2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: June 2021

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Executive Summary: Air Quality in Our Area

Cotswold District Council has continued the diffusion tube monitoring survey for nitrogen dioxide across the district. The sites are representative of relevant exposure and relate to emissions from traffic.

In 2020, our diffusion tube network monitored nitrogen dioxide levels at 16 locations. We have long-term results at 4 of these locations, 3 within our AQMAs and 1 in Cirencester. The remaining 12 locations are around Cirencester, Bourton-on-the-Water, Moreton in Marsh and at Stow-on-the-Wold. One location in Lechlade-on-Thames was repositioned during 2020 and monitoring commenced mid-year in October.

Across the Cotswold District nitrogen dioxide (NO_2) levels fell during the main phases of the Coronavirus pandemic. Although levels at the commencement of the year were similar to those of 2019, by the end of February 2020 levels were falling, presumably as traffic declined in response to the virus. As the first “lockdown” eased in June levels responded and by September were similar to the previous year’s. As Cotswold was moved into higher levels of social restriction at the end of the year, nitrogen dioxide levels fell again to end the year around a third below those of the same month of the previous year.

The District has two Air Quality Management Areas (AQMA). Monitoring of NO_2 was carried out at the AQMA near the junction of Thames Street, Lechlade, where the monitoring point located on the High Street at the junction with Thames Street was removed when the traffic signals were renewed. The monitoring point was relocated to a point across the road some 5m from its original position. Over 2020, monitoring in the vicinity indicates that nitrogen dioxide levels, as with last year, were not at risk of exceeding the National Air Quality Objective, set to protect the health of residents. The national Covid situation of course will have depressed levels in the latter part of the year meaning that monitoring at the repositioned location will need to continue so that we can keep a check on the situation, which is affected by meteorological conditions as well as the number and type of vehicles using the junction, and congestion levels there.

At the Air Balloon Roundabout, Birdlip, the diffusion tube data shows reduced levels of NO_2compared to last year with the adjusted concentrations a little below the national objective level. The cause of the relatively high levels is traffic emissions. The adjusted concentrations were close (within 10%) of the objective level so it is intended that both

monitoring and the AQMA for this location will be maintained to confirm that the observed improvement is sustained.

The air quality issue there is principally related to the quantity of vehicles using this section of road, including HGVs, and the topography; the steep incline on the approach to the roundabout from the Gloucester direction gives rise to the slow moving traffic labouring along this section of the road. A major road improvement scheme is planned for this location and environs which will see the existing road layout replaced. After a public consultation exercise on the proposed route in September and October 2019, Highways England chose a preferred route for a new 3.6 mile dual carriageway, known as Option 30. A further consultation was carried out between October and November 2020 and a response from the Government is awaited.

The recommended changes to the road network in this area are subject to funding from Government being provided and the timeframe for any future alterations is not known. At the time of preparation of this report the DCO (Development Consent Order) proposals were due to be submitted to the planning inspectorate. The proposed changes to the highway layout is likely to improve air quality at the Air Balloon roundabout as the majority of the traffic would be diverted along a new section of road before approaching the roundabout.

Further details will be found in the “Actions to Improve Air Quality” section of this report.

The Council will continue to encourage and support any measures considered by the Highways Agency to improve the situation at the Birdlip AQMA.

Traffic management within our AQMAs is outside the direct control of Cotswold District Council, but the Council has been working with the County Highways Department regarding the traffic management controls at the junction in Lechlade. Alterations in the timing of the traffic lights in recent years to improve traffic flows and reduce periods of congestion appear to have had a positive impact on levels and combined with reduced pollutant emissions from newer vehicles, air quality has improved considerably at this junction.

Other than the amended tube position in Lechlade no other changes were made to tube locations this year. The effects of the coronavirus pandemic have been to reduce overall traffic volumes and measured nitrogen dioxide concentrations are not therefore considered representative of a typical year. Going into 2021, one of the two monitoring sites in Moreton-in-Marsh has been repositioned.

There are no new areas of concern that have been identified within Cotswold District Council's area. Monitoring will continue around the district and will be carried out in accordance with Defra guidance LAQM TG(16). An updated air quality report will be produced in 2022.

Air Quality in the Cotswold District

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

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

Air Quality in the Cotswold Area is generally very good. There are however air pollution hotspots where nitrogen dioxide associated with traffic emissions is higher and where it has been necessary to declare Air Quality Management Areas (AQMA).These areas are typically where houses are very close to a busy road and the pollution from the traffic can be exacerbated by problems with congestion as well as the topography, the presence of street canyons and meteorological conditions such as inversion layers and fog.

Air quality monitoring, using a network of diffusion tubes to measure nitrogen dioxide (NO_2) levels, is undertaken throughout the District. Previous review and assessment of air quality has established that this is the only pollutant of concern in the area. The monitoring results give an annual average for nitrogen dioxide which is assessed for compliance with the National Air Quality Objective of 40 ug/m^3, set to protect health, and compared with the monitoring results from previous years. Current monitoring indicates that background levels were very similar to those of recent years but levels at the more trafficked

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

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

[3] Defra. Air quality appraisal: damage cost guidance, July 2020

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

monitoring sites were noticeably lower. The 16 locations throughout the district where we monitor air quality are mainly roadside locations, of which one is at a site measuring "background" levels and two are situated by junctions in an area of farmland that is to be developed in the future (Chesterton).

The two AQMAs in the district, both declared because nitrogen dioxide levels, relate to traffic emissions and exceeded the national objective at the time of the declaration.

The two AQMAs are:

- the Air Balloon Roundabout in Birdlip, declared in 2008
- an area of Thames Street Lechlade, declared in 2014.

The AQMA at the Air Balloon roundabout is related to the quantity of traffic using the strategic trunk roads and the tailback of traffic on the hill which approaches the roundabout from the Gloucester direction. Here, the diffusion tube data shows reduced levels of nitrogen dioxide (NO_2) compared to last year with the adjusted concentrations a little below the national objective level.

In Thames Street, Lechlade, the AQMA is related to the road which has in the past suffered congestion at the traffic light controlled junction, during rush hours in particular. The levels in Thames Street tend to increase when we have poor meteorological conditions; a street canyon effect combined with frequent foggy conditions when there is an inversion layer due to proximity to the nearby River Thames, exacerbates the accumulation of traffic exhaust emissions as atmospheric dispersion and dilution is inhibited. Since alterations to the timing of the traffic lights, the area is no longer suffering poor air quality; during 2020 the annual average NO_2 level was acceptable, lying below the National Air Quality Objective. However the situation is still being reviewed because, although nitrogen dioxide levels monitored in the High Street fell during both 2018 and 2019, there was a marginal increase in measured annual nitrogen dioxide concentrations at Thames Street in 2019 compared with 2018. As the Covid pandemic affected local traffic levels in most towns and cities from around February 2020, the results of monitoring during 2020 may not be representative of levels that might have been obtained had the year been more "typical". Therefore, monitoring will be continued at this location for at least another year before a decision is made about revoking the AQMA.

The District's air quality monitoring shows that NO_2 levels during 2020 were below the National Air Quality Objective in all locations. At the Air Balloon roundabout, Birdlip, levels have fallen since last year but are close to the National Air Quality Objective of 40 ug/m^3.

The elevated concentrations are expected, as this location is a very heavily trafficked section of road which suffers severe congestion during both morning and afternoon periods (an extended “rush hour”), and there has been no change in the layout of the roads at this roundabout.

The monitoring survey does not indicate any additional areas of concern with regard to air quality within the District. There are no industrial developments with air pollution implications and any development proposals have been considered with regard to their potential to increase traffic pollution in the AQMAs and other areas. We continue to monitor around Chesterton, where we are expecting a major residential development in the future, thus collecting information which will help us identify any change in nitrogen dioxide levels as vehicular traffic in that area increases.

DEFRA has an internet site containing air quality information from all local authorities that have AQMAs. The page for Cotswold District Council reports can be found here:

CDC AQMA Information

Actions to Improve Air Quality

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

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

Air Quality in the Cotswold District is mainly very good. In 2012 an Action Plan to address the AQMA at the Air Balloon roundabout was published. The high nitrogen dioxide levels are due to traffic on the major trunk route, management of which is outside the control of Cotswold District Council. The Action Plan concluded that Cotswold District Council would provide support and encouragement for measures that may help to control traffic and

[5] Defra. Clean Air Strategy, 2019

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

encourage alternative transport, through a working group led by the County Highways Department. These measures are moving forward.

The Government's Road Investment Strategy : 2015-2020 initially identified this road section as requiring measures to improve safety, and to ease congestion and reduce pollution at the Air Balloon Roundabout in due course. Once completed this will provide full dual-carriageway from the M4 at Swindon to the M5 in Gloucestershire and should remove the current traffic bottleneck centred on Crickley Hill, Birdlip and further south at Nettleton. It is hoped that this will significantly reduce nitrogen dioxide concentrations at this location so that the AQMA can be revoked (formally cancelled).

Progress has been made during 2020. After a public consultation exercise on the proposed route in September and October 2019 (details can be found here), Highways England chose a preferred route for a new 3.6 mile dual carriageway, known as Option 30. A further consultation was carried out on updated proposals between October and November 2020and a response from the Government is awaited. The recommended changes to the road network in this area are subject to funding from Government being provided and the timeframe for this is not known, although the Road Investment Strategy 2 (RIS2) : 2020-2025 confirms that the A417 Air Balloon project is committed for the second Road Period 2 (RP2) and that construction of this project is expected to start by 1 April 2025.

There has been no air pollution exceedance in the AQMA at Lechlade this year, but levels in Thames Street are thought to be linked to meteorological conditions and the prevalence of poor dispersion conditions in any year. The levels remain fairly high, so monitoring will continue in this location and the AQMA will not be revoked until levels are consistently below the National Air Quality Objective level. The County Highways Department has renewed the traffic signals this year without changing the timing and thus traffic flows. This appears to have continued the previous positive effect of reducing congestion at the T-junction, with the overall improvement in air quality in this AQMA.

Conclusions and Priorities

Over the next year we will continue the diffusion tube monitoring survey. We will continue discussions with the County Council and Highways England considering the traffic issues in our AQMAs, the impact of measures taken to date and what more might be done to further reduce congestion.

This year's monitoring has shown a marked decrease in nitrogen dioxide levels across the whole of the district with the most significant reductions in urban centres such as Cirencester and with the AQMA at Birdlip. This has been attributed predominantly to the Covid pandemic which affected most activities in the UK from February 2020 and throughout the rest of the year and importantly resulted in a general reduction in traffic levels particularly during the height of the pandemic.

Both the District's AQMAs saw reductions in NO_2 concentrations which although continuing previous trends were larger than would have been expected pre-Covid. The annual concentrations at both were below the air quality objective. However, the AQMAs will not be revoked until levels are consistently below the National Air Quality Objective level.

The Council will continue to work with other bodies especially Highways England to develop the new road A417 scheme especially as it affects the highways approaching the Air Balloon roundabout. It is hoped that this will eventually allow revocation (cancelling) of the AQMA at this location. After continuing monitoring in the centre of Lechlade in 2021 a decision will be made as to whether air quality remains sufficiently improved there to allow this AQMA to be revoked.

Local Engagement and How to get Involved

As the air pollution of concern in the Cotswold District is related to traffic emissions, we can all do our bit to reduce emissions, such as by not using a car unless entirely necessary. Walking or cycling, or taking public transport or car sharing rather than driving an otherwise empty car, reduces our individual carbon footprint.

The solution to congestion-related pollution lies to a large extent in road traffic management and District authorities do not have the remit to manage this. Local interest groups can however lobby County Councils directly to influence the content of Local Transport Plans (LTP).

Copies of the latest Air Quality Report can be found on Cotswold District Council's website at:
Cotswold District Council Air Quality

Any queries about Air Quality should be directed to the Environmental Pollution team within Cotswold District Council. This team can be contacted by email at:
ers@cotswold.gov.uk

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1 Local Air Quality Management

This report provides an overview of air quality in Cotswold District 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 or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Cotswold District Council to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Cotswold District Council can be found in can be found in **Error! Reference source not found.**. Further information related to declared AQMAs are below, maps of AQMA boundaries are in Appendix D and available online at AQMAs Declared by Cotswold District Council and on the Council's own web page: Cotswold District Council's air quality webpage.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Air Balloon Roundabout	08.04.2008	NO_2 Annual Mean	An area encompassing properties adjacent to the roundabout on a strategic trunk route	YES	55 µg/m^3	28.4 µg/m^3	Air Quality Action Plan 2011 - Birdlip – Air Balloon Roundabout Action Plan page Government Road Investment Strategy – proposed new road layout Road Investment Strategy	Cotswold District Council Air Quality Pages
Thames Street, Lechlade	02.04.2014	NO_2 Annual Mean	E.g. An area encompassing a number of properties at the junction of High Street and Thames Street, Lechlade.	No	41 µg/m^3	22.0 µg/m^3	County Council traffic management controls	Need for action plan is under review because of improving air quality

2.2 Progress and Impact of Measures to address Air Quality in Cotswold District

Each year the Council's Air Quality Annual Status Report is submitted to central Government (DEFRA) for peer review before publishing. DEFRA's comments on presentation and treatment of data are considered and where appropriate incorporated into the following year's updated report. Comments arising from the 2020 report review included those shown in Table 2.2 below along with the actions taken.

Table 2.2 Comments and actions arising from the previous years' report

Comment	Action
The second highest NO2 concentration was recorded at the new site NAS26. It is recommended that the Council keep close watch of this site.	NO2 concentrations continued to be elevated at this location, alongside the busy A429 Fosse Way. As this year traffic levels have been affected by the national travel restrictions it is unclear whether the results obtained are representative. Therefore monitoring is to continue at this location.
It would be beneficial for the Council to alter the placement of diffusion tube labels on the maps in Appendix D to offset the labels from the location marker.	Revised location plans have been included in Figure 2.1 and Appendix D below
The introduction of new diffusion tube locations for 2019 is welcomed and the network should continue to be reviewed to ensure the most relevant locations are monitored as required.	New monitoring sites have been set up for commencement in Sept 2020 and January 2021 respectively
Update AQAP	Not yet advanced. This is dependent on progress of proposed A419 highway improvements. However broad objectives as set out in the existing plan have not changed.

Some progress has been made to address air quality in the District and this is described below and summarised in Table 2.3.

One of the two AQMAs in the Cotswolds District is on the A417 at the **Air Balloon Roundabout**. The A417 runs between Gloucester, Cirencester and Swindon and is used by many motorists travelling between London and the West Midlands as a shortcut between the M4 and the M5. Central Government is making funds available for major alterations to the Air Balloon Roundabout and approach roads in due course. Once completed this will provide full dual-carriageway from the M4 at Swindon to the M5 in Gloucestershire and should remove the current traffic bottleneck centred on Crickley Hill, Birdlip and further south at Nettleton.

During 2019, Highways England chose a preferred route for a new 3.6 mile dual carriageway which will cost £435million, known as Option 30. Highways England carried out a public consultation exercise on the proposed route in September and October 2019. This is the current timeline:

- December 2014: Scheme announced
- February - March 2018: Route options consultation
- April 2018 - Spring 2019: Selection and development of preferred route
- Spring 2019: Preferred route announcement
- September 2019: Statutory consultation
- October 2020 Further consultation following changes arising from 2019 consult
- During 2021: -Development Consent Order (DCO) proposals due to be submitted to the planning inspectorate

Further information on the scheme can be found here:

Highways England Information Webpages

The scheme would include:

- Some 3.4 miles of new dual carriageway connecting the existing A417 Brockworth bypass with the existing A417 dual carriageway south of Cowley
- The section to the west of the existing Air Balloon roundabout would follow the existing A417 corridor. However, the section to the south and east of the Air Balloon roundabout would be offline, away from the existing road corridor
- A new junction at Shab Hill, providing a link from the A417 to the A436 towards Oxford and into Birdlip
- A new junction would be included near Cowley, replacing the existing Cowley roundabout.

Highways England has commissioned various environmental studies in connection with preparations for the scheme. Of particular relevance is:

- Arup, A417 Missing Link Preliminary Environmental Information Report, Chapter 5 Air Quality, Sept 2020.

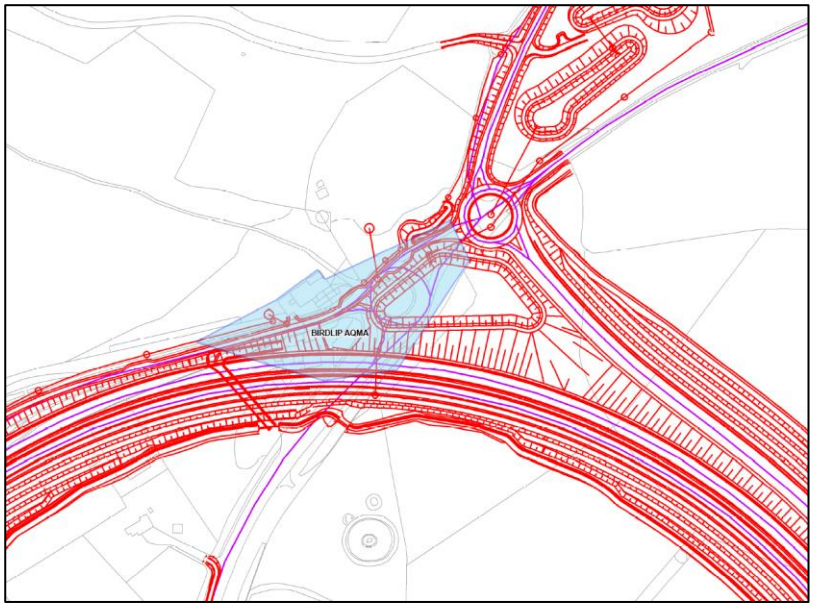
A link is available to this report, here: Link to A417 Air Quality Assessment Report

The consultants undertook modelling of air quality for the project (using ADMS –Roads software) considering an existing (baseline) scenario and the effects on local air quality with and without the proposed scheme, by 2024. The modelling predicts that overall traffic

will increase along the A417 but traffic flow is improved and is moved away from the sensitive receptors (Air Balloon Inn and cottages) at the roundabout. Also, traffic will be significantly reduced south of the Air Balloon Roundabout along the existing alignment. The modelling predicts an improvement in NO_2 concentration of 13ug/m^3 (over 2016 baseline figures see the above report Table 5-6, receptor points 49 and 51) at the AQMA. The modelling has also considered nitrogen deposition as a result of the road scheme, in accordance with the Conservation of Habitat and Species Regulations 2017 (a 'Habitats Regulations Assessment'). At Crickley Hill and Barrow SSSI which is located adjacent to the proposed scheme north of the A417, there is a predicted 47.8% *decrease* in nitrogen deposition. The improvement in nitrogen deposition is due to the proposed scheme moving traffic away from the designated habitat and improved traffic flow.

The report concludes that the proposed A417 scheme does not result in any exceedance of AQOs in new areas and it moves traffic away from a number of properties that are currently located within an AQMA resulting in local improvements in air quality at those areas. The relationship between the existing AQMA, present and proposed road alignments is shown in Figure 2.1.

Figure 2.1 Extract from EIA Section 5 Assessment showing proposed scheme at Birdlip (lines in red) relative to existing scheme (grey) and AQMA (shaded blue)



Progress on this scheme is outside of the direct control of Cotswold District Council, however the Council will continue to keep a watching brief on the development of this project and assist with any technical studies on air quality if approached.

At the **Lechlade AQMA** at the Thames Street junction with the High Street, in recent years Gloucestershire County Council Highways Department has carried out works on the traffic management controls at the T-junction to improve flows and reduce congestion. The overall impact of this work in terms of air quality appears to have improved matters. In the autumn of 2020 the traffic signals were replaced by the County Council and in doing so it became necessary for the District Council to reposition one of its monitors. The Council will therefore continue to assess local air quality particularly to understand the effect of the new signals on traffic flow and thus air pollution, but also in relation to meteorological conditions. These are closely linked to pollution dispersal especially in the winter months when poor dispersion conditions can prevail due to the proximity of the river as well as the street canyon effect. The County Highways Team has confirmed that the new signals have adopted the same timings of the old signals so that there shouldn't be significant change in traffic flows. However, it will be prudent to confirm this over the coming months and monitoring will be continued at this location.

If improvements continue and the current nitrogen dioxide levels are sustained at this AQMA then it is probable that this AQMA could be revoked in coming years.

Table 2.3 – 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	A417 Trunk Road Improvements at Air Balloon Roundabout	Transport Planning and Infrastructure	Other – trunk road improvement	2014	Expected to start by 1 April 2025	Highways England	The second Road Investment Strategy (RIS2)	No	Not funded	£250-500m	Planning	50%	Annual average NO_2 to be reduced to meet AQ objective	Funding secured, planning phase	Lengthy Timescale and funding
2	Thames Street, Lechlade - Reduction of speed limits, 20mph zones	Traffic Management	Congestion management	2017	2017	Gloucestershire County Council	Gloucestershire County Council	No	Funded	n/a	Completed	>20%	Annual average NO_2 to be reduced to meet AQ objective	Completed 2017	None, completed
3	Thames Street, Lechlade - New traffic signals	Traffic Management	Congestion management	2020	2020	Gloucestershire County Council	Gloucestershire County Council	No	Funded	n/a	Completed	Reduced vehicle emissions	Annual average NO_2 to be reduced to meet AQ objective	Completed 2020	None, completed
4	District Planning Policy - Sustainable Transport (POLICY INF3)	Promoting Travel Alternatives	Other	2018	Ongoing	Cotswold District Council	Cotswold District Council	No	Funded	none	Implementation	Reduced vehicle emissions	Annual average NO_2 to be reduced to meet AQ objective	Implementation on-going	None, completed
4	Gloucestershire's Local Transport Plan 2020-41	Promoting Travel Alternatives	Other	2021	Ongoing	Gloucestershire County Council	Gloucestershire County Council	No	Funded	none	Implementation	Reduced vehicle emissions	Annual average NO_2 to be reduced to meet AQ objective	Implementation on-going	None, completed

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

2.3.1 General Approach

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

Other than the potential source from vehicles, the most significant source of $PM_{2.5}$ identified within the District is the burning solid fuel for domestic heating. Average PM2.5 concentrations within the District, based on background mapping data supplied by DEFRA, are low at around 8.4µg/m^3 with a maximum of 10.4µg/m^3. Control at this stage is aligned with the measures designed to achieve a reduction in vehicular emissions alongside new national controls on the sale of solid fuel (see section 3.1.4).

2.3.2 Public Health Outcomes Framework

Public Health England publishes various information related to public health.

The importance of the effect of air pollution on public health is reflected by the inclusion of an indicator of mortality associated with air pollution in the Public Health Outcomes Framework. This is a series of “indicators” prepared by Central Government as a measure of public health in various categories and across the regions of the UK. One category of data is “D01 - Fraction of mortality attributable to particulate air pollution” (2018).

For Gloucestershire as a whole, the estimated Fraction of Mortality attributable to particulate air pollution is ranked 4 out of 15 areas in the South West of England. This equates to a percentage of 4.9% compared with the regional average of 4.4%.

For the Cotswold District, the estimated Fraction of Mortality attributable to particulate air pollution is ranked 9 out of 30 areas in the South West of England. This equates to a percentage of 4.7% compared with the regional average of 4.4%.

PM2.5 is the pollutant which has a significant impact on public health and on which the Public Health Outcomes Framework (PHOF) indicator D01 is based[7]. PM2.5 data is available for 2017 which indicated that for the PHOF indicator Air pollution: fine particulate matter (2017) Cotswold District is ranked 9 out of 30 areas in the South West of England. This equates to annual mean concentrations of 8.0µg m^{-3} PM2.5 compared with the regional average of 7.8µg m^{-3} PM2.5.

[7] Source: Background annual average PM2.5 concentrations for the year of interest are modelled on a 1km x 1km grid using an air dispersion model, and calibrated using measured concentrations taken from background sites in Defra's Automatic Urban and Rural Network (http://uk-air.defra.gov.uk/interactive-map.) Data on primary emissions from different sources and a combination of measurement data for secondary inorganic aerosol and models for sources not included in the emission inventory (including re-suspension of dusts) are used to estimate the anthropogenic (human-made) component of these concentrations. By approximating LA boundaries to the 1km by 1km grid, and using census population data, population weighted background PM2.5 concentrations for each lower tier LA are calculated. This work is completed under contract to Defra, as a small extension of its obligations under the Ambient Air Quality Directive (2008/50/EC). Concentrations of anthropogenic, rather than total, PM2.5 are used as the basis for this indicator, as burden estimates based on total PM2.5 might give a misleading impression of the scale of the potential influence of policy interventions (COMEAP, 2012).

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

This section sets out the monitoring undertaken within 2020 by Cotswold District 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.

The 2020 monitoring year was largely one of consolidation not least because the Coronavirus pandemic limited both staff availability and mobility around the District. During April 2020, due to staff being redeployed on to emergency duties, NO_2 diffusion tubes were not placed during that month.

However for the rest of the year we continued monitoring at 16 locations. Of these, 3 were within our AQMAs (NAS37, NAS38 in Lechlade and NAS39 at Birdlip). The majority of the remainder were within Cirencester, partly in response to requests of local residents represented by a pressure group known as “Save Our Cirencester”, who wished to see more monitoring carried out around Cirencester itself. During 2020 we continued to monitor in the same locations within Cirencester.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Cotswold District Council has no automatic (continuous) monitoring sites within its area.

3.1.2 Non-Automatic Monitoring Sites

Cotswold District Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 16 sites during 2020. **Error! Reference source not found.** in Appendix A presents the d etails 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

3.1.3 Nitrogen Dioxide (NO_2)

The air quality monitoring results presented in this section are, where relevant, ratified then 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.

As there were at least 9 months data for all but 2 monitoring sites, annualisation was not required for most of those. However there were 2 sites where monitoring was for only part of the year; this was at High Street Lechlade where work to renew the traffic signals resulted in the enforced relocation of the diffusion tube (NAS 38 to location NAS38a). Therefore annualisation was carried out to provide an estimated annual exposure. 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.

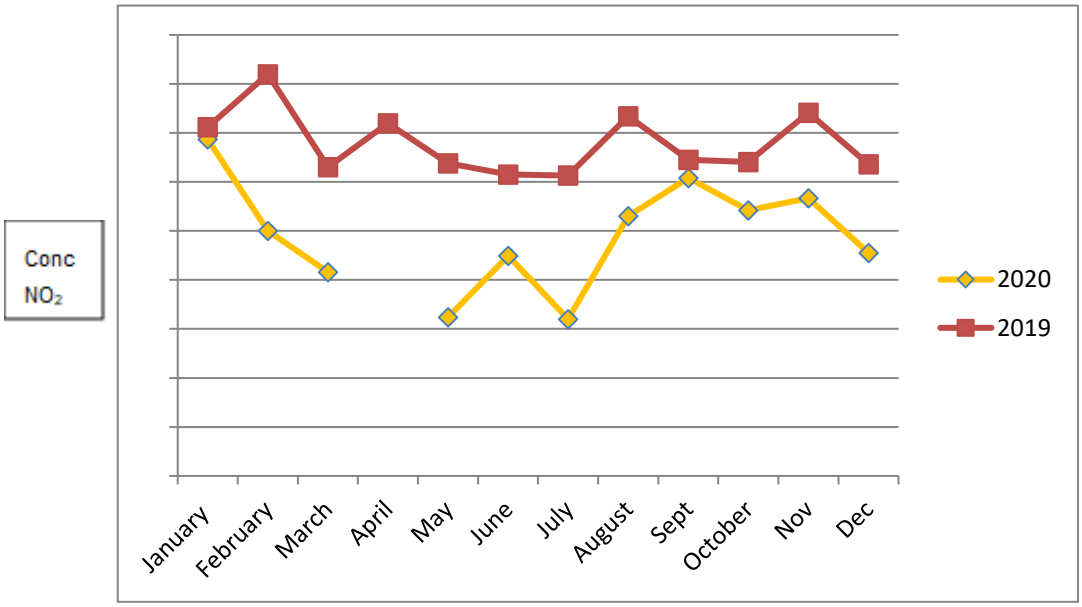
Table A.2 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years (where available), for comparison with the air quality objective of 40µg/m^3. The full 2020 dataset of monthly mean NO_2 levels from the diffusion tube survey is provided in Appendix B.

Across the District the Coronavirus pandemic began to take effect from February 2020 with the first lockdown preventing much of the usual traffic from mid-March 2020. Various phases of social restrictions during the rest of 2020 had a related effect on traffic volumes and thus it seems NO2 concentrations at the locations measured.

Nitrogen dioxide levels remained high within the Air Balloon roundabout AQMA, which is as expected given the significant volume of traffic on this strategic trunk route, but were significantly lower than last year’s levels. The bias adjusted mean annual nitrogen dioxide level at this location was a little below 40 µg/m^3, set as the national objective level to protect health, which when adjusted for distance to the dwellings there reduced much further to be around 25% less than the previous year’s. Reduction in traffic flows because of the pandemic throughout most of 2020 is thought to be the primary cause. So, although the adjusted concentrations (28.4 µg/m^3) were well below the objective level (40 µg/m^3) and this is the second year in a row that the objective level has not been exceeded, it is intended that both monitoring and the AQMA for this location will be maintained to confirm that the observed improvement is sustained.

Figure 3.1 shows a comparison of 2020's monthly concentration readings compared with the same periods in 2019. Note that although the year began in January 2020 with similar levels to the 2019 data, it fell rapidly in February as the pandemic developed, recovering in the summer of 2020 as restrictions were lifted and falling away in the autumn of 2020 as further restrictions were introduced.

Figure 3.1 Comparison NO2 concentrations, Air Balloon, during 2019 and 2020



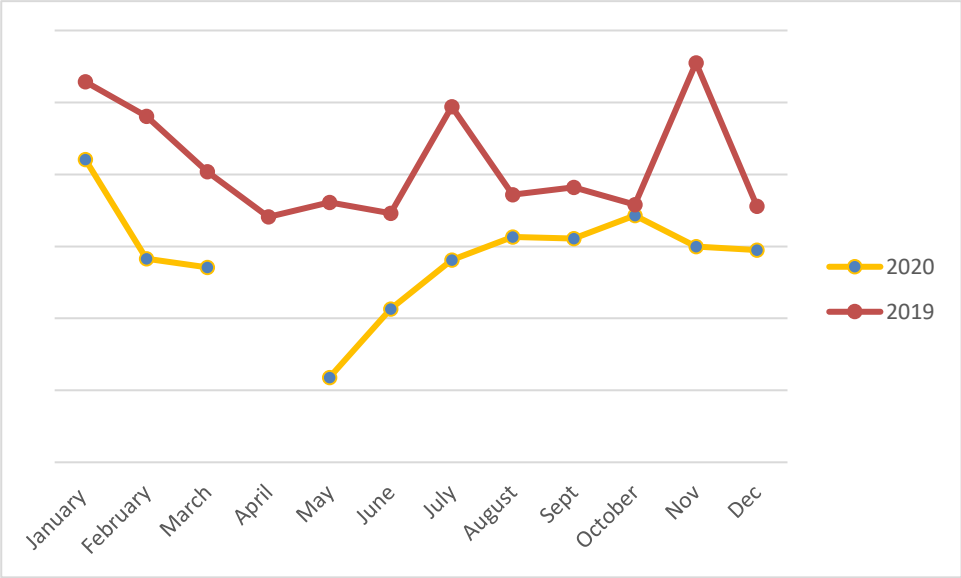
NB concentrations illustrated are measured concentration without correction for bias nor adjusted for distance to receptor. Data for April 2020 was not collected due to the Covid pandemic.

The annual average nitrogen dioxide level in Thames Street, Lechlade continued to remain below the 40 µg/m^3 national objective level. Exhaust emissions from idling traffic queuing at the High Street junction traffic lights, cause elevated levels at this junction. The County Highways Department has altered the timing of the traffic light controls in an attempt to reduce congestion in Thames Street. Thames Street often suffers fog during inversion conditions, due to its proximity to the River Thames and dispersion of vehicle exhaust emissions is hampered by the relatively high buildings either side of the narrow road. Annual average nitrogen dioxide levels here are thought to be linked to the frequency of these meteorological conditions during the year.

Figure 3.2 shows a comparison of 2020's monthly concentration readings compared with the same periods in 2019. As with the Air Balloon roundabout, levels of NO_2 were generally lower than the previous year with recovery towards higher levels following the

easing of the first lockdown in the early summer of 2020. Levels were significantly lower towards the end of 2020 as further Covid restrictions started to have their effect on travel.

Figure 3.2 Comparison NO2 concentrations, Lechlade Thames St, during 2019 and 2020



It is noted that during the autumn of 2020 there were significant roadworks in High Street Lechlade to install replacement traffic signals. Specifically this occurred during the period 7 September - 16 October 2020. The raw measured concentrations of nitrogen dioxide during that period deviate less from those of 2019 than at other times of the year as set out in Table 3.1 below. This may reflect the net effect of traffic disruptions and some easing of pandemic-related traffic reductions at this time. It may have had a similar effect on adjoining Thames Street. The timings on the new traffic signals are not different to the previous set so no significant change is expected. The Council will continue diffusion tube monitoring in the area and maintain the AQMA.

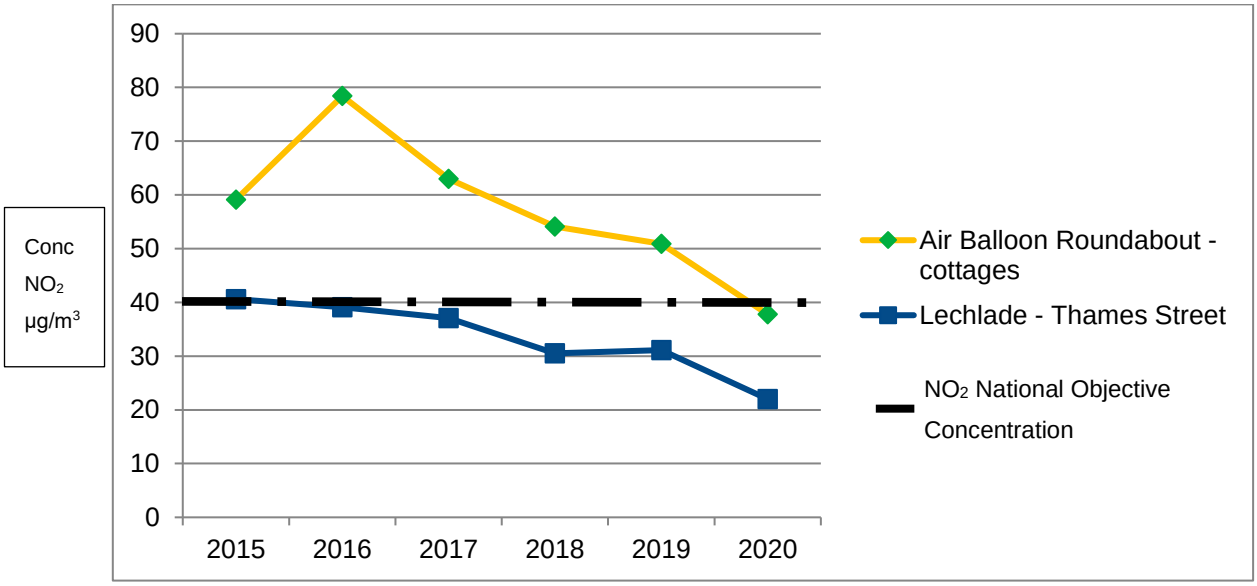
Table 3.1 High St, Lechlade NO_2 Comparison Autumn 2019 and 2020*

Year	NO_2 µg/m^3	NO_2 µg/m^3
	October	November
2019 (NAS38)	35.8	45.9
2020 (NAS38a)	34.1	40.1

*NB raw, unadjusted data, for comparison

Figure 3.3 illustrates the change in annual mean NO_2 concentrations within the AQMAs over the last 5 years. Note the gradual decline at both locations since 2016, albeit more marked at Air Balloon Roundabout, Birdlip.

Figure 3.3 – Trends in Annual Mean NO_2 Concentrations - Graph showing the trends over 5 years at AQMA long-term diffusion tube monitoring sites



NB concentrations illustrated are measured concentration corrected for bias but not adjusted for distance to receptor.

The levels recorded during 2020 at our other roadside sites were also significantly less than the previous year's levels with the areas with higher NO_2 concentrations showing the most marked falls. This reflects their location largely in urban areas and at junctions in particular which would have experienced significant falls in traffic flows because of the pandemic.

Most of the Cirencester monitoring locations experience relatively low annual average levels of NO_2 considering they are roadside locations. The highest results are found in Grove Lane at the junction with Spitalgate Lane, and at Burford Road traffic lights at the junction with the A417 main road. In the months where dispersion is hindered by poor meteorological conditions the levels are the highest as would be expected.

The Berkeley Road and the Spratsgate Lane sites, around Chesterton Farm mostly experienced NO_2 levels below 10 µg/m^3 which are generally expected in locations away from any sources. This can be considered as the "background" level in the Cotswolds, but will be reviewed as and when proposed developments in this area commence. These sites are in the Chesterton Farm vicinity and are being monitored so we can see the change when the new residential development is built.

3.1.4 Particulate Matter

Measurements of particulate matter were not made within the District.

The UK Government has produced a selection of statistics on annual emissions to air in the UK for the period 1970 to 2019. Whilst there has been a long-term decrease in the emissions of all of the air pollutants covered, burning of other solid fuels for domestic heating and industry has increased in recent years and this is having an adverse effect on the release of particulate matter. Decreases in emissions of particulates from many sources have been partially offset by increases in emissions from residential burning (domestic solid fuel heating; emissions of PM2.5 from this source increased by 28 per cent between 2009 and 2019). In fact domestic combustion using wood as a fuel accounted for 38 per cent of primary emissions of PM2.5 in 2019. This reflects the increasing popularity of solid fuel appliances in the home such as wood-burning stoves. Now emissions of particulates from domestic burning is now cumulatively greater than that from road transport.

As a reflection of these concerns, new legislation has come into effect in England, controlling the sale of wood and coal for domestic heating. Under the Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020, wet wood (that is, wood having a moisture content of more than 20%) cannot be sold in units of less than $2m^3$. The same legislation outlaws sale of bags of coal for domestic fireplaces. This is intended to encourage use of approved kiln-dried logs which produce much less smoke and thus particulates.

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)
NAS26	Unicorn PH, Stow on the Wold, Gloucestershire	Roadside	419003	225693	NO2	None	6.5	1.2	No	2.1
NAS27	Coach Park,Station Road,Bourton-on-the-Water, Gloucestershire	Urban Centre	417028	220781	NO2	None	15.2	6.4	No	2.5
NAS28	Burford Rd Traffic lights j/w A417, Cirencester, Gloucestershire	Roadside	403020	202175	NO2	None	10.0	1.5	No	2.3
NAS29	Abbey Way j/w Spitalgate, Cirencester, Gloucestershire	Roadside	402305	202519	NO2	None	6.0	1.4	No	2.2
NAS30	London Road, Cirencester, Gloucestershire	Kerbside	402783	201946	NO2	None	5.8	2.8	No	2.2
NAS31	Lewis Lane, Cirencester, Gloucestershire	Roadside	402480	201772	NO2	None	2.7	1.5	No	2.1
NAS32	Hammond Way, Cirencester, Gloucestershire	Roadside	402039	201765	NO2	None	8.0	1.7	No	2.4
NAS33	Tetbury Road, Cirencester (O/S Steading Cottages), Gloucestershire	Roadside	401064	201044	NO2	None	3.8	2.9	No	2.2
NAS34	Spratsgate Lane nr j/w Park Way, Cirencester, Gloucestershire	Roadside	402394	199581	NO2	None	0	2.3	No	2.1

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)
NAS35	NAS35 - Berkeley Road j/w Somerford Road, Cirencester	Roadside	402439	200297	NO2	None	15	0.5	No	2.1
NAS36	Somerford Road, Cirencester, Gloucestershire (on lamp post 6)	Roadside	402241	201102	NO2	None	4.6	1.7	No	2.4
NAS37	NAS37 - Thames Street, Lechlade, Gloucestershire	Kerbside	421365	199503	NO2	Lechlade AQMA	0.2	1.3	No	2.4
NAS38	NAS38 - High Street, Lechlade, Gloucestershire	Kerbside	421374	199511	NO2	Lechlade AQMA	0.3	2.0	No	2.1
NAS38A	4 High Street, Lechlade , Gloucestershire (from 29/09/20)	Kerbside	421367	199515	NO2	Lechlade AQMA	0	1.0	No	2.2
NAS39	Air Ballon Roundabout, Birdlip, Gloucestershire	Kerbside	393462	216111	NO2	Birdlip AQMA	4.2	1.1	No	2.1
NAS42	A429 j/w A44 (White Horse Hotel) Moreton-in-Marsh , Gloucestershire	Roadside	420486	232419	NO2	None	0.4	3.3	No	2.4

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 2020 (%) (2)	2016	2017	2018	2019	2020
NAS26	419003	225693	Roadside		92.0	-	-	-	38.7	29.3
NAS27	417028	220781	Urban Centre		84.3	-	-	13.6	10.8	8.4
NAS28	403020	202175	Roadside		76.6	-	-	-	29.8	22.1
NAS29	402305	202519	Roadside		92.0	-	34.8	29.8	29.9	23.8
NAS30	402783	201946	Kerbside		92.0	30.4	25.7	22.6	23.4	17.7
NAS31	402480	201772	Roadside		92.0	-	22.6	20.9	20.6	15.7
NAS32	402039	201765	Roadside		82.1	-	21.0	18.1	17.2	13.2
NAS33	401064	201044	Roadside		92.0	-	24.6	21.8	21.6	16.2
NAS34	402394	199581	Roadside		92.0	-	9.6	9.5	9.3	7.4
NAS35	402439	200297	Roadside		92.0	-	9.4	9.4	9.9	7.0
NAS36	402241	201102	Roadside		92.0	-	17.6	14.5	14.9	11.2
NAS37	421365	199503	Kerbside		92.0	**41.5**	36.2	30.5	31.1	22.0
NAS38	421374	199511	Kerbside	100	57.1	29.1	29.0	28.0	26.2	19.5
NAS38A	421367	199515	Kerbside	100	27.2	-	-	-	-	22.8
NAS39	393462	216111	Kerbside		92.0	**61.2**	**61.4**	**54.1**	**50.9**	37.7
NAS42	420486	232419	Roadside		92.0	-	-	-	29.0	20.0

Notes:

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

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

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

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 2020 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.77)	Annual Mean: Distance Corrected to Nearest Exposure
NAS26	419003	225693	**40.0**	30.1	33.5		27.4	33.2	33.9	**49.6**	**51.1**	**40.9**	39.5	37.2	38.0	29.3	-
NAS27	417028	220781	14.8	Missing	12.6		5.2	7.3	4.2	11.5	9.2	11.5	16.5	15.7	10.9	8.4	-
NAS28	403020	202175	Missing	Missing	27.1		7.4	21.5	23.3	31.4	33.0	35.5	35.7	41.5	28.7	22.1	-
NAS29	402305	202519	**43.1**	31.3	29.7		19.6	26.1	18.4	31.0	32.3	34.9	32.9	39.1	30.9	23.8	-
NAS30	402783	201946	37.0	28.0	25.4		10.0	13.9	13.5	19.1	23.7	24.4	28.8	30.5	23.0	17.7	-
NAS31	402480	201772	33.0	23.3	22.7		9.3	14.4	12.5	16.4	21.7	23.7	22.2	25.6	20.4	15.7	-
NAS32	402039	201765	31.0	24.5	20.1		7.9	11.7	8.8	14.5	16.3	16.4	23.3	Missing	17.2	13.2	-
NAS33	401064	201044	31.4	12.0	18.8		12.8	18.7	13.8	20.6	24.5	24.2	27.5	27.0	21.1	16.2	-
NAS34	402394	199581	13.7	8.6	10.2		5.9	7.7	2.6	8.0	8.9	9.5	15.6	14.5	9.6	7.4	-
NAS35	402439	200297	12.9	8.1	9.7		5.9	8.2	2.7	7.8	9.5	7.7	14.6	12.7	9.0	7.0	-
NAS36	402241	201102	22.3	16.4	16.1		6.8	10.4	5.8	11.1	13.4	15.3	20.7	21.3	14.5	11.2	-
NAS37	421365	199503	**42.1**	28.3	27.1		11.8	21.3	28.1	31.3	31.1	34.3	30.0	29.5	28.6	22.0	-
NAS38	421374	199511	31.7	19.3	24.5		18.5	20.3	14.2	27.2	Missing				22.3	19.5	-
NAS38A	421367	199515										34.1	**40.1**	37.2	36.9	22.8	-
NAS39	393462	216111	**68.7**	**50.0**	**41.6**		32.4	**44.9**	32.0	**53.0**	**60.8**	**54.2**	**56.7**	**45.5**	**48.9**	37.7	28.4
NAS42	420486	232419	35.2	30.2	28.4		16.3	23.5	16.3	27.2	27.7	23.8	26.8	30.7	25.9	20.0	-

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Cotswold District During 2020

Cotswold District has not identified any new sources relating to air quality within the reporting year of 2020.

Additional Air Quality Works Undertaken by Cotswold District During 2020

Cotswold District has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

Supplier of Diffusion Tubes

The diffusion tubes (50% TEA in acetone) were supplied and analysed by Socotec Didcot laboratories.

Tube Manufacturing Fault

In March 2020 the Council was notified by the laboratory that that month's batch of tubes had been sent out by the laboratory with a manufacturing fault resulting in some atmospheric contamination of certain tubes that was only discovered sometime later. The results of the analysis indicate that the contamination ranges from no contamination to a positive bias of 0.5 micrograms of NO_2 on the tubes, equivalent to approximately 0 - 8 ug/m3 or 0 to 4 ppb positive bias on the result. Nevertheless, the results of these tubes have been included in this report because the month in question coincided with significant societal changes in England following the announcement of a national lockdown due to Covid and thus significant changes in traffic volumes on the highways that in themselves would result in unseasonably low pollution concentrations. The results from the Covid lockdown periods in 2020 are not necessarily representative of pollution levels that might have been experienced around the District had traffic levels been "typical" of other years.

Effects of Pandemic on Diffusion Tube Placement

It should be noted that the diffusion tubes were not placed around the District during April 2020. This was due to the Covid pandemic and specifically because of the closure of the analysis laboratory. The monitoring was resumed after opening of the laboratory the following month.

Diffusion Tube Annualisation

Where monitoring has been completed for less than 75% of the year, annualisation techniques can be used to estimate an annual average from a part year average. For annualisation to be completed there must be 3 months of monitoring data available. Monitoring at 2 sites (NAS38 and NAS38a, Lechlade) was carried out only part year as the monitoring location at NAS38 was lost part way through the year and the revised location was only set up and operational from October 2020, meaning that data was only made available for 8 months and 3 months of the year respectively.

A measured mean concentration for the respective periods of exposure is available for each location. However it will be necessary to estimate the annual mean for these 2 locations, for comparison with the annual target concentration, because less than 75% availability for this area.

The procedure involves the following steps:

1. Identification of two to four nearby, long-term, continuous monitoring sites, ideally those forming part of the national network. The data capture for each of these sites should ideally be at least 85%. These sites should be background (Urban Background, Suburban or Rural) sites to avoid any very local effects that may occur at Urban Centre, Roadside or Kerbside sites, and should, wherever possible lie within a radius of about 50 miles. If no background sites are available, and the site to be annualised is itself a Urban Centre, Roadside or Kerbside site, then it is permissible to annualise using roadside or kerbside sites rather than background sites.

The nearest sites that have characteristics similar to the areas requiring normalisation are located in Swindon and Oxford (St Ebbes).

2. Obtain the annual means, ‘Am’, for the calendar year for these sites.

3. Work out the period means, ‘Pm’, for the period of interest, in this case Jan-Aug 2020 and Oct-Dec 2020 for the two sites.

4. Calculate the ratio, ‘R’, of the annual mean to the period mean (‘Am/Pm’) for each of the sites.

5. Calculate the average of these ratios, ‘Ra’. This is then the annualisation factor.

6. Multiply the measured period mean concentration ‘M’ by this annualisation factor Ra to give the estimate of the annual mean for 2020.

The results of this process are shown in Table C.2.

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_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.

National bias adjustment factors have been used from Defra database, available at:

Link to DEFRA National Bias Adjustment factors (see more below).

Cotswold District Council has applied a national bias adjustment factor of 0.77 (based on 22 studies) to the 2020 monitoring data and this was applied to all diffusion tubes. A summary of bias adjustment factors used by Cotswold District Council over the past five years is presented in Table C.1. An extract of the information supporting the choice of national factor selected is set out below

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/21

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

This spreadsheet will be updated at the end of June 2021

LAQM Helpdesk Website

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

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

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

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

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

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

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

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

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

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

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[5]	Bias Adjustment Factor (A) (Cm/Dm)
SOCOTEC Didcot	50% TEA in acetone	2020	R	East Suffolk Council	12	30	25	19.6%	G	0.84
SOCOTEC Didcot	50% TEA in acetone	2020	UB	Canterbury City Council	10	13	10	28.1%	G	0.78
SOCOTEC Didcot	50% TEA in acetone	2020	R	Canterbury City Council	9	26	20	29.6%	G	0.77
SOCOTEC Didcot	50% TEA in acetone	2020	UB	Kingston upon Hull City Council	12	24	18	34.8%	G	0.74
SOCOTEC Didcot	50% TEA in acetone	2020	R	Ipswich Borough Council	12	27	21	28.5%	G	0.78
SOCOTEC Didcot	50% TEA in acetone	2020	R	Ipswich Borough Council	12	36	26	36.3%	G	0.73
SOCOTEC Didcot	50% TEA in acetone	2020	R	Thanet District Council	9	20	17	21.2%	G	0.83
SOCOTEC Didcot	50% TEA in acetone	2020	R	Medway Council	12	26	18	41.7%	G	0.71
SOCOTEC Didcot	50% TEA in acetone	2020	B	Medway Council	11	20	10	96.3%	G	0.51
SOCOTEC Didcot	50% TEA in acetone	2020	B	Gravesham Borough Council	12	23	22	5.6%	G	0.95
SOCOTEC Didcot	50% TEA in acetone	2020	B	Gravesham Borough Council	12	27	24	16.1%	G	0.86
SOCOTEC Didcot	50% TEA in acetone	2020	R	Monmouthshire County Concil	10	32	24	35.3%	G	0.74
SOCOTEC Didcot	50% TEA in acetone	2020	UI	North Lincolnshire Council	13	18	14	26.6%	G	0.79
SOCOTEC Didcot	50% TEA in acetone	2020	R	City of York Council	12	24	19	29.0%	G	0.78
SOCOTEC Didcot	50% TEA in acetone	2020	R	City of York Council	11	22	17	34.3%	G	0.74
SOCOTEC Didcot	50% TEA in acetone	2020	R	City of York Council	12	33	23	40.4%	G	0.71
SOCOTEC Didcot	50% TEA in acetone	2020	R	Cambridge City Council	10	30	20	47.6%	G	0.68
SOCOTEC Didcot	50% TEA in acetone	2020	R	Wrexham County Borough Council	9	17	13	26.6%	G	0.79
SOCOTEC Didcot	50% TEA in acetone	2020	KS	Marylebone Road Intercomparison	11	59	43	38.0%	G	0.72
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	10	23	23	2.2%	G	0.98
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	12	22	19	18.6%	G	0.84
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	9	25	18	42.0%	G	0.70
SOCOTEC Didcot	50% TEA in acetone	2020		Overall Factor[3] (22 studies)				Use		0.77

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	03/21	0.77
2019	National	03/20	0.75
2018	National	03/19	0.76
2017	National	03/18	0.79
2016	National	03/17	0.78

NO_2 Fall-off with Distance from the Road

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

Corrections for distance (to allow for the distance the diffusion tubes are from the roadside) have been made within this assessment. This is at one site (NAS39) where concentrations are not representative of actual exposure (because the receptor is set back from the roadway) fall within 10% of the annual mean objective.

Distance correction has been made where appropriate using the DEFRA correction tool.

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

Site ID	Annualisation Factor Swindon Walcot AURN	Annualisation Factor St Ebbes	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
NAS38	1.1650	1.1060	1.1355	22.3	25.3	
NAS38a	0.7765	0.8290	0.8028	36.9	29.6	

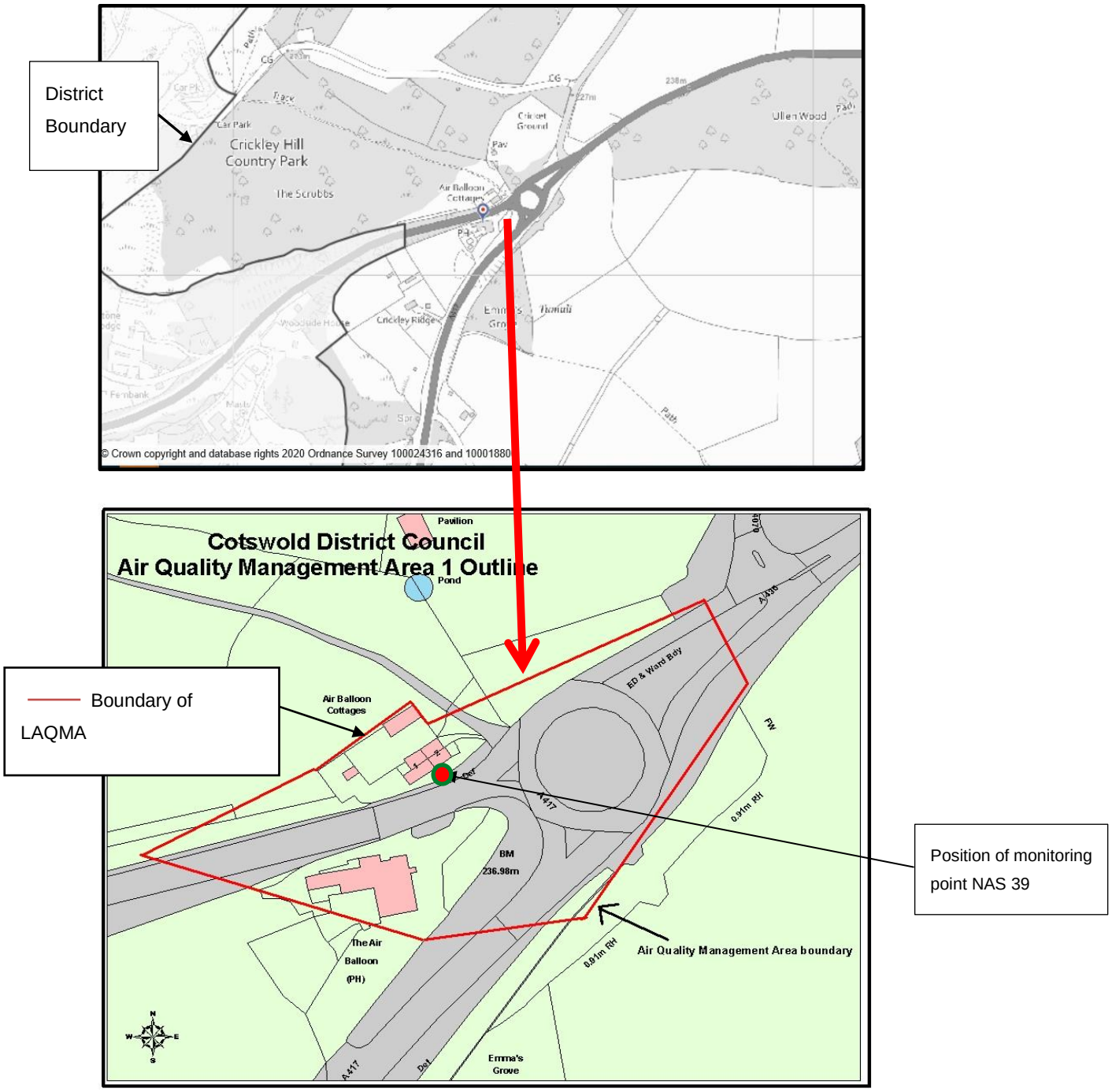
Table C.3 – NO_2 Fall off With Distance Calculations (concentrations presented in $\mu g/m^3$)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
NAS39	1.1	5.3	37.7	9.0	28.4	

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.2 – Maps of AQMA Boundaries

Air Balloon Birdlip



Cotswold Distict Council
Air Quality Management (Thames Street, Lechlade 2014) Area

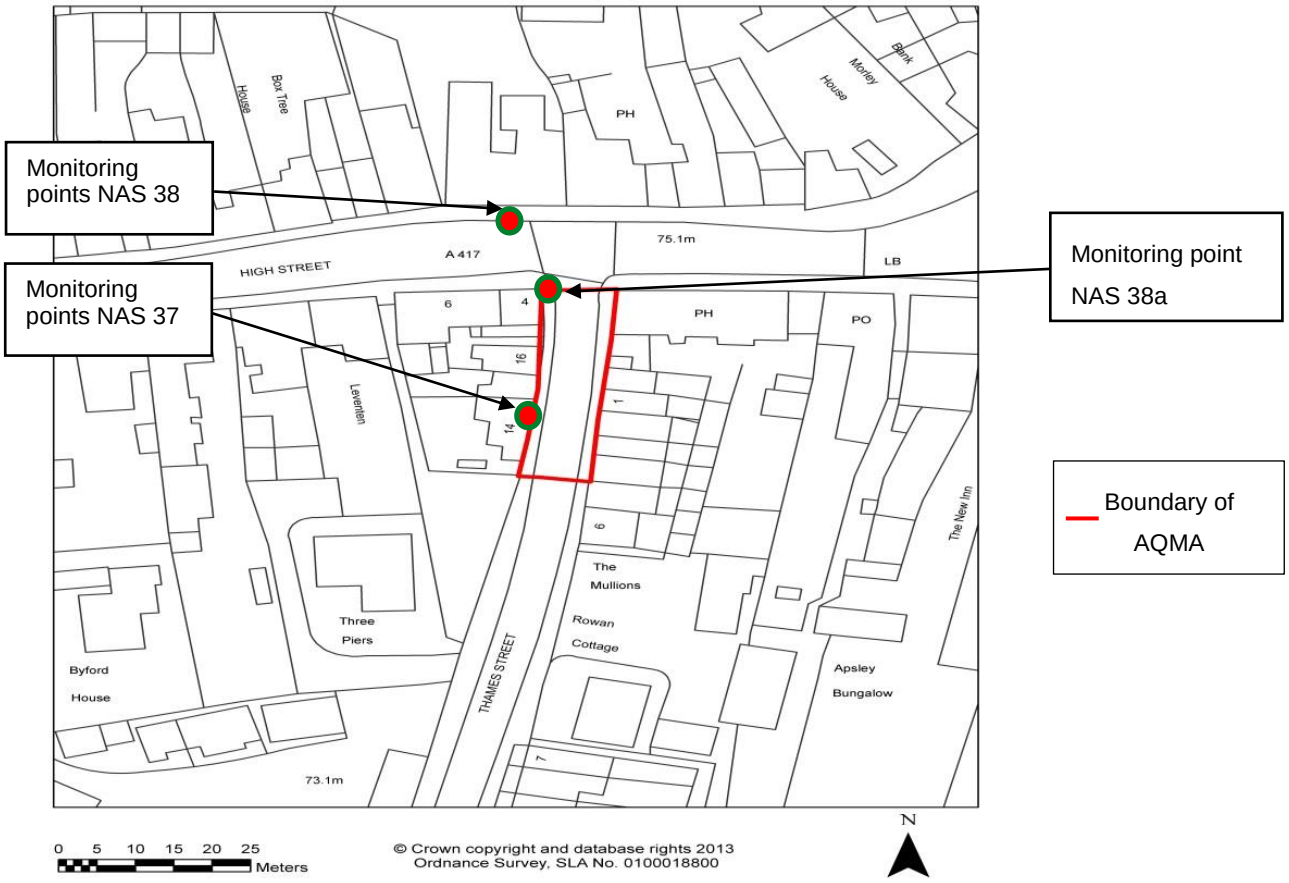
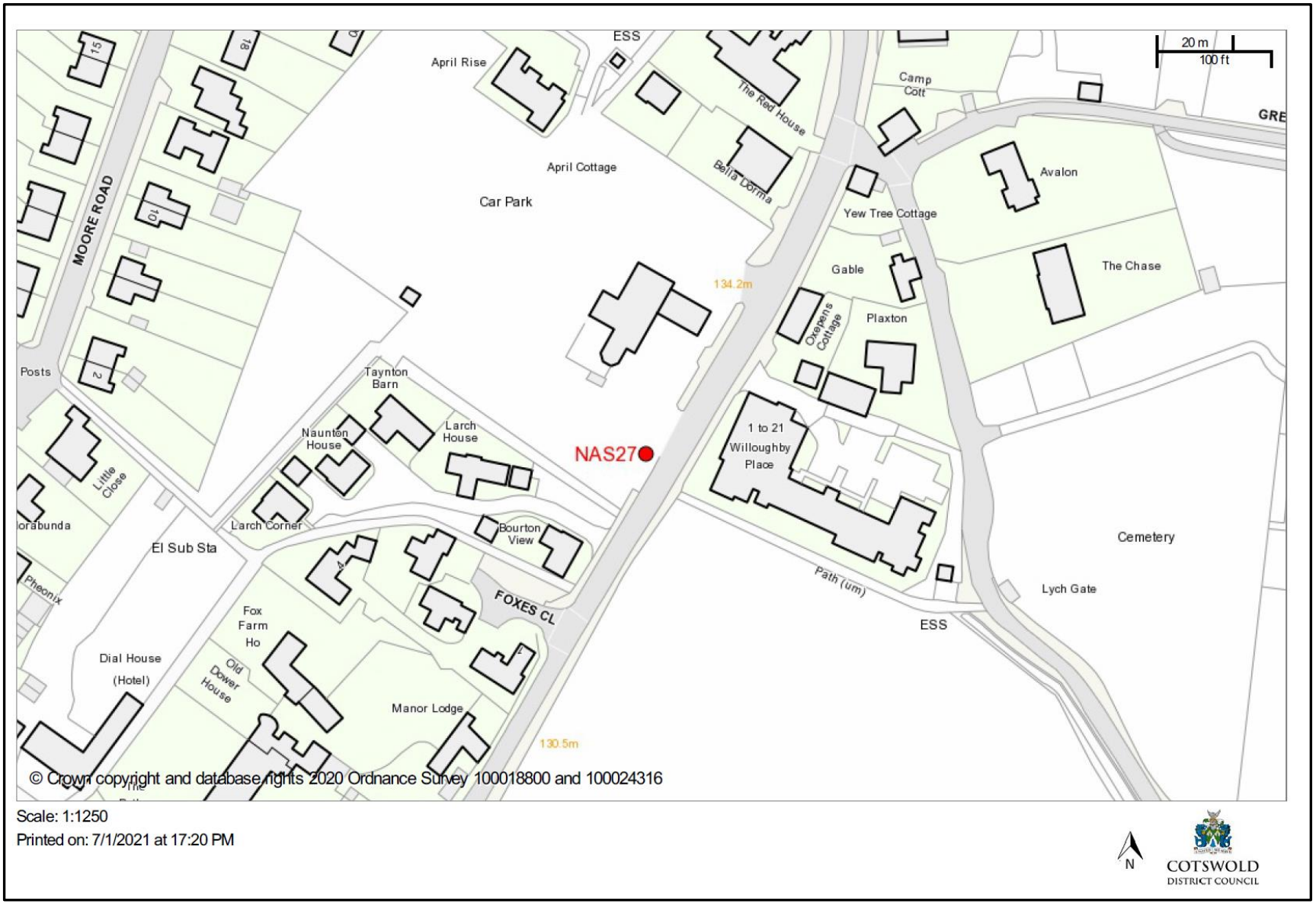


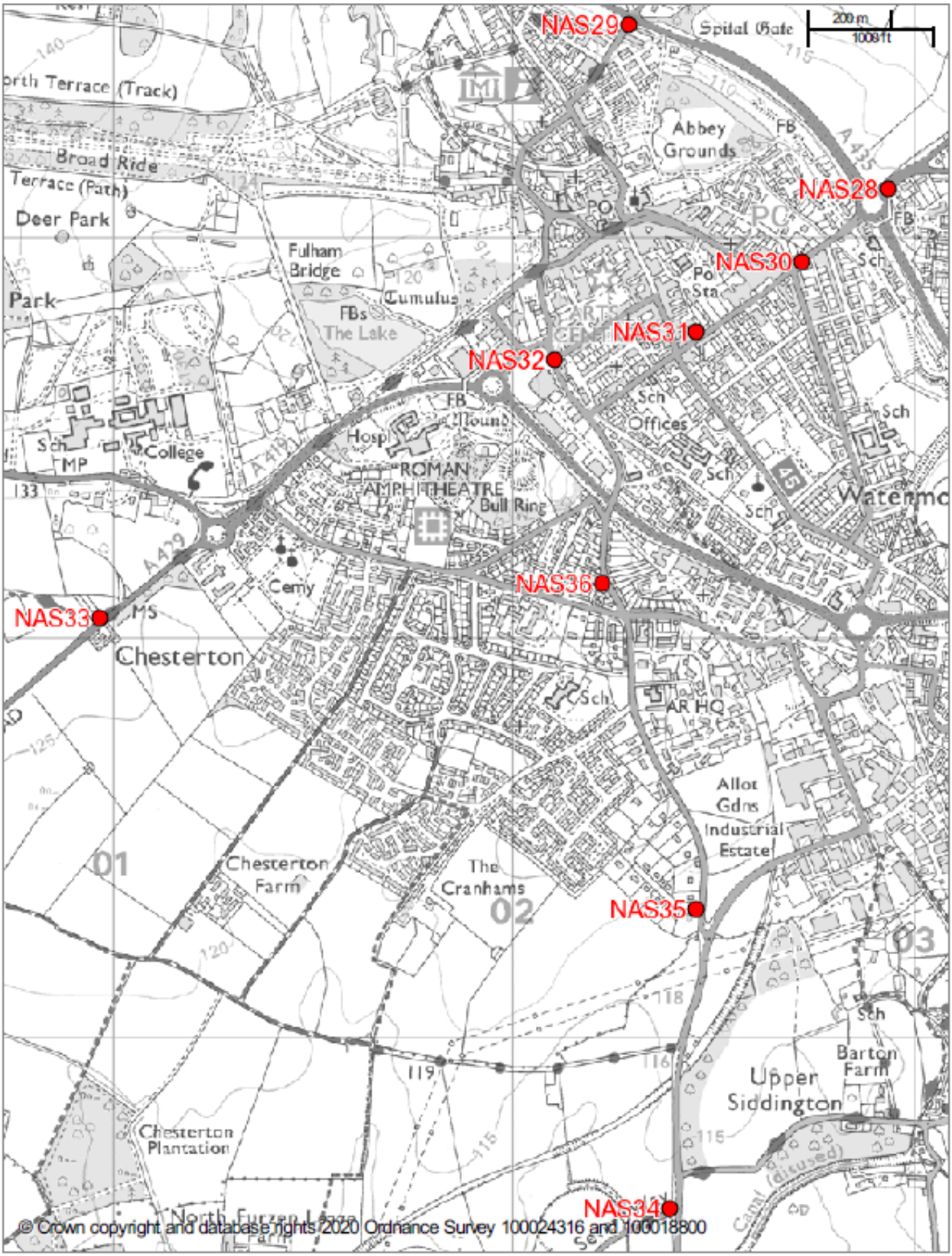
Figure D2 Maps of Non-Automatic Monitoring Sites

Location 26 Stow – Unicorn

Location 27 Bourton-on-the-Water



Locations in Cirencester



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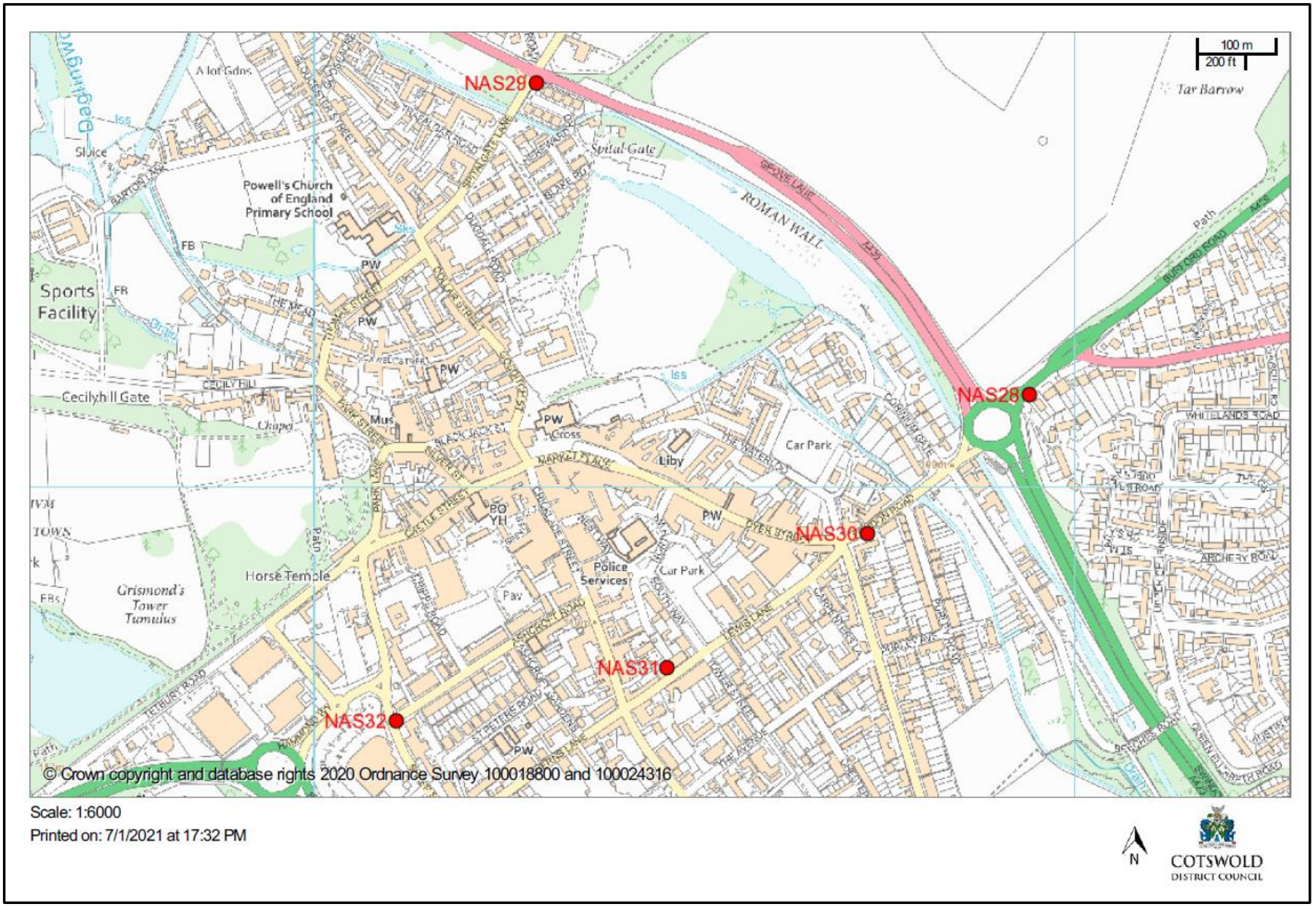
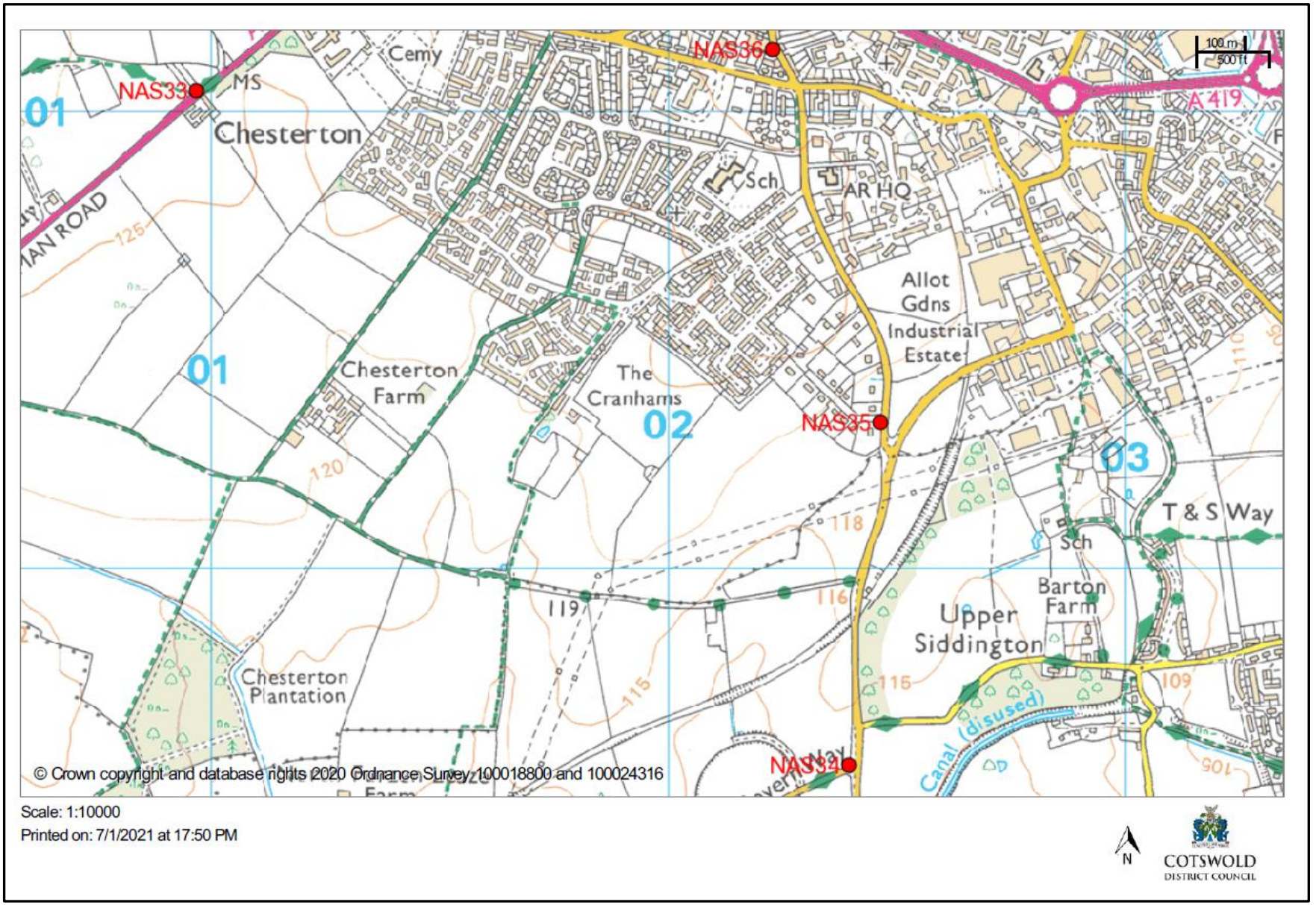
Locations 28-32 Cirencester

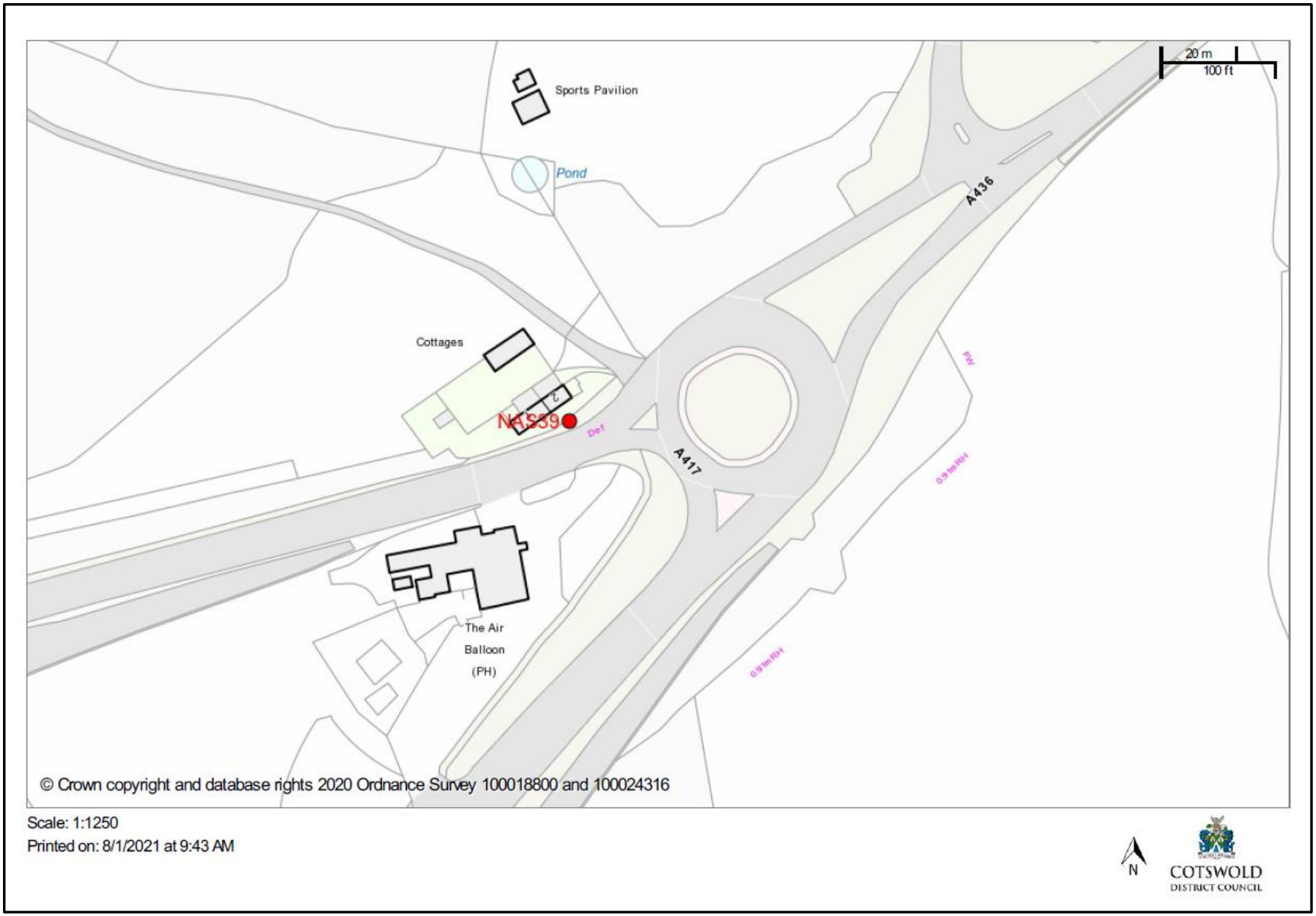


Locations 33-36 Cirencester

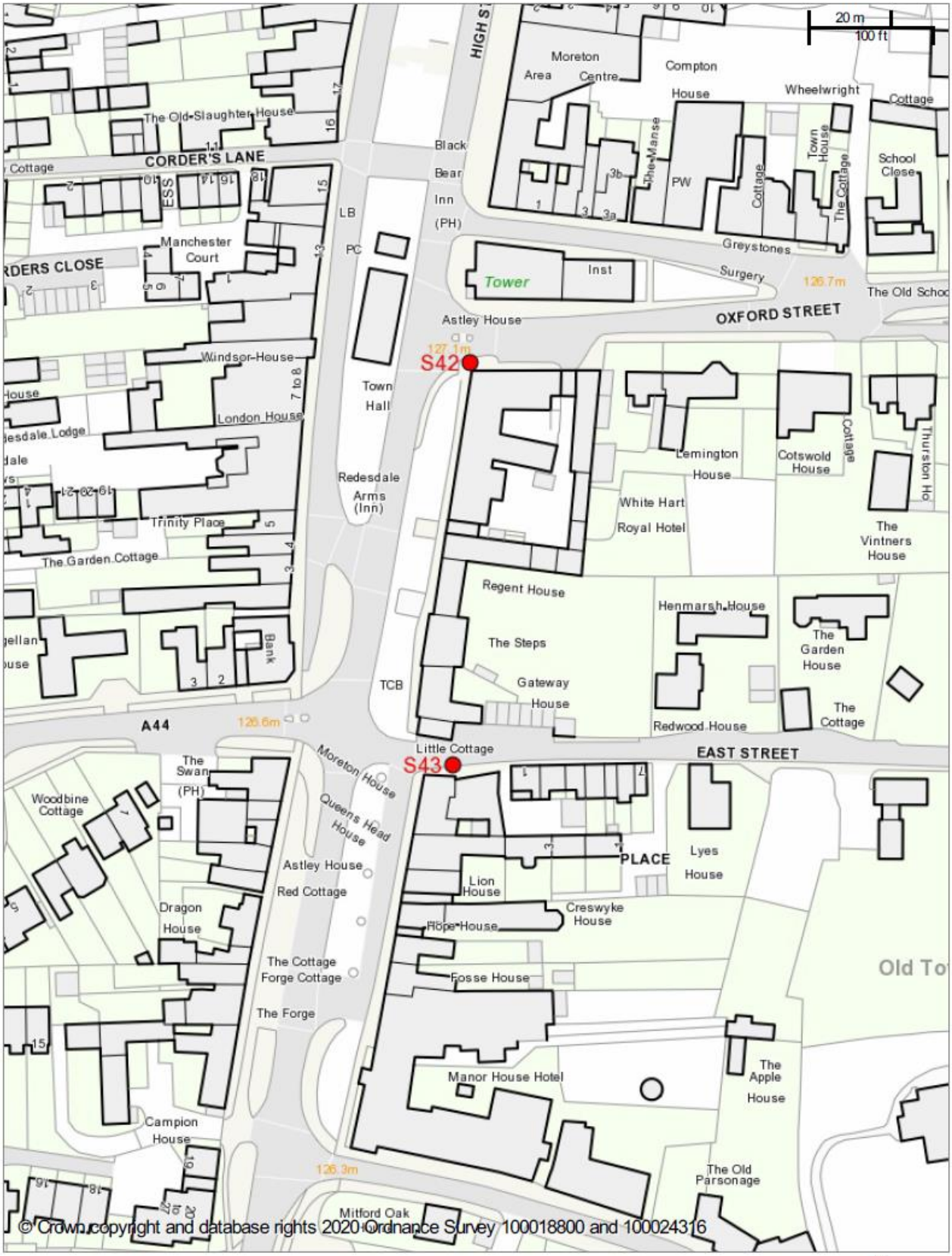


Locations NAS37-38 Lechlade

Location NAS39 Air Balloon Roundabout, Birdlip, Gloucester



Sites NAS 42 and 43 Moreton-in-Marsh



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Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[8]

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

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

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_2) 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[9] 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_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[10] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

[9] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

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

represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/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 the Cotswold District

The reduction in NO_2 concentrations compared to pre-pandemic levels and their subsequent recovery as 2020 progressed are covered in Chapter 3 above. In both of our AQMAs the reduction in raw NO_2 concentrations in May 2020 was as much as 50% at Air Balloon Roundabout, Birdlip and 65% in Thames Street, Lechlade. By September when many restrictions on social movement had been lifted NO_2 levels returned to near pre-pandemic levels. This is further evidence, if it were needed, that reducing traffic volumes in our streets has a positive impact on air quality.

Opportunities Presented by COVID-19 upon LAQM within Cotswold District

No LAQM related opportunities have arisen as a consequence of COVID-19 within Cotswold District.

Challenges and Constraints Imposed by COVID-19 upon LAQM within Cotswold District

The main challenges and constraints that have been experienced in relation to local air quality management within 2020 that can be attributed to the pandemic were in relation to staff availability. At the initial stages of the pandemic, staff were diverted to emergency duties and unavailable for tube placement and collection. However, this affected just one month and usual service was resumed after April.

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 Highways England
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.TG16. April 2021. 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.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Air Information Resource, Background Mapping data for local authorities – published by DEFRA, 2018.
- Covid-19: Supplementary Guidance, Local Air Quality Management Reporting in 2021, Published by DEFRA and the Greater London Authority in April 2021.