redditchbc.gov.uk](https://www.redditchbc.gov.uk/e-scooters)

A new Air Quality Partnership led by the officers of the Director of Public Health (DoPH), and supported by WRS Land and Air Quality Team, was set up in 2019 to discuss potential actions to improve air quality across the County and determine an action plan for implementation. The group comprises officers from the County and District authorities from public health, air quality, strategic planning, sustainability, highways and transport disciplines, and also representatives from the NHS and Highways England. The group is largely driven by DoPH so, due to Covid-19 taking priority, the business of the partnership has been postponed indefinitely.

WRS is also a member of Central England Environmental Protection Managers Group (CEEPG) which provides a strategic overview and direction for the delivery of Environmental Protection Services across the area of Central England covered by participating authorities. CEEPG responsibilities covers all environmental health matters regarding air quality, noise, contaminated land and LAPPC/IPPC including cooperation and coordination with the Environment Agency and Public Health England.

Following direct contact WRS were invited by Defra LAQM Team to join their Local Authority Air Quality Advisory Group (LAQAG), formed in 2017. The group consists of a network of local authority officials acting as an informal sounding board by Defra to enable development of better-informed strategy and policy proposals across the two areas of work in air quality- local authorities and domestic combustion. It is an advisory body and not a decision-making body.

## Conclusions and Priorities

There are currently no Air Quality Management Areas (AQMAs) in the Redditch Borough area. Over the past five years monitoring results have consistently remained below the air quality objective. Monitoring results within the Redditch Borough Council area demonstrate that there were no exceedances of the air quality objective of 40µg/m<sup>3</sup> in 2020. Results demonstrate a decrease in NO<sub>2</sub> concentrations at all monitoring locations in 2020; this is consistent with trends across Worcestershire. This is likely to have been caused by the reduction in traffic during the 'lockdowns' in 2020 caused by the Covid-19 pandemic.

There were no significant residential or commercial/industrial developments or highway infrastructure works within the Borough in 2020.

WRS on behalf of Redditch Borough Council will continue to monitor locations in 2021 to assess any improvements or degradation in NO<sub>2</sub> concentrations. The data gathered will assist in further assessment of areas of poor air quality within the Borough. Further update on monitoring and action progress will be provided in the 2022 Annual Status Report.

## Local Engagement and How to get Involved

There are a number of ways members of the public can help to improve local air quality:

- **Walk or cycle, leave your car at home:** Leaving your car at home and walking or cycling instead will benefit in three ways - increased exercise, reduced pollution exposure and will reduce individual's pollution emissions;
- **Turn off your engine when stationary or parked,** don't 'idle', particularly outside sensitive receptors such as schools, hospitals, care homes and residential properties;
- Worcestershire County Council have launched a car sharing website, **LiftShare**, to help people find others journeying to the same destinations to share journeys and costs and reduce traffic and emissions. Visit this link for more information <https://worcestershire.liftshare.com/>
- Contact Worcestershire County Council for help and advice on a **Travel Plan** for your business. General travel planning advice is available on Worcestershire County Council's website (including walking, cycling and bus maps and timetables);
- **Hold meetings by Conference Call** by phone or Video conference via Skype, Facetime, Zoom or other services rather than driving to meetings. This reduces fuel

and other travel costs, vehicle maintenance and hire cost, increases productivity through reduction in hours lost through unnecessary travel;

- Facilitate **Flexible Working Arrangements** for non-front-line staff to **work remotely from home** or nearer home facilities for one or more days a week thus removing or reducing any journey to work. This reduces congestion which has beneficial impacts for delivery times, reduced business costs and thus economic benefits. Additionally, provides social benefits through improved work life balance for employees, reduces local air quality and reduced emergency vehicle response times.
- **Switch Fleet to Low Emission Vehicles:** The government is providing £80m funding to encourage installation of Electric Vehicle (EV) charging points. Eligible businesses, charities and public sector organisations with off street parking for staff or vehicles fleets can apply for vouchers to redeem costs of electric vehicle charge-points. There is a limit of 1 voucher per applicant; however, applicants with a 'franchise' may apply for up to 20 franchisees. There is an approved charge points list and a list of authorised installers:  
  
<https://www.gov.uk/government/collections/government-grants-for-low-emission-vehicles#workplace-charging-scheme>
- If you have to drive follow fuel efficient driving advice, often known as '**Smarter Driving Tips**', to save on fuel and reduce your emissions. A number of websites promote such advice including:  
  
<http://www.theaa.com/driving-advice/fuels-environment/drive-smart>  
<http://www.dft.gov.uk/vca/fcb/smarter-driving-tips.asp>
- **Reduce air pollution from open fires and wood-burning stoves:** Advice is available from Defra on choosing the right stove, using the right fuels and maintenance enabling householders to reduce their impact on their health and air quality from open fires and wood burning stoves. Further information is available on the [Smokeless Zones](#) and [Public Advice](#) pages on WRS website.

Air pollution can affect all of us over our lifetime however certain groups will be more sensitive to the effects of air pollution. Vulnerable groups include adults and children with

lung or heart conditions such as asthma, chronic bronchitis, emphysema and chronic obstructive lung disease (COPD)<sup>7,8</sup>. Senior citizens are more likely to be affected by respiratory diseases and children are more likely to be affected by air pollution due to relatively higher breathing and metabolic rates as well as a developing lung and immune system.

**Vulnerable individuals and groups can keep informed of:**

- Current levels and forecasts of air pollution from Defra at:  
<https://uk-air.defra.gov.uk/>.
- If you are sensitive to the effects of air pollution, it may be appropriate to limit the length of time spent in areas of local poor air quality – see advice from Defra at <https://uk-air.defra.gov.uk/air-pollution/daqj>
- If you are on social media, sign up to the WRS Twitter feed. WRS tweet when pollution is forecast by Defra to be moderate to very high.

Further information for the general public on reducing your family’s exposure to poor air quality in Worcestershire and how individuals, business and schools can assist with reducing their impact on local air quality can currently be found at <http://www.worcsregservices.gov.uk/pollution/air-quality/public-advice.aspx> .

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<sup>7</sup> <http://www.breathelondon.org/>

<sup>8</sup> <https://www.londonair.org.uk/LondonAir/guide/MyActionsForMe.aspx>



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# 1 Local Air Quality Management

This report provides an overview of air quality in Redditch Borough Council during 2020. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Redditch 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

### Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

Redditch Borough Council currently does not have any declared AQMAs. Concentrations continue to fall below the annual mean objective for nitrogen dioxide at all locations.

For reference, maps of Redditch Borough Council's monitoring locations are available in Appendix D.

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

Defra's appraisal of last year's ASR concluded the report is well structured, detailed, and provides the information specified in the Guidance.

1. Although the Council have recently reviewed their monitoring strategy, we note that all five diffusion tube sites continue to show low pollution levels. This is unusual for an urban area the size of Redditch; we would expect there to be areas of congested traffic generating higher pollution levels than is reported.
2. QA/QC of the data was considered to be appropriate, with a national bias adjustment factor applied. Annualisation and distance correction calculations were not required.
3. The Council demonstrated detailed actions and measures introduced to improve air quality from Redditch Borough and the wider Worcestershire Regulatory Services group.
4. The report did not include links to the Public Health Outcomes Frameworks, and the Council is recommended to do so in future ASRs.
5. The Council is reminded to use consistent decimal places when reporting pollutant concentrations.
6. Feedback from last year's appraisal was included and addressed. This is welcomed, and we encourage this to continue in future ASRs.

No specific actions have been progressed to improve air quality in the Redditch Borough area as there is currently no declared AQMA. However, the general actions to improve air quality detailed in the AQAP apply across Worcestershire as a whole, including the Redditch Borough Council area.

More detail on these measures can be found in the Air Quality Action Plan for Worcestershire at:

<http://www.worcsregservices.gov.uk/pollution/air-quality/air-quality-action-plan.aspx>

Redditch Borough Council has published a strategy for ultra-low emission vehicles to help inform the development of appropriate infrastructure in the area to enable more people to use ULEVs. The document is available at:

<https://www.redditchbc.gov.uk/living/getting-around/electric-vehicles.aspx#strategy>

In 2020 Redditch Borough Council in collaboration with micro-mobility company Bird started running an e-scooter trial across Redditch Town as part of the Department for Transport's e-scooter trials. More information can be found at:

[e-scooters - redditchbc.gov.uk](https://redditchbc.gov.uk/e-scooters)

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	Promote flexible working arrangements	Promoting Travel Alternatives	Encourage / Facilitate home-working	2017	-	WCC & RBC		NO	Not Funded		Implementation	<1%	Increase in uptake of personal travel planning services. Change in behaviour towards more sustainable modes of transport	Implementation on-going	
2	Installing electric vehicle charging points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2014	-	WRS & RBC	-	NO	Not Funded	-	Implementation	1%	Increase in availability of EV charging points and corresponding increase in use of electric vehicles	Recommendations for installation of EV Charging Points routinely recommended by WRS on relevant planning consents.	WRS technical guidance note for planning (v.5.1), produced on behalf of Worcestershire local authorities
3	Travel Planning	Promoting Travel Alternatives	Personalised Travel Planning	2017	2018	WCC		NO	Not Funded		Completed	<1%	Increased uptake of alternative modes of transport	WCC have developed a "one-stop-shop" online travel portal	
4	Car Sharing	Alternatives to private vehicle use	Car & lift sharing schemes	2015	2016	WCC		NO	Not Funded		Completed	<1%	Increase in number of people car sharing	LiftShare booking is available on the WCC Website	
5	Produce Air Quality Supplementary Planning Document	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2017	2021	WRS & District Councils	N/A	NO	Not Funded	-	Completed	<1%	Formally adopted and utilised SPD at all six LPAs across County	Formally adopted by North Worcestershire Strategic Planning. Currently being formulated by South Worcestershire Strategic Planning	
6	Encourage developers to provide sustainable transport facilities and links serving new developments	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2017	2021	WRS & District Councils	N/A	NO	Not Funded	-	Completed	<1%	Formally adopted and utilised SPD at all six LPAs across County	Formally adopted by North Worcestershire Strategic Planning. Currently being formulated by South Worcestershire Strategic Planning	
7	Air Quality Networks	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2014	-	RBC & WRS	N/A	NO	Not Funded	-	Implementation	1%	Improved cross boundary working between local authorities in Worcestershire	WRS are members of the Midlands Joint Advisory Council (MJAC). Provision of AQ services to Tewkesbury Borough Council & Gloucester City Council	On-going
8	Forge closer links with local health agencies	Other	Other	2019	-	WRS, District Councils & WCC	N/A	NO	Not Funded	-	Completed	,1%	Participation of relevant health agencies in the Worcestershire Air Quality Steering Group	Director of Public Health at Worcestershire County Council set up an air quality group in 2019 to discuss air quality issues in the County	On-going

## PM<sub>2.5</sub> – Local Authority Approach to Reducing Emissions and/or Concentrations

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

There are currently no automatic PM<sub>2.5</sub> monitoring stations in Worcestershire. The nearest AURN PM<sub>2.5</sub> monitoring station is the Birmingham Acocks Green site approximately 22 kilometres to the north east of the Redditch Borough Council area. WRS has reviewed the DEFRA national background maps to determine projected PM<sub>2.5</sub> concentrations within the Redditch Borough area for the 2020 calendar year. The average total PM<sub>2.5</sub> at 54 locations (centre points of 1km x 1km grids) across Redditch Borough Council is 7.94µg/m<sup>3</sup>, with a minimum concentration of 7.32µg/m<sup>3</sup> and a maximum concentration of 8.82µg/m<sup>3</sup>. This indicates that PM<sub>2.5</sub> concentrations within Redditch Borough are well below the annual average EU limit value for PM<sub>2.5</sub> of 25µg/m<sup>3</sup> and is below the World Health Organisation (WHO) annual average limit value for PM<sub>2.5</sub> of 10µg/m<sup>3</sup>.

WRS has reviewed the fraction of mortality attributable to particulate air pollution (indicator 3.01) as published by Public Health England. The fraction of mortality attributable to particulate emissions in Worcestershire in 2019 (the most recent year available) was 4.8%. This falls below the national figure for England (5.1% in 2019) and below the figure for the West Midlands region (5.3% in 2019). Recent trend data is not available for Worcestershire due to a lack of data points with valid values.

More information on the Public Health Outcomes Frameworks that examines indicators that help us understand trends in public health can be found at:

[Public Health Outcomes Framework - PHE](#)

A new Air Quality Partnership led by the DoPH and supported by WRS Land and Air Quality Team was set up in 2019 to discuss potential actions to improve air quality across the County and determine an action plan for implementation. The group comprises officers from the County and District authorities from public health, air quality, strategic planning, sustainability, highways and transport disciplines and also representatives from the NHS and Highways England. The group met initially in May



2019 to discuss terms and references and in September to discuss potential actions. The group is largely driven by DoPH so, due to Covid-19 taking priority in 2020, the business of the partnership has been postponed indefinitely.

In light of the above no additional actions are currently planned by Redditch Borough Council in relation to the reduction of PM<sub>2.5</sub> levels. However, it is anticipated that any actions taken to improve NO<sub>2</sub> levels across the Borough will likely result in a linked improvement in PM<sub>2.5</sub> levels.

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

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

### Summary of Monitoring Undertaken

#### 3.1.1 Automatic Monitoring Sites

No automatic (continuous) monitoring was undertaken within the Redditch Borough Council area during 2020

#### 3.1.2 Non-Automatic Monitoring Sites

Redditch Borough Council undertook non-automatic (i.e. passive) monitoring of NO<sub>2</sub> at 5 sites during 2020. 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.

### 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<sub>2</sub>)

Table A. in Appendix A compares the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past five years with the air quality objective of 40µg/m<sup>3</sup>. Note that the concentration data presented represents the concentration at the location of the

monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

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

Redditch Borough Council currently does not have any declared AQMAs. Figure A.1 in Appendix A demonstrates that there have been no exceedances of the annual average Air Quality Objective (AQO) for NO<sub>2</sub> concentrations recorded at all monitoring locations for the five-year period 2016 to 2020. Monitoring results demonstrate a decrease in concentrations at all monitoring locations in 2020; this is consistent with trends across Worcestershire. This is likely to have been caused by the reduction in traffic during the 'lockdowns' in 2020 due to the Covid-19 pandemic. There was an average decrease in NO<sub>2</sub> concentrations of 16.9% (3.9µg/m<sup>3</sup>) across the Borough between 2019 and 2020. The decrease between 2019 and 2020 monitoring data should not be considered as indicative of local trends.

It should be noted that diffusion tubes OR4, OR5 and OR6 is a triplicate location (Misty Florist, Other Road), when averaged and bias adjusted the NO<sub>2</sub> concentration for this location is 25.3µg/m<sup>3</sup>. Overall, there is no discernible trend in NO<sub>2</sub> concentrations.

### **3.1.4 Particulate Matter (PM<sub>10</sub>)**

PM<sub>10</sub> is not monitored within Redditch Borough Council.

### **3.1.5 Particulate Matter (PM<sub>2.5</sub>)**

PM<sub>2.5</sub> is not monitored within Redditch Borough Council.

### **3.1.6 Sulphur Dioxide (SO<sub>2</sub>)**

SO<sub>2</sub> is not monitored within Redditch Borough Council.

## Appendix A: Monitoring Results

**Table A.2 – Details of Non-Automatic Monitoring Sites**

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
OR1	Other Road Street Lamp 2237	Roadside	404599	267542	NO2	No	3.0	1.5	No	2.4
OR2 (26N)	14 Other Road	Roadside	404620	267495	NO2	No	0.0	3.0	No	2.1
OR4 (28N), OR5 (29N), OR6	Other Road Misty Florist	Roadside	404629	267467	NO2	No	0.0	4.0	No	2.0
SS	7 Summer Street	Suburban	404376	267242	NO2	No	0.0	2.6	No	2.0
STOR	Lamppost opposite 18 Washford Lane	Urban Background	406603	265783	NO2	No	14.6	0.8	No	2.2

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2020 (%) <sup>(2)</sup>	2016	2017	2018	2019	2020
OR1	404599	267542	Roadside	83.3	42.3	35.4	30.6	35.1	29.4	26.1
OR2 (26N)	404620	267495	Roadside	83.3	42.3	38.2	28.9	38.2	31.8	24.4
OR4 (28N), OR5 (29N), OR6	404629	267467	Roadside	100	51.9	31.2	28.6	36.9	28.5	23.0
SS	404376	267242	Suburban	83.3	42.3	20.0	17.3	19.2	15.8	14.2
STOR	406603	265783	Urban Background	100	51.9			12.9	10.6	8.9

Annualisation has been conducted where data capture is <75% and >33% 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<sup>3</sup>.

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

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

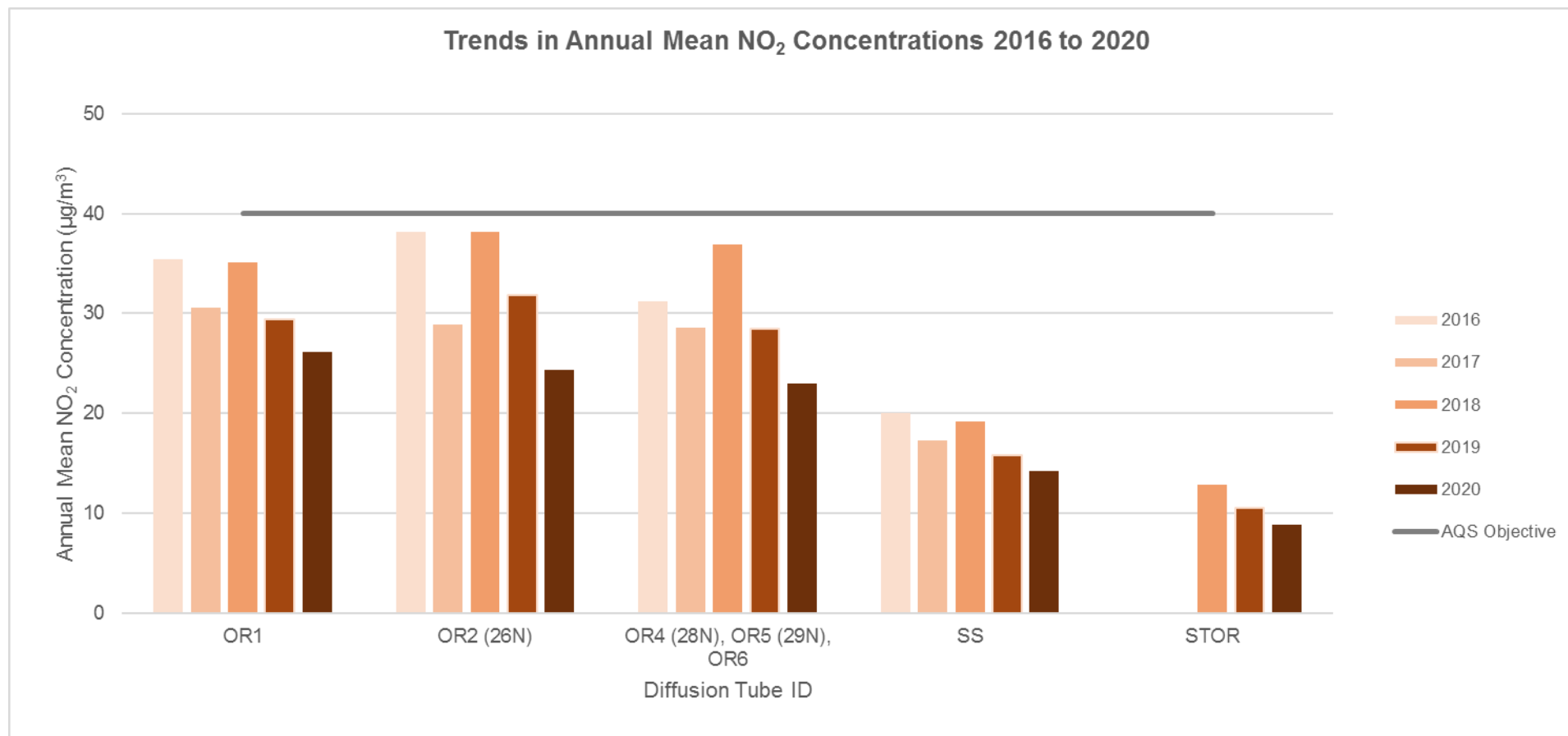
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

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



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

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

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
OR1	404599	267542	-	-	-	-	-	-	24.5	28.8	32.5	35.1	35.6	-	31.3	26.1	-	
OR2 (26N)	404620	267495	-	-	-	-	-	-	22.1	32.5	33.8	-	36.6	35.3	32.0	24.4	-	
OR4 (28N)	404629	267467	-	-	-	-	-	-	21.1	32.7	34.9	25.7	32.5	33.1	-	-	-	Triplicate Site with OR4 (28N), OR5 (29N) and OR6 - Annual data provided for OR6 only
OR5 (29N)	404629	267467	-	-	-	-	-	-	20.9	31.8	-	-	35.3	32.6	-	-	-	Triplicate Site with OR4 (28N), OR5 (29N) and OR6 - Annual data provided for OR6 only
OR6	404629	267467	-	-	-	-	-	-	21.1	30.6	35.2	-	31.8	32.8	29.9	23.0	-	Triplicate Site with OR4 (28N), OR5 (29N) and OR6 - Annual data provided for OR6 only
SS	404376	267242	-	-	-	-	-	-	9.5		16.9	26.9	22.0	22.3	19.5	14.2	-	
STOR	406603	265783	-	-	-	-	-	-	6.8	8.6	11.4	11.8	13.9	17.1	11.6	8.9	-	

- All erroneous data has been removed from the NO<sub>2</sub> diffusion tube dataset presented in Table B.1.
- Annualisation has been conducted where data capture is <75% and >33% 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.
- Redditch Brough Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

### Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

### New or Changed Sources Identified Within Redditch Borough Council During 2020

Redditch Borough Council has not identified any new sources relating to air quality within the reporting year of 2020.

### Additional Air Quality Works Undertaken by Redditch Brough Council During 2020

Redditch Borough Council has not completed any additional works within the reporting year of 2020.

### QA/QC of Diffusion Tube Monitoring

#### Excluded Diffusion Tube Data

In 2020 Redditch Borough Council changed diffusion tube supplier part way through the calendar year. In addition, Redditch Borough Council experienced several months where diffusion tubes were not exposed due to the impact of the Covid-19 pandemic.

Tubes were exposed as follows:

Months	Tubes Exposed?	Tube Supplier
Jan- Feb	Yes	Somerset Scientific Services
March – June	No	n/a
July – December	Yes	Gradko International Limited

Diffusion tube data for January to February 2020 has been omitted from diffusion tube data processing and reporting. Data capture for tubes supplied by Somerset Scientific Services during 2020 is <33% and as such it cannot be annualised in accordance with the methodology outlined in LAQM.TG.16 and subsequently cannot be bias-adjusted in



accordance with the methodology for bias-adjusting data from two laboratories as outlined in LAQM.TG.16.

Confirmation regarding this was sought from the LAQM Helpdesk which confirmed via email on 20<sup>th</sup> May 2021 that the January to February diffusion tube data for 2020 should be excluded from data processing and reporting as a result of insufficient data capture.

For information the raw diffusion tube data for January to February 2020 is provided below:

Diffusion Tube ID	Raw Nitrogen Dioxide Concentration ( $\mu\text{g}/\text{m}^3$ )	
	January 2020	February 2020
OR1	39.24	28.92
OR2 (26N)	32.40	24.77
OR4 (28N)	29.42	22.79
OR5 (29N)	26.62	20.32
OR6	29.42	20.01
SS	20.54	-
STOR	14.57	10.59

Tube data for July to December 2020 represents >33% data capture for tubes supplied by a single laboratory and as such has been annualised and bias-adjusted in accordance with the methodologies prescribed by LAQM.TG.16.

The following UKAS accredited company provides Redditch Borough Council with nitrogen dioxide diffusion tubes and analysis:

Gradko International Ltd

St. Martins House

77 Wales Street

Winchester

SO23 0RH

01962 860 331

[Diffusion@gradko.com](mailto:Diffusion@gradko.com)

The 20% Triethanolamine (TEA) / De-ionised Water preparation method was used. Under the AIR NO<sub>2</sub> Proficiency Testing Scheme, Gradko International Ltd performed 75% satisfactory for January to February and September to October 2020. Results for May to June and July to August were not reported due to the pandemic. Tube precision was

'Good' throughout 2020. Monitoring has been completed in adherence with the 2020 Diffusion Tube Monitoring Calendar.

### Diffusion Tube Annualisation

Annualisation was required for all non-automatic monitoring sites in Redditch Borough Council as only six months monitoring data was gathered for 2020. Data from three AURN monitoring sites, Birmingham Ladywood, Coventry Allesley and Walsall Woodlands was used to provide location specific diffusion tube average annualisation factors to apply to the raw data annual mean giving an annualised annual mean for each location.

### Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2020 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO<sub>x</sub>/NO<sub>2</sub> continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Redditch Borough Council have applied a national bias adjustment factor of 0.81 to the 2020 monitoring data. A summary of bias adjustment factors used by Redditch Borough Council over the past five years is presented in Table C.1.

The national factor bias adjustment factor used was taken from the 03/21 version of the national spreadsheet, derived from eighteen studies by Gradko International Ltd.

**Table C.1 – Bias Adjustment Factor**

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	03/21	0.81
2019	National	03/20	0.78
2018	National	03/19	0.89
2017	National	09/18	0.77
2016	Local	-	0.89

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

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

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

### **QA/QC of Automatic Monitoring**

No Automatic Monitoring was completed in Redditch Borough Council in 2020.

Table C.2 – Annualisation Summary (concentrations presented in  $\mu\text{g}/\text{m}^3$ )

Site ID	Annualisation Factor Birmingham Ladywood	Annualisation Factor Coventry Allesley	Annualisation Factor Walsall Woodlands	Annualisation Factor Site 4 Name	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
OR1	1.0054	1.0482	1.0391	-	1.0309	31.3	32.3	
OR2 (26N)	0.9227	0.9494	0.9513	-	0.9411	32.0	30.1	
OR4 (28N)	0.9295	0.9614	0.9564	-	0.9491	-	-	Triplicate Site with OR4 (28N), OR5 (29N) and OR6 - Annual data provided for OR6 only
OR5 (29N)	0.9295	0.9614	0.9564	-	0.9491	-	-	Triplicate Site with OR4 (28N), OR5 (29N) and OR6 - Annual data provided for OR6 only
OR6	0.9295	0.9614	0.9564	-	0.9491	29.9	28.4	Triplicate Site with OR4 (28N), OR5 (29N) and OR6 - Annual data provided for OR6 only
SS	0.8683	0.9040	0.9155	-	0.8960	19.5	17.5	
STOR	0.9295	0.9614	0.9564	-	0.9491	11.6	11.0	

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

Figure D.1 – Map of Redditch Borough Council Non-Automatic Monitoring Sites

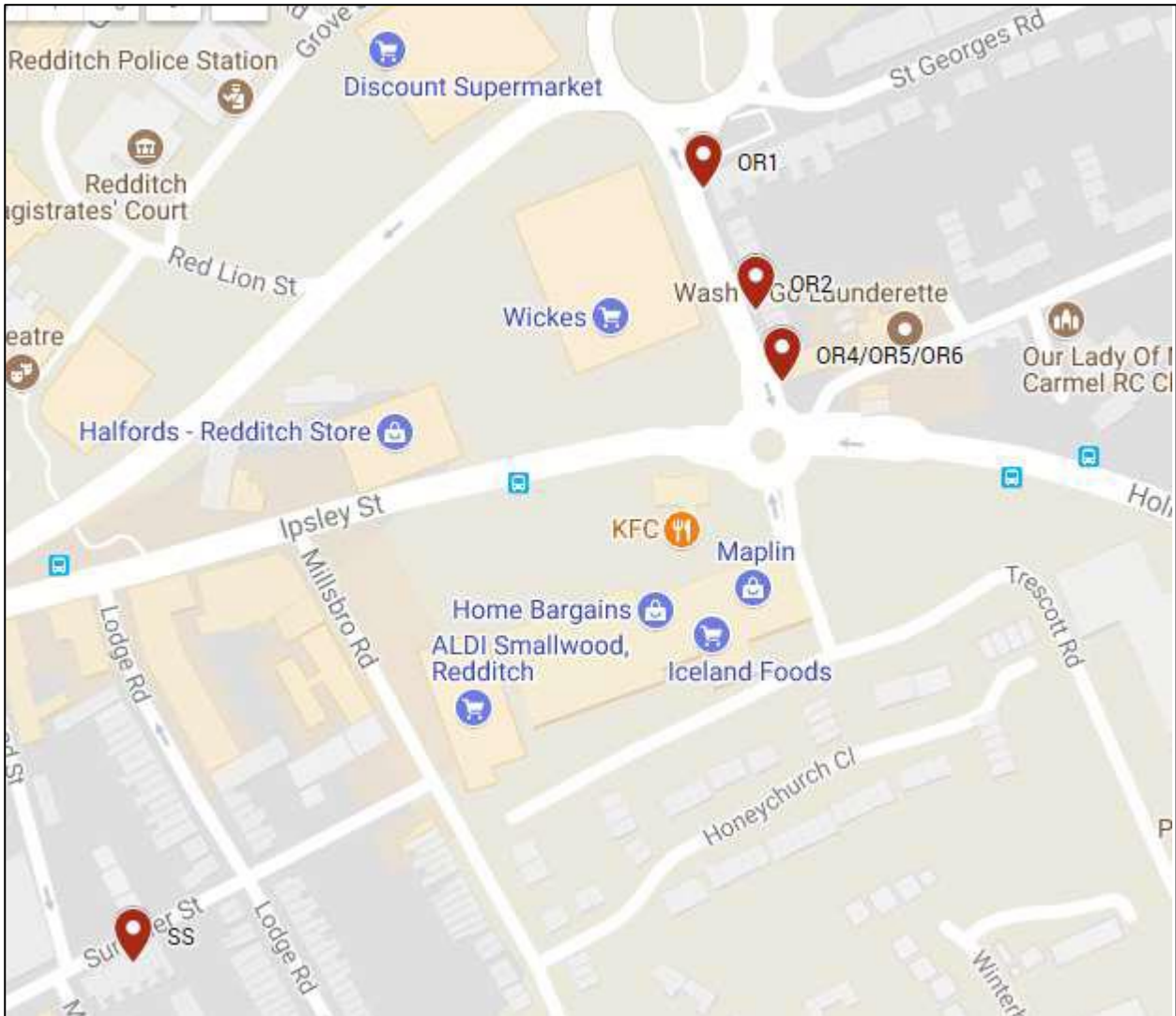


Figure D.2 – Map of STOR Urban Background Non-Automatic Monitoring Site



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

Table E.1 – Air Quality Objectives in England<sup>9</sup>

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

<sup>9</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

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

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

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

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO<sub>2</sub>) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data<sup>10</sup> suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO<sub>x</sub>), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)<sup>11</sup> has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO<sub>2</sub> annual mean

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<sup>10</sup> Prime Minister's Office, COVID-19 briefing on the 31<sup>st</sup> of May 2020

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



concentrations were between 20 and 30% relative to pre-pandemic levels, which represents an absolute reduction of between 10 to 20 $\mu\text{g}/\text{m}^3$  if expressed relative to annual mean averages. During this period, changes in PM<sub>2.5</sub> concentrations were less marked than those of NO<sub>2</sub>. PM<sub>2.5</sub> concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that PM<sub>2.5</sub> concentrations during the initial lockdown period are of the order 2 to 5 $\mu\text{g}/\text{m}^3$  lower relative to those that would be expected under business-as-usual conditions.

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

## Impacts of COVID-19 on Air Quality within Redditch Borough Council

### Traffic Data

Nitrogen Dioxide concentrations in the Redditch Borough Council area are largely linked to road traffic. During the Covid-19 pandemic Worcestershire County Council has collated travel and traffic data for the County. This data has been compared with normal baseline data to give an indication of the impact of Covid-19 lockdowns and restrictions on traffic flows and travel behaviours. Data was gathered from County and DfT sources and included nine live traffic monitors in the Worcester City area and nine further monitors across the County.

Countywide traffic data shows that changes in traffic flows and patterns largely followed the trends seen nationally. Traffic volumes across the County dropped to as low as 34% of normal baseline conditions during the March/April 2020 lockdown and as low as 63% of normal baseline conditions during December 2020 (Figure F.1 below).

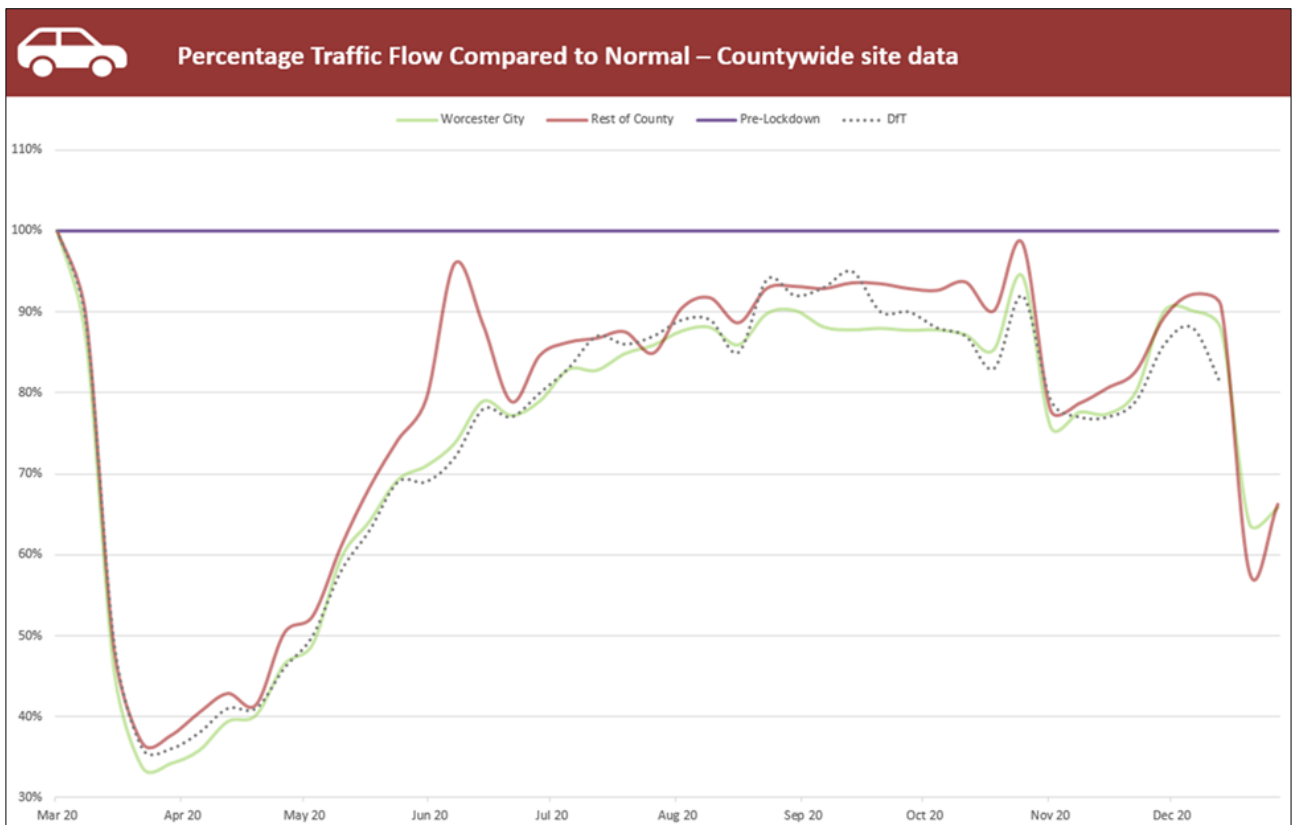
Due to a combination of Covid-19 restrictions and a change of laboratory diffusion tube data for January to June 2020 is not available for the Redditch Borough area and as such it is not possible to comment on any monthly changes in nitrogen dioxide concentrations for the first six months of 2020; including any changes experienced as a result of reductions in traffic associated with the first national lockdown.

A comparison of annual mean nitrogen dioxide concentrations across Redditch Borough Council between 2019 and 2020 shows a general decrease across the Borough at all

locations. An average decrease in concentration of 16.8% (3.9g/m<sup>3</sup>) can be observed across the Borough as a whole.

Whilst Covid-19 restrictions and subsequent reductions in traffic volumes will have influenced nitrogen dioxide concentrations, the Borough has experienced no discernible trends in annual mean nitrogen dioxide concentrations over the period 2016 to 2019 and as such it is not possible to quantify the impact of traffic changes as a result of Covid-19 restrictions on nitrogen dioxide concentrations locally with the data available.

**Figure F.1 – Worcestershire 2020 Percentage Traffic Flow Compared to Normal**



## Opportunities Presented by COVID-19 upon LAQM within Redditch Borough Council

No LAQM specific related opportunities have arisen as a consequence of Covid-19 within the Redditch Borough area.

## Challenges and Constraints Imposed by COVID-19 upon LAQM within Redditch Borough Council

The following challenges and constraints imposed by Covid-19 impacted the LAQM work of the Council:

- Passive monitoring Data Capture – diffusion tubes were not exposed for the months March 2020 to June 2020 due to a combination of laboratory closures and a Council decision not to deploy officers to change tubes due to Covid-19 restrictions. This has affected data capture during 2020, resulting in data from all monitoring sites having to be annualised. **Small/Medium impact**
- Defra Diffusion Tube Exposure Calendar - during months where diffusion tubes were exposed the calendar was adhered to. **No impact**
- Diffusion Tube Storage - during months where diffusion tubes were sent for analysis they were stored and analysed in accordance with laboratory guidance. **No impact**
- Diffusion tube bias-adjustment - in 2019 diffusion tubes were supplied and analysed by Somerset Scientific Services and the national bias-adjustment factor for that laboratory used. The 2019 bias-adjustment factor for Somerset Scientific Services was based on 2 studies. Between July and December 2020 diffusion tubes were supplied and analysed by Gradko International Limited and the national bias-adjustment factor for Gradko used. The 2020 bias-adjustment factor for Gradko is based on 18 studies. **No impact**
- The work of the Worcestershire Air Quality Partnership was due to continue in 2020 however at the time of report writing the work of the group has been postponed indefinitely due to the Covid-19 pandemic. **Small impact.** A small impact is assigned in this case as Redditch Borough Council does not have any AQMAs or other identified areas of poor air quality requiring action.

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

## 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
DoPH	Director of Public Health
EU	European Union
LAQM	Local Air Quality Management
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
RBC	Redditch Borough Council
SO <sub>2</sub>	Sulphur Dioxide
WCC	Worcestershire County Council
WRS	Worcestershire Regulatory Services

## References

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- DEFRA (2021) National Diffusion Tube Bias Adjustment Factor Spreadsheet v.03/21
- DEFRA (2013) Background Mapping for Local Authorities
- Worcestershire Regulatory Services (2013) 'Air Quality Action Plan for Worcestershire'
- Worcestershire Regulatory Services (2015) 'Air Quality Action Plan Progress Report for Worcestershire April 2013-April 2015'
- Worcestershire Regulatory Services (2016) 'Air Quality Action Plan Progress Report for Worcestershire April 2015 – April 2016'
- Worcestershire Regulatory Services (2020) Air Quality Annual Status Report for Redditch Borough Council