COTSWOLD DISTRICT COUNCIL

UNITED WE SERVE

2023 Air Quality Annual Status Report (ASR)

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

Date: June 2023

Information	<Local Authority Name> Details
Local Authority Officer	David Rudland and Susan McPherson
Department	Environmental Regulatory Services
Address	Trinity Road, Cirencester GL7 1PX
Telephone	01285 623000
E-mail	ers@cotswold.gov.uk
Report Reference Number	COTS ASR 2023
Date	June 2023

Executive Summary: Air Quality in Our Area

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 29,000 to 343,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

During 2022, Cotswold District Council has continued monitoring nitrogen dioxide across the district using diffusion tubes. The monitoring sites are representative of relevant exposure and relate to emissions from traffic.

The monitoring reported within this 2023 Annual Status Report for Cotswold District Council took place during the whole of 2022. The district's air quality remains generally very good, and the monitoring has not indicated any additional areas of concern with regard to air pollution.

In 2022, our diffusion tube network monitored nitrogen dioxide levels at 16 locations. These are mainly roadside locations, of which one is at a site measuring "background" levels and two are situated by junctions near a new development in Cirencester (Chesterton). We have long-term results at 4 of these locations, 3 within our Air Quality Management areas (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. The majority of the monitoring locations remain the same compared with 2021. The exceptions

---

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

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

[3] Defra. Air quality appraisal: damage cost guidance, January 2023

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

are NAS27 and NAS32a. NAS27 has remained in Bourton on the Water, but has been moved from Station Road to the junction of Lansdowne and School Hill. NAS32a has remained in Cirencester, but has moved from Hammond Way to Stroud Road. Both relocations were carried out at the beginning of 2022.

During 2022, all but one of the monitoring locations were below the national objective of 40 µgm/m^3, which was set to protect health. The only exceedance was within the Air Balloon Roundabout AQMA (42.1 µgm/m^3). 2022 was the first year since the outbreak of Covid-19 in the UK, with no restrictions on travel. The expectation was an increase in traffic volumes and a corresponding increase in air pollution. However, contrary to expectations, a significant rise in nitrogen dioxide (NO_2) concentrations was not observed. Although some locations showed an increase on the previous two years, of the locations which were also monitored in 2021, 8 out of 14 locations showed a decrease in NO_2 concentrations compared with 2021, with 5 out of 12 showing a decrease compared with 2020. By the end of 2022 (unadjusted) average annual NO_2 concentrations across the district were around 20% lower than equivalent average measurements in 2019. The reasons are, as yet, not clear but are likely to be related to a combination of more efficient vehicles and the rise in popularity of homeworking.

Monitoring will continue around the district and will be carried out in accordance with Defra guidance LAQM TG(22). An updated air quality report will be produced in 2024.

Although air quality in the Cotswold Area is generally very good, there are, air pollution hotspots where nitrogen dioxide concentrations, associated with traffic emissions, are elevated. These have been declared Air Quality Management Areas (AQMA). These areas are typically where houses are very close to a busy road, often where the pollution from traffic is exacerbated by problems with congestion, topography, the presence of street canyons and meteorological conditions, such as inversion layers and fog.

The District has two AQMAs, these are:

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

In Lechlade, monitoring of NO_2 was carried out at two locations within the AQMA. Both locations are on Thames Street, NAS28 is approximately 30m south of the junction with High Street, and NAS29 is located at this junction. Over 2022, monitoring has indicated that nitrogen dioxide levels were not at risk of exceeding the National Air Quality Objective, set to protect the health of residents.

At the Air Balloon Roundabout, Birdlip, the diffusion tube data shows that levels of NO_2 have risen compared to 2021, but are still below 2019 levels. However, the adjusted concentrations remain above the national objective level at this monitoring location. Consequently, this AQMA is set to remain in place for the foreseeable future.

The air quality issue at this location is principally related to the combination of the steep incline of the A417 as it approaches the Air Balloon Roundabout and the roundabout itself. The roundabout causes a backup of traffic along the A417, principally at peak hours, with the incline resulting in slow moving traffic, particularly HGVs, labouring along this section of the road.

Traffic management within both our AQMAs is outside the direct control of Cotswold District Council. However, in Lechlade Cotswold District Council has been working with the County Highways Department regarding the traffic management controls at the Thames Street / High Street junction. Alterations in the timing of the traffic lights in 2017 has improved traffic flows and reduced periods of congestion. Combined with the uptake of more efficient vehicles, we have seen considerable improvement in air quality at this junction.

In addition, the Council has supported a major road improvement scheme planned to alleviate the issues at the Birdlip AQMA location and environs. The project will see the existing roundabout and road layout replaced with a dual carriage way and interchanges, to improve traffic flow and reduce congestion. Following a public consultation exercise in 2019, Highways England (now National Highways) chose a preferred route for a new 3.6 mile dual carriageway, known as Option 30. The Secretary of State for Transport gave the A417 “Missing Link” project the go-ahead on 16 November 2022, and construction is due to start in autumn 2023. The Council will continue to encourage and support any measures proposed by National Highways to improve the situation at the Birdlip AQMA.

Cotswold District Council have not been made aware of any industrial developments with air pollution implications during 2022. Any development planning applications 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 a major residential development has commenced, e.g. such as junction improvements at Somerford / Wilkinson Road. The data we have been collecting around this site 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:

Link to CDC AQMA Information

Actions to Improve Air Quality

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

The Environmental Improvement Plan[5] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[6] details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

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 lies with National Highways and is thus 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 encourage alternative transport. These measures are moving forward.

The Government's Road Investment Strategy: 2015-2020 initially identified this road section, known as the "Missing Link" as requiring measures to improve safety, ease congestion and reduce pollution at the Air Balloon Roundabout. 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).

In Lechlade, the Gloucestershire Local Transport Plan 2020-2041 (LTP), has identified two measures which may facilitate further improvements in air quality:

---

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

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

- Further highway improvements to the Thames Street and High Street junction (LTP Ref: S Cot 12).
- An active travel route between Fairford and Lechlade (LTP Ref: S Cot 3).

These measures are still at the scoping stage and awaiting funding.

Into 2023, the District Council is working with the County Council to facilitate the School Streets scheme in Cirencester. Roads within a School Streets area will only be open to pedestrians, cyclists and those with exemptions, including emergency vehicles, Blue Badge holders and residents, for a short period at the start and end of each school day. This is in order to encourage safer means for children to access their school, and improve air quality in and around school gates.

As part of this scheme, nitrogen dioxide monitoring has been set up in two of the streets around Stratton Church of England Primary School, Cirencester to assess the effect on local air quality. Further details are contained within Appendix F.

Conclusions and Priorities

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

2022's monitoring has shown a marked decrease in nitrogen dioxide levels across the whole of the district in comparison with 2019, the final year before the Covid-19 pandemic. The most significant reductions are 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 2020-21 and importantly resulted in a general reduction in traffic levels particularly during the height of the lockdown. Although all remaining movement restrictions had been removed by the beginning of 2022, it is not yet clear whether the improvement in air quality is due to changed travel patterns and/or improvement in vehicle emissions.

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 Lechlade were below the air quality objective. However, this AQMA will not be revoked (cancelled) until levels are consistently below the National Air Quality Objective level post-pandemic.

The Council will continue to work with other bodies especially National Highways to develop the new road A417 scheme. It is hoped that this will eventually allow revocation of the AQMA at this location.

Similarly, it is hoped that continued monitoring in the centre of Lechlade post pandemic will allow a decision to be made as to whether air quality remains sufficiently improved to allow the AQMA to be revoked.

Whilst this remains a distinct possibility, it is considered that no updates to air quality plans are required.

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 not using a car unless entirely necessary. In addition, walking, cycling, taking public transport or car sharing rather than driving an otherwise empty car, reduces our individual carbon footprint.

Individuals, schools and businesses can all play their part in improving our local air quality.

Businesses can develop workplace travel plans: travel plans which enable their staff to utilise active travel options between work locations, and between work and home, and onward work journeys. This may include workplace and health programmes to engage workplaces and support the adoption of a template best practice travel plan, and/or to engage specific larger employers to develop travel plans which promote an increase in the uptake of active travel.

Schools can also develop travel plans: Schools can develop dynamic travel plans that support pupils, families and staff to engage in active travel to and from school.

For individuals, Cotswold District Council partners with organisations that seek to increase individual mobility, such as the Active Cotswolds Programme.

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

Local Responsibilities and Commitment

This ASR was prepared by the Technical Pollution Service of Cotswold District Council with the support of Gloucestershire County Council.

If you have any comments on this ASR please send them to the Air Quality Officer at:

Cotswold District Council
Trinity Road
Cirencester
Gloucestershire
GL7 1PX

Tel: 01285 623000
Email: ers@cotswold.gov.uk

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

Table of Contents

Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in Cotswold District Council's area during 2022. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by 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 18 months. The AQAP should specify how air quality targets will be achieved and maintained, and provide dates by which measures will be carried out.

A summary of AQMAs declared by Cotswold District Council can be found in Table 2.1. The table presents a description of the 2 AQMAs that are currently designated within Cotswold District Council. 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	Number of Years Compliant with Air Quality Objective	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	42.1	Not compliant	Air Quality Action Plan 2011 - Birdlip – Air Balloon Roundabout Action Plan page National Highways A417 scheme: proposed new road layout Link to Website for Highways Missing Link England Project	Cotswold District Council Air Quality Pages
Thames Street, Lechlade	02.04.2014	NO_2 Annual Mean	An area encompassing a number of properties at the junction of High Street and Thames Street, Lechlade.	No	41 µg/m^3	25.1	6 years	County Council traffic management controls	Need for action plan is under review because of improving air quality

☒ **Cotswold District Council confirms the information on UK-Air regarding their AQMA(s) is up to date.**

☒ **Cotswold District Council confirms that all current AQAPs have been submitted to Defra.**

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

2.2.1 Measures Brought forward

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
There is currently only one monitoring site located within the Air Balloon Birdlip AQMA. The council should consider increasing the number of sites at this location. This would aid in tracking the impact of the highway improvements scheme.	Cotswold District Council intend to review monitoring in this area during the course of 2023, to assess the most favourable locations to install diffusion tubes.
We note that the need for an updated AQAP was mentioned in last years' ASR appraisal, and there is deliberation on whether an AQAP is required with the improving air quality in the AQMA. If the air quality does not continue to improve going forward, then the Council should consider adopting a new AQAP in the future.	The need for action plans is being constantly reviewed. It is dependent on post pandemic assessment and in the case of the AQMA at Birdlip upon the progression of the proposed A417 "Missing Link" highway improvements. However broad objectives as set out in the existing plan have not changed.
The Public Health Outcomes Frameworks was mentioned. The Council have referred specifically to indicator D01, which is the fraction of mortality attributable to particulate air pollution, and this is encouraged. No measures discussed to address $PM_{2.5}$ emissions.	At this time local $PM_{2.5}$ concentrations are not expected to exceed levels of concern, however the Council is aware of ongoing consultations and proposals for addressing $PM_{2.5}$ and will adapt accordingly.
It would be useful to include a map to show all monitoring locations at the district level.	This has been included
Overall the report is detailed, concise and satisfies the criteria of relevant standards. The Council should continue their good and thorough work.	

2.2.2 Measures to improve air quality

Cotswold District Council and its partners have taken forward a number of direct measures during the current reporting year of 2022 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.3. Seven measures are included within Table 2.3, with the type of measure and the progress Cotswold District Council and its partners have made during the reporting year of 2022 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.3.

More detail on these measures can be found below.

Cotswold District Council expects the following measures to be progressed over the course of the next reporting year:

A417 Trunk Highway improvements

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 and hauliers travelling between London and the West Midlands as a shortcut between the M4 and the M5. The Air Balloon Roundabout, causes a significant bottleneck on this route with the approaches from Gloucester and Cirencester experiencing congestion during peak hours as well as at other times of the day. The Missing Link project will create a new stretch of dual carriage way, which will bypass this roundabout, and create a continuous dual carriage way link between the M4 and M5. The project will cost £250 - £500 million, and will be funded by Central Government. Preliminary works commenced in early 2023, and the project is expected to be complete in 2027. The scheme is led by National Highways and was approved by the Secretary of State for Transport on 16 November 2022. Currently the scheme managers are working to obtain the necessary Development Consent Orders with the intention to start construction in autumn 2023.

Details of the scheme to improve the A417 road in the vicinity of the Air Balloon roundabout can be found on the scheme website, here:

Link to Website for Highways Missing Link England Project

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.

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

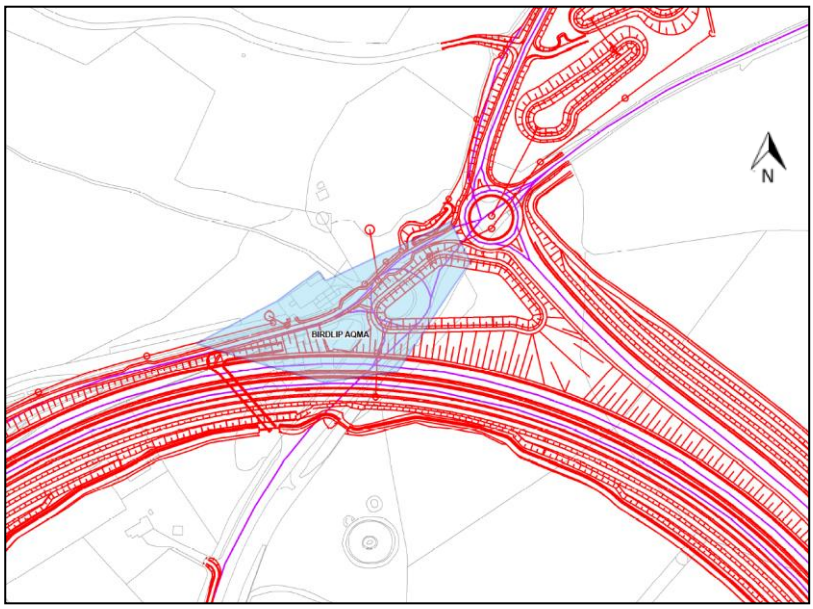
- Arup, A417 Missing Link Preliminary Environmental Information Report, Chapter 5 Air Quality, Sept 2020.

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 (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 air quality objectives 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 progress of this project and assist with any technical studies on air quality if approached.

Lechlade AQMA

The Lechlade AQMA is located at the Thames Street junction with High Street. The elevated NO_2 concentrations which triggered the declaration of the AQMA were related to congestion at the traffic lights of this junction, particularly during rush hour. As a consequence of the close proximity of the River Thames, and under the correct meteorological conditions, an inversion layer can develop, causing foggy conditions. This, in combination of the street canyon effect, exacerbated the accumulation of traffic exhaust emissions as atmospheric dispersion and dilution was inhibited. Changes to the traffic light sequencing in 2017 has improved traffic flow and reduced congestion. This, coupled with improvements in exhaust technology and the uptake of low emission vehicles, has seen a decrease in NO_2 concentrations within the AQMA, with no exceedance in the national objective since 2016. Furthermore, concentrations have remained within 10% of the national objective since 2018. The position of the NO_2 diffusion tube in the High Street was revised in 2020 when the traffic signals were renewed and as a result there has been an increase in measured NO_2 at this point compared with the previous location. However, the NO_2 concentration is still well below the national objective level. If the current nitrogen dioxide levels are sustained at this AQMA then it is probable that this AQMA could be revoked in coming years.

The Gloucestershire Local Transport Plan 2020-2041 includes two measures to which may positively impact air quality in Lechlade.

The first, referenced S Cot 12 in the aforementioned plan, are further improvements to the High Street/Thames Street junction. This measure is still in the scoping stage and requires funding, and no details are available regarding the proposed works.

The second is the development of a cycle way between Lechlade and Fairford. The primary objective of the scheme is to provide a safe, sustainable link for residents of Lechlade and Fairford to places of work, education, health and recreation, as well as improving access to the eastern section of Cotswold Water Park. Feasibility studies, funded by the town councils of Lechlade and Fairford, are being conducted by Sustrans. Phase 1 for the study is complete, and identified two possible routes: the northern route, to the north of the A417, utilising an existing dismantled railway; and, the southern route which utilises the existing Thames & Severn Way. The preference of the town council is to develop both routes to create a circular path. The second phase is currently underway, and is concentrating on the southern route. This second phase will include:

- Undertaking traffic Surveys
- Public and Stakeholder Consultations including Gloucestershire County Council and Cotswold District Council.
- Producing a brochure summarising the project
- Discussions with local landowners
- Verifying the preferred routes
- Identify funding options including adoption as part of Gloucestershire's LCWIP (Local Cycling and Walking Infrastructure Plans) currently under consultation.

Part of the route is to be funded by a local holiday resort, with additional funding currently being sought for the remainder of the route.

This project is referenced as S Cot 3 in the Gloucestershire Local Transport Plan, and is also part of the Policy S7 of the Cotswold District Local Plan 2011-2031. Link: Gloucestershire Local Transport Plan 2020-2041; Cotswold District Local Plan 2011-2031

School Streets

In 2022, the District Council assisted Gloucestershire County Council to set up an extension to the School Streets scheme in Cirencester. Roads within a School Streets area are only open to pedestrians, cyclists and those with exemptions, including emergency vehicles, Blue

Badge holders and residents, for a short period at the start and end of each school day. Typically this involves a 45 minute closure at start and end of school day (8:15-9am and 2:45-3:30pm). This is intended to encourage safer means for children to access their school, also to improve air quality in and around school gates. Additional nitrogen dioxide monitoring has been set up in the vicinity by the District Council to assess the effect on local air quality.

After a launch in the springtime and thus less than 1 years' worth of data it is difficult to gauge the outcome at this time, although nitrogen dioxide concentration in the air around the local streets has been found to be low and well within the national objective level. See Appendix F.

Community Municipal Investment

Cotswold District Council launched Gloucestershire's first Community Municipal Investment (CIM) in April 2022 to give local people the opportunity to invest directly in a cleaner, greener, healthier future for the Cotswolds.

A key element of this is to support a range of projects, in particular the installation of off-street EV charging points around the District to encourage Electric Vehicle take-up.

By March 2023 the first phase of the programme will install 10 charging points:

- 1 at the Beeches car park in Cirencester,
- 4 at the Council Offices in Cirencester,
- 4 at the Rissington Road car park in Bourton on the Water
- 1 at Old Market Way in Moreton in Marsh.

Two of these charging points are already in place but will be updated to the latest technology.

More details of the scheme can be found here:

Link to Cotswold Climate Investment scheme

Cotswold District Council worked to implement these measures in partnership with the following stakeholders during 2022:

- National Highways – in the case of the A417 improvements
- Abundance Investment, in relation to the Cotswold Climate Investment scheme.

Table 2.3 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	A417 Trunk Road Improvements at Air Balloon Roundabout	Transport Planning and Infrastructure	Other – trunk road improvement	2014	2027	Highways England	The second Road Investment Strategy (RIS2)	No	Not funded	£250-500m	Implementation	0.5	Annual average NO_2 to be reduced to meet AQ objective	Funding secured, Ministerial approval made, design in progress	Lengthy Timescale and funding
2	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
3	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
4	School Streets	Promoting Travel Alternatives	School Travel Plans	2022	2022	Gloucestershire County Council	Gloucestershire County Council	NO	Funded	< £10k	Implementation	Reduced vehicle emissions	Before and during diffusion tube measurements to show reduction in NO_2 concentration	Measurement points in place and monitoring in progress in advance of scheme	None
5	Community Municipal Investment scheme - EV Charging points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2021	2023	Cotswold District Council	Investment fund	NO	Funded		Planning	Reduced vehicle emissions	Before and during diffusion tube measurements to show reduction in NO_2 concentration	Commencement March 2023	None
6	Improvements to Thames Street / High Street Junction, Lechlade	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2022	Not Known	Gloucestershire County Council	Gloucestershire County Council	NO	Not funded	Not known	Scoping	Reduced vehicle emissions	Reduced NO_2 concentrations within the Lechlade AQMA	The project is at the scoping stage and awaiting funding	Funding availability
7	Fairford to Lechlade Multi-use path	Transport Planning and Infrastructure	Cycle Network	2022	2024	Town Councils, private stakeholders. Other funding sources to be confirmed	Town Councils and private funding. Other funding sources to be confirmed	No	Partially funded	Not Known	Feasibility studies & stakeholder/community engagement	Reduced vehicle emissions	Reduced NO_2 concentrations within the Lechlade AQMA.	Feasibility studies & stakeholder/community engagement	Funding availability

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

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

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 $PM_{2.5}$ concentrations within the District, based on background mapping data supplied by DEFRA, are low at around 7.8µg/m^3 with a maximum of 9.7µg/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 3.2.2).

2.3.1 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” (2021).

For Gloucestershire as a whole, the estimated Fraction of Mortality attributable to particulate air pollution (May 2021 update) is ranked 5 out of 15 areas in the South West of England. This equates to a percentage of 5.3% compared with the regional average of 5.1%.

For the Cotswold District, the estimated Fraction of Mortality attributable to particulate air pollution is ranked 15 out of 30 authorities in the South West of England. This equates to a percentage of 5.0% compared with the regional average of 5.1%.

$PM_{2.5}$ 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]. In 2022 the estimated annual mean concentrations of $PM_{2.5}$ were 7.8 µg /m^3 (8.5µg /m^3 in 2021) for the Cotswold District compared with the 2022 Southern England estimated regional average of 7.4 µg /m^3 (7.6µg /m^3 $PM_{2.5}$ in 2021) (source: UK AIR Background Mapping data for local authorities –background mapping).

Link to Background Mapping data for local authorities

[7] Source: Background annual average $PM_{2.5}$ 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 $PM_{2.5}$ 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, $PM_{2.5}$ are used as the basis for this indicator, as burden estimates based on total $PM_{2.5}$ 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 2022 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 2018 and 2022 to allow monitoring trends to be identified and discussed.

3.1 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 2022. Table A.1 in Appendix A presents the details of the non-automatic sites.

Maps showing the location of the monitoring sites are provided in Appendix D.

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

Two new monitoring locations, one in Cirencester and another in Bourton-on-the-Water, were set up at the start of 2022 with monitoring commencing in January (locations S27 and S32). The new Cirencester location is on Stroud Road, outside a residential property opposite Cirencester College. This location was selected to ensure congestions created by the college and adjacent secondary school does not result in elevated NO_2 concentrations, and to monitor the impact (if any) of the forthcoming Chesterton housing development and the Royal Agricultural University's proposed research and business development.

Diffusion tube NAS32 had been located at Station Road since 2018, and had consistently recorded annual mean NO_2 concentrations well below the national objective, with a maximum concentration of 14.4µg/m^3 . It was decided to relocate this tube to the junction of Lansdowne, School Hill and High Street, as this is also a busy road.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

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 monitoring sites, annualisation was not required. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. distance correction), are included in Appendix C.

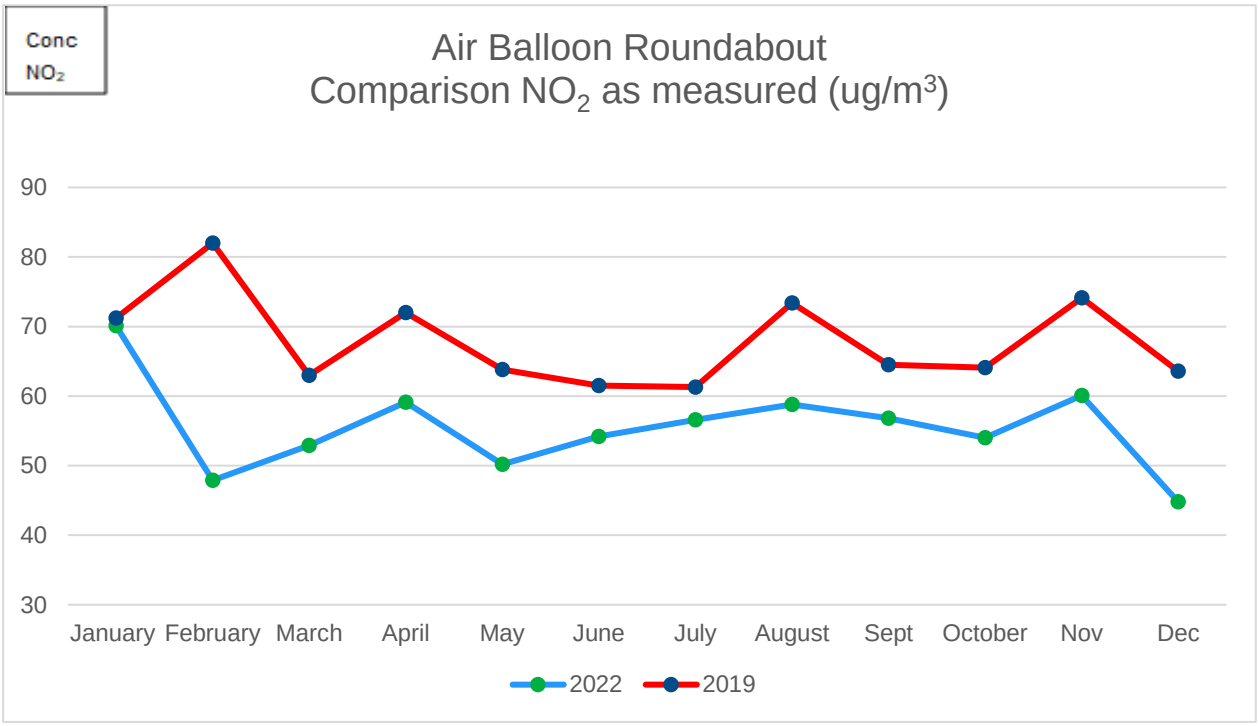
Table A.2 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years (where available), for comparison with the air quality objective of 40µg/m^3. The full 2022 dataset of monthly mean NO_2 levels from the diffusion tube survey is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values only where relevant.

At the beginning of 2022, the remaining Coronavirus pandemic restrictions in England were lifted meaning there were no formal restrictions on travel around the Cotswolds during the year as in previous years of the pandemic (2020-2021). Despite this, across the Cotswold District nitrogen dioxide (NO_2) levels remained below 2019 (pre-pandemic) levels following lifting of restrictions. By the end of 2022 (unadjusted) average annual NO_2 concentrations across the district were around 20% lower than equivalent average measurements in 2019. The reasons are as yet not clear but are likely to be related to a combination of more efficient vehicles and less individual journeys taken by road, as less people commute to work. Figure 3.1 shows a comparison of 2022's monthly concentration readings compared with the same periods in 2019 at this location.

In comparison to 2021 levels however, most NO_2 concentrations in 2022 were broadly similar with a slight increase noted at the Air Balloon cottages tube NAS39. This is located on a major trunk highway and may be affected as much by national as local traffic trends.

This location, within the Air Balloon roundabout AQMA, was the only one in the District where NO_2 concentrations were measured in excess of the annual mean air quality objectives. The bias adjusted mean annual nitrogen dioxide level at this location was a little above 40 µg/m^3, (42.1 µg/m^3) set as the national objective level to protect health. When this is adjusted for distance to the dwellings at this location the NO_2 concentration was below the national threshold level. This is a continuation of the trend indicated by the previous year's monitoring data and reflects the probable return towards pre-pandemic travel in this area following the lifting of all restrictions.

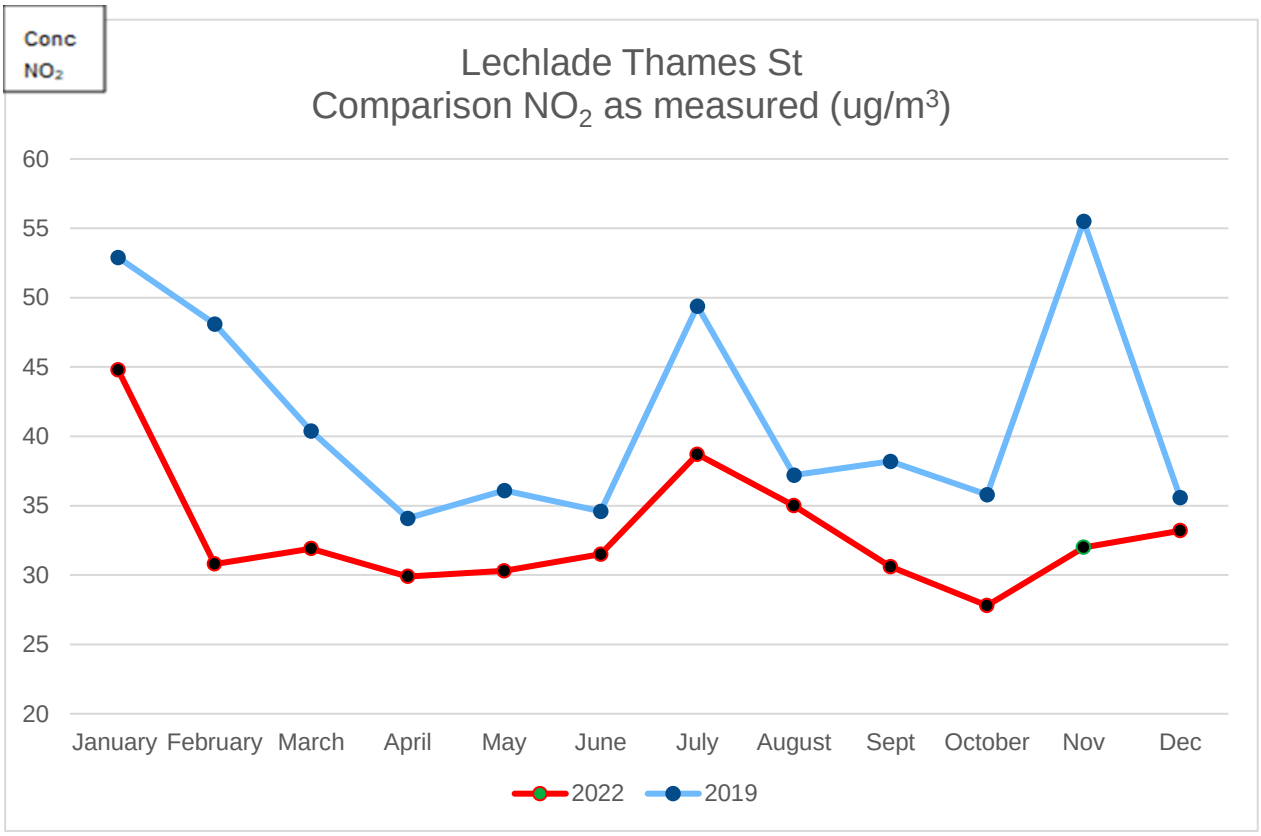
Figure 3.1 Comparison NO_2 concentrations, Air Balloon, during 2019 and 2022



NB concentrations illustrated are measured concentration of NO_2 (µg/m^3) without correction for bias nor adjusted for distance to receptor.

The annual average nitrogen dioxide level in Thames Street, Lechlade continued to remain below the 40 µg/m^3 national objective level. Figure 3.2 shows a comparison of 2022's monthly concentration readings compared with the same periods in 2019. As with the Air Balloon roundabout, levels of NO_2 remained below those of 2019 throughout the year.

Figure 3.2 Comparison NO_2 concentrations, Lechlade Thames St, during 2019 and 2022



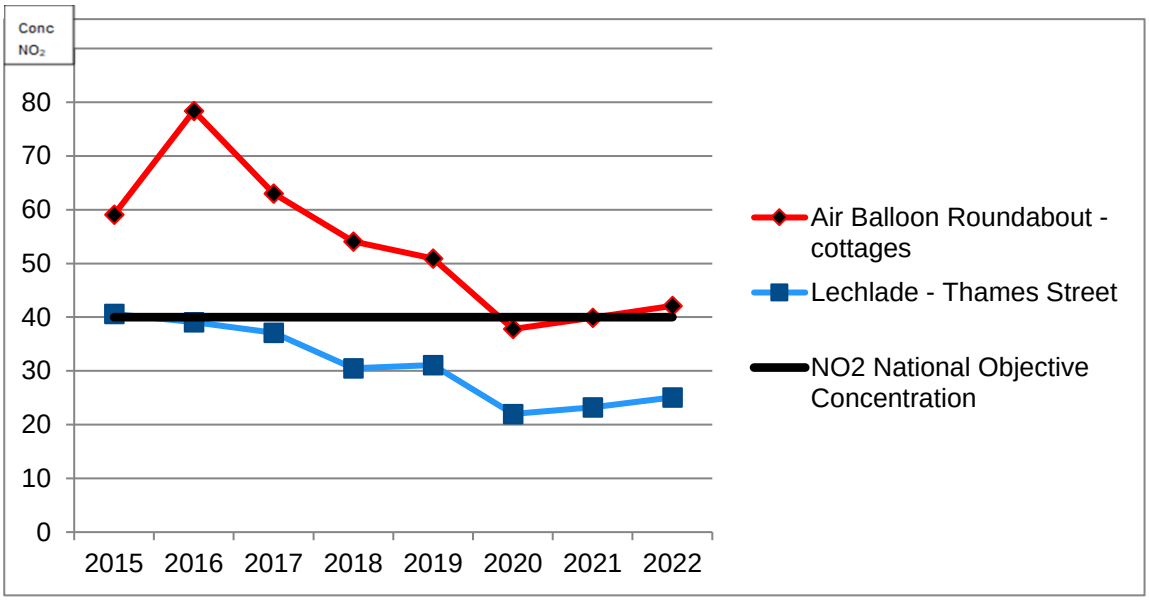
NB concentrations illustrated are measured concentration of NO_2 (µg/m^3) without correction for bias nor adjusted for distance to receptor.

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. In addition, 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. The Council will continue diffusion tube monitoring in the area and maintain the AQMA whilst the pandemic is still a feature of our society, but once traffic levels become “normal” it is likely that the Council will review the data and seek to remove the AQMA at this location.

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. This shows the slight uptick in concentrations

at Birdlip where traffic levels are likely to have increased over the previous year as pandemic restrictions were removed.

Figure 3.3 – Trends in Annual Mean NO_2 Concentrations - Graph showing the trends over 8 years at each AQMA's long-term diffusion tube monitoring sites



NB concentrations illustrated are measured concentration of NO_2 (µg/m^3) corrected for bias but not adjusted for distance to receptor.

Road Closures affecting monitoring results

There were major roadworks on Spratsgate Lane with the junction of Wilkinson Road and Somerford Road during 2022 in connection with the major residential development in this area. The road was closed completely between 18th July and 3 August 2022. The severe reduction in traffic as a result might be expected to reduce readings at diffusion tube locations NAS 34 and NAS 35, and NAS 36 in Somerford Road throughout this period, as traffic found alternative routes. NAS 35 is on the affected closed stretch of highway and NAS 34 and NAS36 are on a section of the road approaching this so will be impacted proportionately.

The roadworks continued through August and September with temporary traffic control which would have encouraged traffic to continue to use other routes.

There are no obvious reductions in the annual average NO_2 readings observed at Somerford Road during the affected months of 2022. This may be due to the relatively low NO_2 readings here and the trend being masked by this. At all these locations NO_2 concentrations are well within the national objective level and not of particular concern.

3.2.2 Particulate Matter (PM_{10})

Measurements of particulate matter were not made within the District during 2022.

Particulate matter can enter the respiratory system and have consequential health implications. Particulates which are routinely monitored in the UK are PM_{10} and $PM_{2.5}$. PM_{10} are particles that have a diameter of 10µm or less, and can pass through the upper respiratory system and travel deep into the lungs. $PM_{2.5}$ particles have a diameter of 2.5µm or less, and can pass into the deepest parts of the lungs, and potentially through the lung walls into the blood stream. These particles have been strongly connected with respiratory problems such as asthma, chronic obstructive pulmonary disease and cardiovascular disease.

The Environment Act 2021 required the Secretary of State to set $PM_{2.5}$ objectives for the UK, which were laid out in The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. The targets set within the 2023 Regulations are:

- *The annual mean concentration target is that by the end of 31st December 2040 the annual mean level of $PM_{2.5}$ in ambient air must be equal to or less than 10 µg/m³*
- *The population exposure reduction target is that there is at least a 35% reduction in population exposure by the end of 31st December 2040, as compared with the average population exposure in the three-year period from 1st January 2016 to 31st December 2018.*

To monitor progress in meeting these objectives, new monitors are expected to be installed across the country to provide concentration data for fine particles in the air. These will predominantly be in urban areas.

Trends in $PM_{2.5}$ in the UK between 2009 and 2022 have been published by DEFRA. Annual average concentration of the fine particles peaked in 2011, and have since shown a steady decline. Despite a decline, data from 2020 to 2022 have shown a small increase.

The data for 2022 showed temporal changes in $PM_{2.5}$, with concentrations peaking during the winter and spring months. This is thought to be attributed to elevated airborne nitrates from European agricultural activities being transported to the UK, and the increase in the use of solid fuel stoves and open air fires both in Europe and the UK. The contribution of solid fuel stoves is further reflected in the average hourly concentrations, which show the highest emissions of $PM_{2.5}$ occurred mid to late evening. Link to: Particulate matter (PM_{10}/ $PM_{2.5}$).

The impact of solid fuel stoves and open fires demonstrates the importance of the Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020, which stipulates that 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	Roadside	419003	225693	NO_2	No	6.5	1.2	No	2.1
NAS27	Lansdowne, Jct School Hill, Bourton-on-the-Water	Roadside	416600	220893	NO_2	No	4.7	2.3	No	2.5
NAS28	Burford Rd Traffic lights j/w A417, Cirencester	Roadside	403020	202175	NO_2	No	10.0	1.5	No	2.3
NAS29	Abbey Way j/w Spitalgate, Cirencester	Roadside	402305	202519	NO_2	No	6.0	1.4	No	2.2
NAS30	London Road, Cirencester	Kerbside	402783	201946	NO_2	No	5.8	2.8	No	2.2
NAS31	Lewis Lane, Cirencester	Roadside	402480	201772	NO_2	No	2.7	1.5	No	2.1
NAS32	Bartonbury Lodge, Stroud Road, Cirencester	Kerbside	401102	201364	NO_2	No	2.4	1.0	No	2.5
NAS33	Tetbury Road, Cirencester (O/S Steading Cottages)	Roadside	401064	201044	NO_2	No	3.8	2.9	No	2.2
NAS34	Spratsgate Lane nr j/w Park Way, Cirencester	Rural	402394	199581	NO_2	No	0.0	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	Berkeley Road j/w Somerford Road, Cirencester	Roadside	402439	200297	NO_2	No	15.0	0.5	No	2.1
NAS36	Somerford Road, Cirencester. (on lamp post 6)	Roadside	402241	201102	NO_2	No	4.6	1.7	No	2.4
NAS37	Thames Street, Lechlade	Kerbside	421365	199503	NO_2	Lechlade	0.2	1.3	No	2.4
NAS38	4 High Street, Lechlade	Kerbside	421367	199515	NO_2	Lechlade	0.0	1.0	No	2.2
NAS39	Air Balloon Roundabout, Birdlip	Kerbside	393462	216111	NO_2	Birdlip	6.4	1.1	No	2.1
NAS42	A429 j/w A44 (White Horse Hotel) Moreton-in-Marsh	Roadside	420486	232419	NO_2	No	2.1	1.2	No	2.4
NAS48	Gateway House A429 j/w East Street, Moreton on Marsh	Roadside	420462	232344	NO_2	No	4.0	7.0	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.2 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
NAS26	419003	225693	Roadside	100	91.5	-	38.7	29.3	31.8	33.3
NAS27	416600	220893	Roadside	100	100.0	-	-	-	-	7.3
NAS28	403020	202175	Roadside	100	100.0	-	29.8	22.1	23.8	23.9
NAS29	402305	202519	Roadside	100	100.0	29.8	29.9	23.8	25.3	24.9
NAS30	402783	201946	Kerbside	100	92.3	22.6	23.4	17.7	18.1	17.4
NAS31	402480	201772	Roadside	100	100.0	20.9	20.6	15.7	15.8	16.5
NAS32	401102	201364	Kerbside	100	92.3	-	-	-	-	20.5
NAS33	401064	201044	Roadside	100	100.0	21.8	21.6	16.2	16.2	15.6
NAS34	402394	199581	Rural	100	100.0	9.5	9.3	7.4	7.0	7.1
NAS35	402439	200297	Roadside	100	100.0	9.4	9.9	7.0	7.9	8.0
NAS36	402241	201102	Roadside	100	100.0	14.5	14.9	11.2	10.8	10.7
NAS37	421365	199503	Kerbside	100	100.0	30.5	31.1	22.0	23.2	25.1
NAS38	421367	199515	Kerbside	100	100.0	-	-	22.8	29.4	28.7

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
NAS39	393462	216111	Kerbside	100	100.0	**54.1**	**50.9**	37.7	39.9	42.1
NAS42	420486	232419	Roadside	100	100.0	-	29.0	20.0	21.9	19.9
NAS48	420462	232344	Roadside	100	92.6	-	-	-	18.6	17.2

☒ **Diffusion tube data has been bias adjusted.**

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction.**

Notes:

The annual mean concentrations are presented as µg/m^3.

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

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

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

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO_2 2022 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(0.76)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
NAS26	419003	225693	50.2	30.6	48.6	43.1	40.7	44.1	48.7	52.9	45.1	39.2	38.1		43.8	33.3	-	
NAS27	416600	220893	17.4	11.4	12.6	9.8	7.3	6.8	10.3	8.2	8.6	9.2	6.7	6.4	9.6	7.3	-	
NAS28	403020	202175	43.6	34.3	29.6	30.3	26.5	28.5	33.4	32.2	30.7	31.1	28.2	29.0	31.5	23.9	-	
NAS29	402305	202519	44.7	28.5	32.9	30.0	26.3	28.3	35.1	34.1	31.4	31.9	36.4	34.0	32.8	24.9	-	
NAS30	402783	201946	35.9	24.9	25.4	21.6	18.3	19.5	21.9	20.5		25.0	24.6	13.6	22.8	17.4	-	
NAS31	402480	201772	36.6	21.9	23.2	19.6	16.0	14.9	19.2	18.7	20.2	19.3	24.4	25.8	21.7	16.5	-	
NAS32	401102	201364	38.6	25.4	28.9	26.3	28.0		27.7	24.4	27.0	26.3	22.9	21.4	27.0	20.5	-	
NAS33	401064	201044	26.5	18.5	22.0	22.0	18.0	18.6	23.0	20.9	19.1	22.7	28.6	7.0	20.6	15.6	-	
NAS34	402394	199581	16.4	8.9	12.6	11.4	6.0	5.6	6.1	7.5	6.9	7.4	10.1	12.6	9.3	7.1	-	
NAS35	402439	200297	18.0	9.1	13.4	12.8	7.3	7.1	8.2	9.7	8.3	9.7	10.2	12.5	10.5	8.0	-	
NAS36	402241	201102	26.1	12.7	17.6	13.2	9.9	2.7	11.7	9.1	13.3	15.8	17.0	20.2	14.1	10.7	-	
NAS37	421365	199503	44.8	30.8	31.9	29.9	30.3	31.5	38.7	35.0	30.6	27.8	32.0	33.2	33.0	25.1	-	
NAS38	421367	199515	52.0	32.4	36.5	33.9	34.3	36.7	41.9	37.1	36.3	37.8	37.6	36.1	37.7	28.7	-	
NAS39	393462	216111	70.1	47.9	52.9	59.1	50.2	54.2	56.6	58.8	56.8	54.0	60.1	44.8	55.5	42.1	29.1	
NAS42	420486	232419	27.5	26.9	34.1	28.2	21.0	21.6	26.4	25.6	27.1	29.3	15.6	30.2	26.1	19.9	-	
NAS48	420462	232344	22.4		28.2	27.6	18.0	15.2	17.6	28.0	21.7	21.7	21.0	27.1	22.6	17.2	-	

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1.**

☒ **National bias adjustment factor used.**

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

☒ **Cotswold District Council confirms that all 2022 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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 2022

Cotswold District has not identified any new sources relating to air quality within the reporting year of 2022.

Additional Air Quality Works Undertaken by Cotswold District During 2022

Cotswold District Council has not completed any additional works within the reporting year of 2022.

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.

The monitoring has been completed in adherence with the 2022 Diffusion Tube Monitoring Calendar.

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 at least 3 months of monitoring data available.

All diffusion tube monitoring locations within Cotswold District recorded data capture of 75% therefore it was not necessary to annualise any monitoring data.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under

or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

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 0.76 (based on 26 studies) to the 2022 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.. 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: 03/23

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

This spreadsheet will be updated at the end of June 2023
LAQM Helpdesk Website

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

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

Step 1:	Step 2:	Step 3:	Step 4:
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	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 a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	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 update your selection, choose (All) from the pop-up list)	Year[5] (To update your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Socotec Didcot	50% TEA in acetone	2022	UB	Torfaen County Borough Council	13	13	10	33.4%	G	**0.75**
Socotec Didcot	50% TEA in acetone	2022	R	Bridgend Council	12	37	27	40.6%	G	**0.71**
Socotec Didcot	50% TEA in acetone	2022	R	Cardiff Council / Shared Regulatory Services	11	42	33	27.3%	G	**0.79**
Socotec Didcot	50% TEA in Acetone	2022	R	Dacorum Borough Council	12	24	18	30.8%	G	**0.76**
Socotec Didcot	50% TEA in Acetone	2022	UB	Gravesham Borough Council	11	22	18	19.6%	G	**0.84**
Socotec Didcot	50% TEA in Acetone	2022	UB	Gravesham Borough Council	11	26	22	17.0%	G	**0.85**
Socotec Didcot	50% TEA in acetone	2022	R	Kingston Upon Hull City Council	12	30	23	27.9%	G	**0.78**
Socotec Didcot	50% TEA in acetone	2022	UB	Kingston Upon Hull City Council	12	24	18	35.0%	G	**0.74**
SOCOTEC Didcot	50% TEA in acetone	2022	UB	City Of York Council	12	16	13	31.6%	G	**0.76**
SOCOTEC Didcot	50% TEA in acetone	2022	R	City Of York Council	12	25	19	28.7%	G	**0.78**
SOCOTEC Didcot	50% TEA in acetone	2022	R	City Of York Council	11	23	17	37.2%	G	**0.73**
SOCOTEC Didcot	50% TEA in acetone	2022	R	City Of York Council	11	37	27	37.6%	G	**0.73**
SOCOTEC Didcot	50% TEA in acetone	2022	R	East Suffolk Council	11	32	23	38.6%	G	**0.72**
SOCOTEC Didcot	50% TEA in acetone	2022	R	Ipswich Borough Council	11	42	28	50.4%	G	**0.66**
SOCOTEC Didcot	50% TEA in acetone	2022	KS	Marylebone Road Intercomparison	12	60	42	40.7%	G	**0.71**
SOCOTEC Didcot	50% TEA in acetone	2022	R	North East Lincolnshire Council	10	46	31	49.4%	G	**0.67**
SOCOTEC Didcot	50% TEA in acetone	2022	R	North East Lincolnshire Council	10	28	27	3.7%	G	**0.96**
SOCOTEC Didcot	50% TEA in acetone	2022	R	Wrexham County Borough Council	12	16	14	15.5%	G	**0.87**
SOCOTEC Didcot	50% TEA in Acetone	2022	R	Horsham District Council	11	25	22	14.4%	G	**0.87**
SOCOTEC Didcot	50% TEA in acetone	2022	R	Leeds City Council	12	40	29	37.8%	G	**0.73**
SOCOTEC Didcot	50% TEA in acetone	2022	KS	Leeds City Council	11	33	23	44.6%	G	**0.69**
SOCOTEC Didcot	50% TEA in acetone	2022	R	Leeds City Council	12	43	34	26.0%	G	**0.79**
SOCOTEC Didcot	50% TEA in acetone	2022	R	Leeds City Council	11	41	30	34.2%	G	**0.75**
SOCOTEC Didcot	50% TEA in acetone	2022	R	Leeds City Council	12	30	22	36.9%	G	**0.73**
SOCOTEC Didcot	50% TEA in acetone	2022	UC	Leeds City Council	12	30	22	34.1%	G	**0.75**
SOCOTEC Didcot	50% TEA in Acetone	2022	R	Thanet District Council	12	23	17	29.1%	G	**0.77**
SOCOTEC Didcot	50% TEA in acetone	2022		**Overall Factor[3] (26 studies)**				**Use**		**0.76**

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	National	03/23	0.76
2021	National	03/22	0.78
2020	National	03/21	0.77
2019	National	03/20	0.75
2018	National	03/19	0.76

NO_2 Fall-off with Distance from the Road

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

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) and fall within 10% of the annual mean objective.

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

Table C.2 – NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
NAS39	1.1	7.5	42.1	9.0	29.1	

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Maps of Air Balloon Roundabout AQMA - Location & Boundary

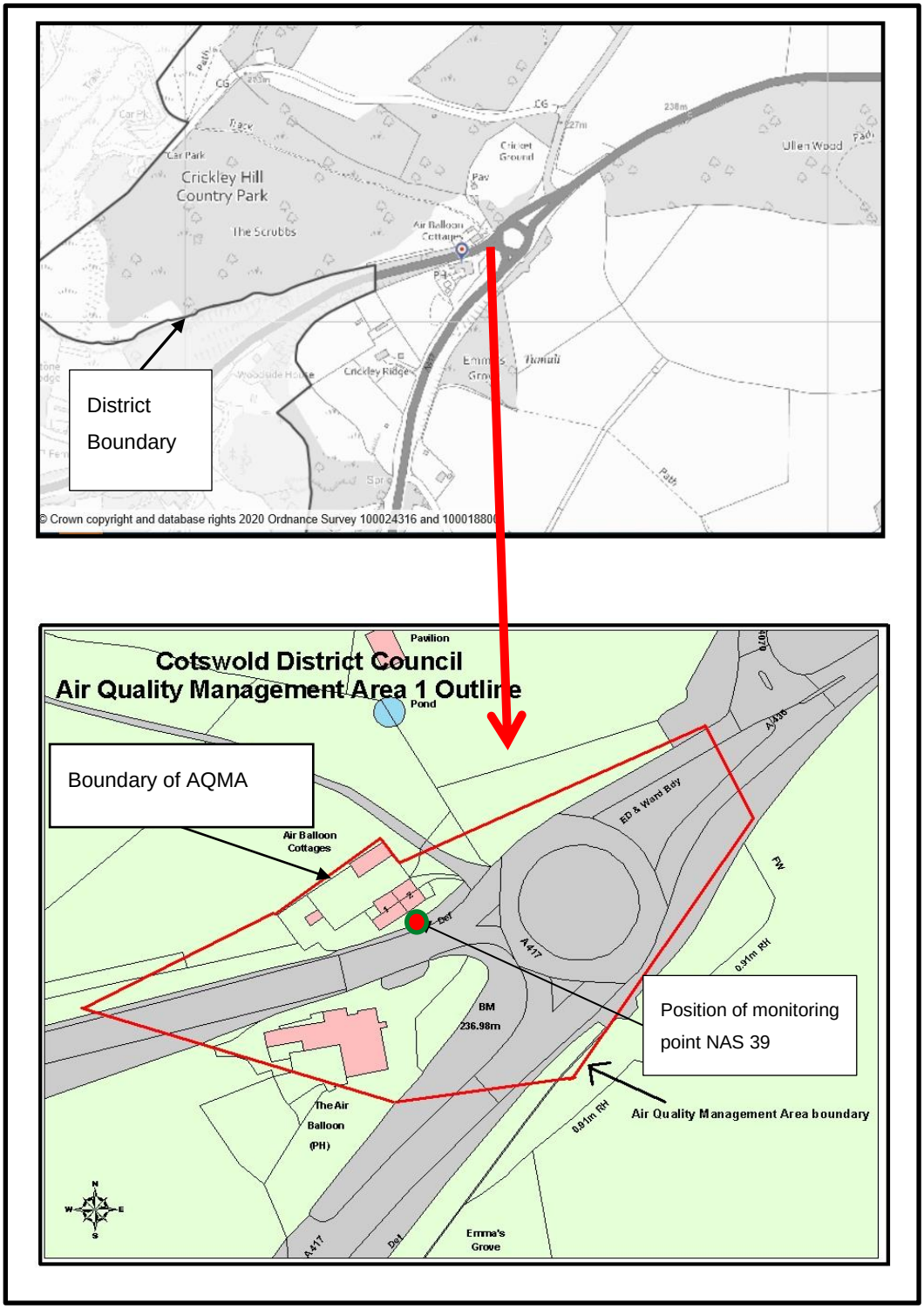


Figure D.2 – Map of Lechlade AQMA

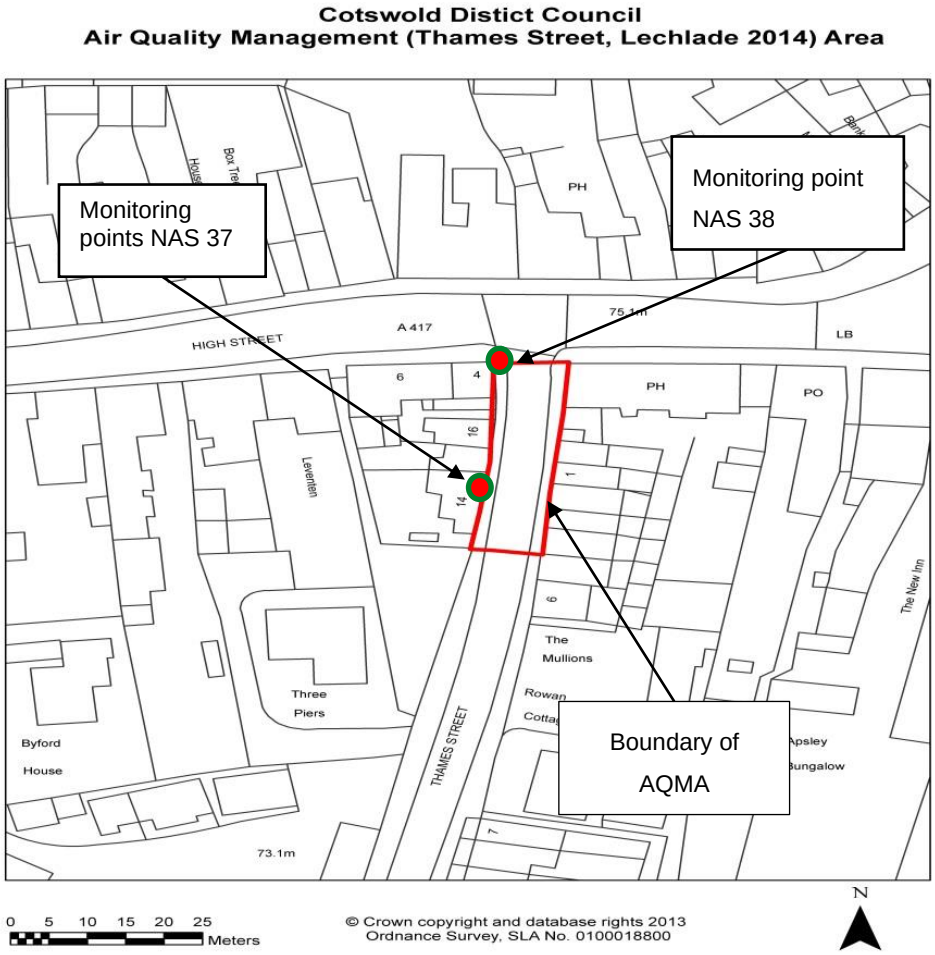


Figure D.3 – Map of Non-Automatic Monitoring Site: Stow on the Wold - NAS26

Figure D.4 – Map of Non-Automatic Monitoring Site: Bourton-on-the-Water - NAS27

Figure D.5 – Map of Non-Automatic Monitoring Site: Cirencester - NAS28 to NAS36

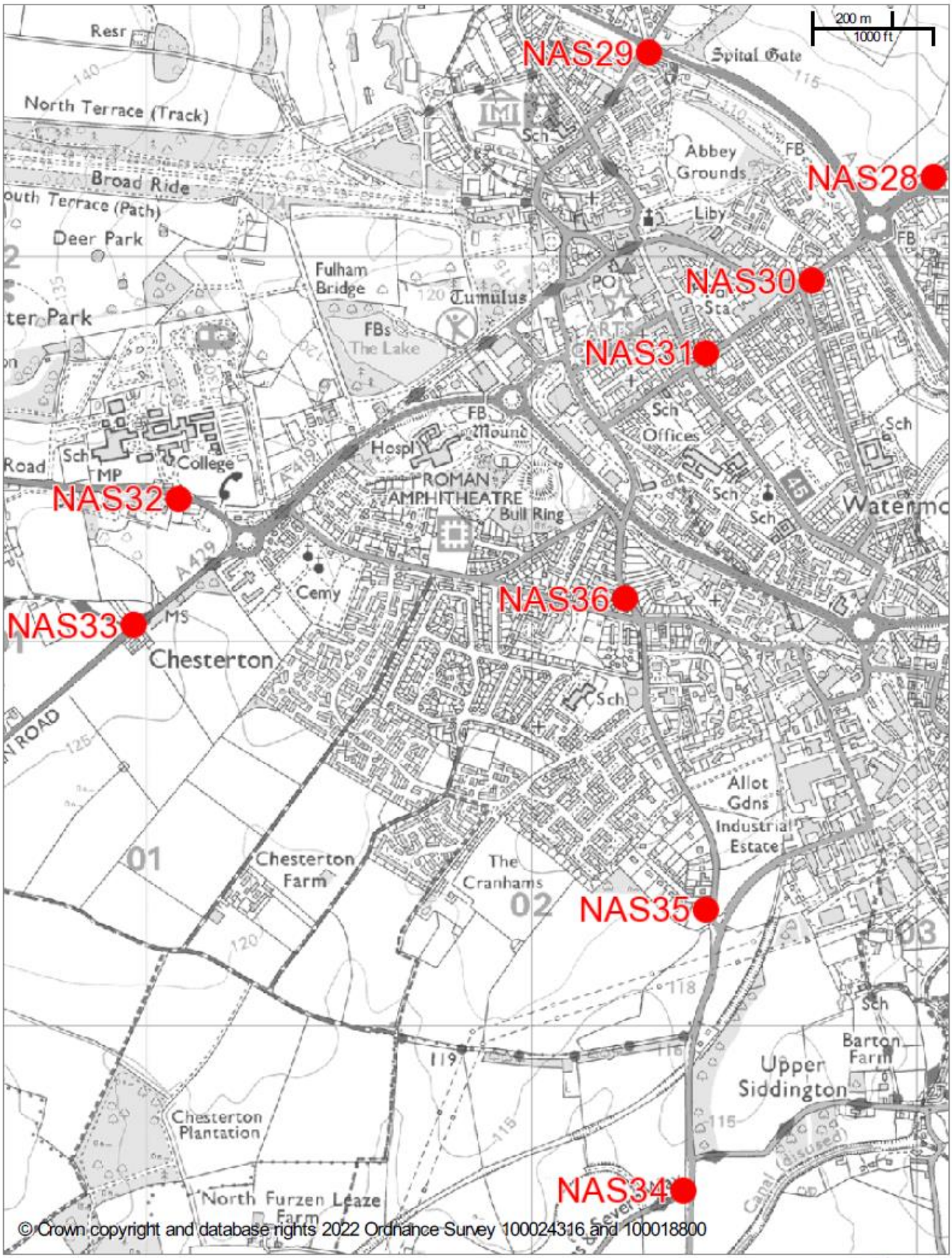


Figure D.6 – Map of Non-Automatic Monitoring Site: Cirencester - NAS28, NAS29, NAS30 and NAS31

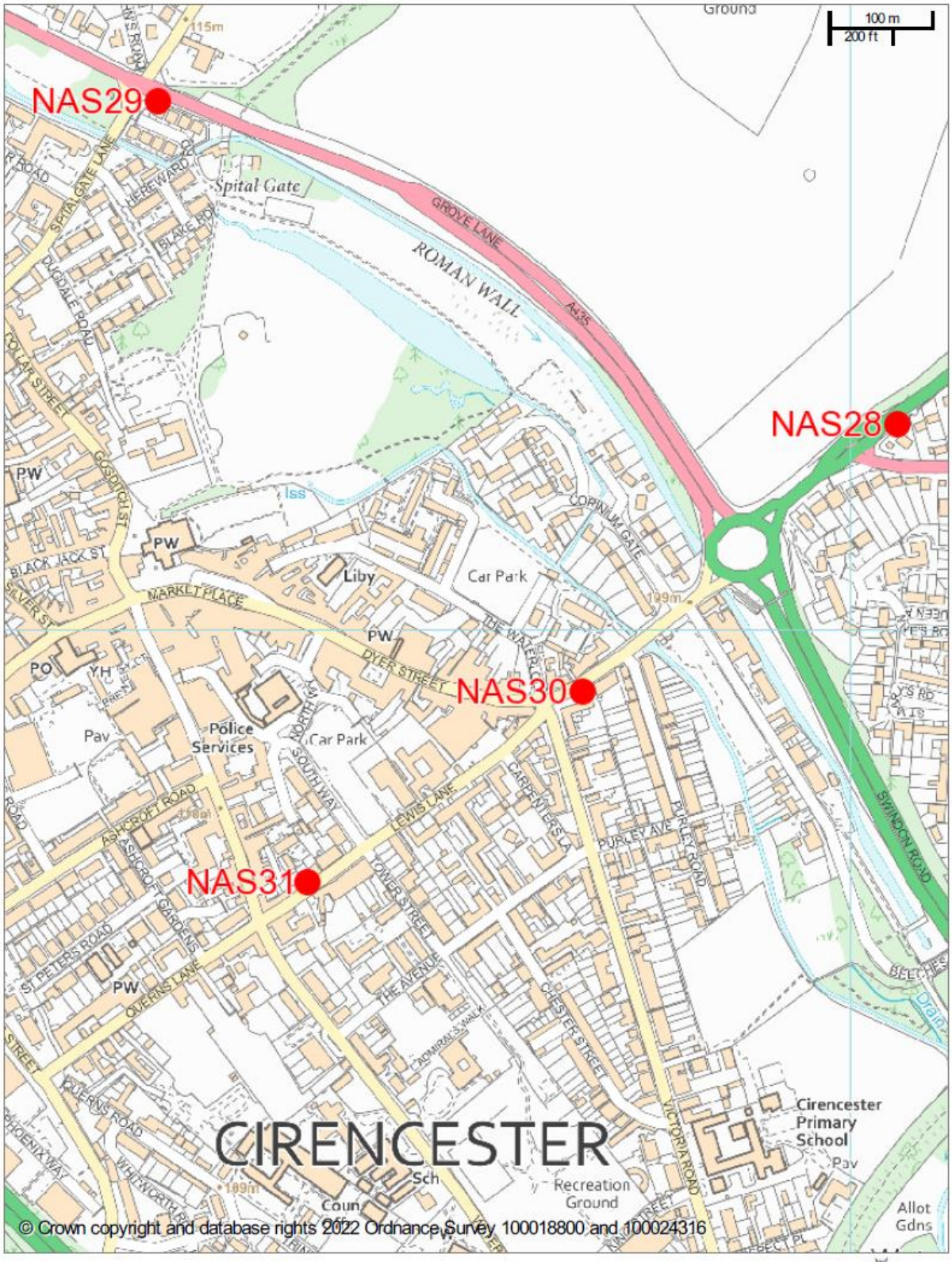


Figure D.7 – Map of Non-Automatic Monitoring Site: Cirencester – NAS32, NAS33, NAS34, NAS35 and NAS366

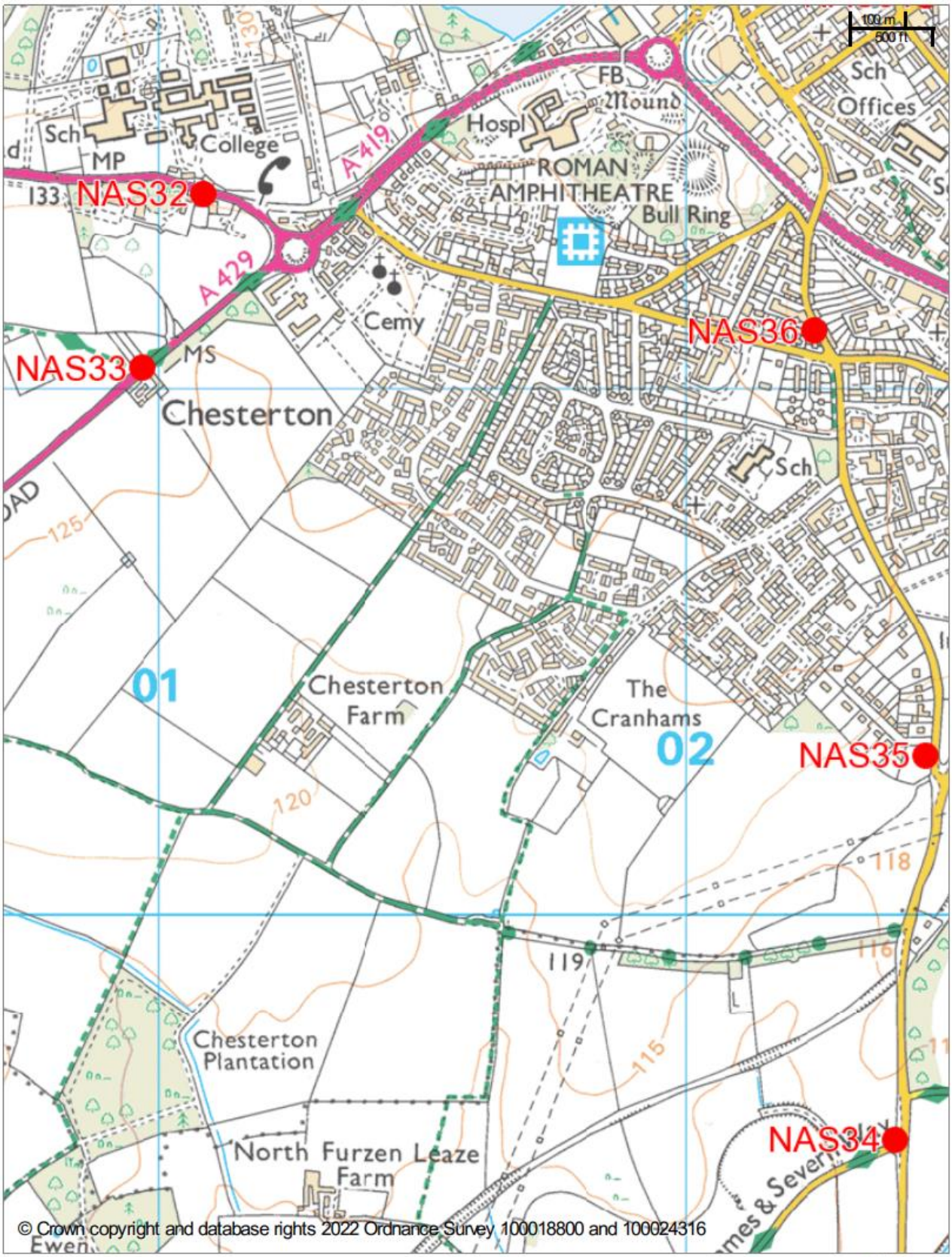


Figure D.8 – Map of Non-Automatic Monitoring Site: Lechlade – NAS37 and NAS38,

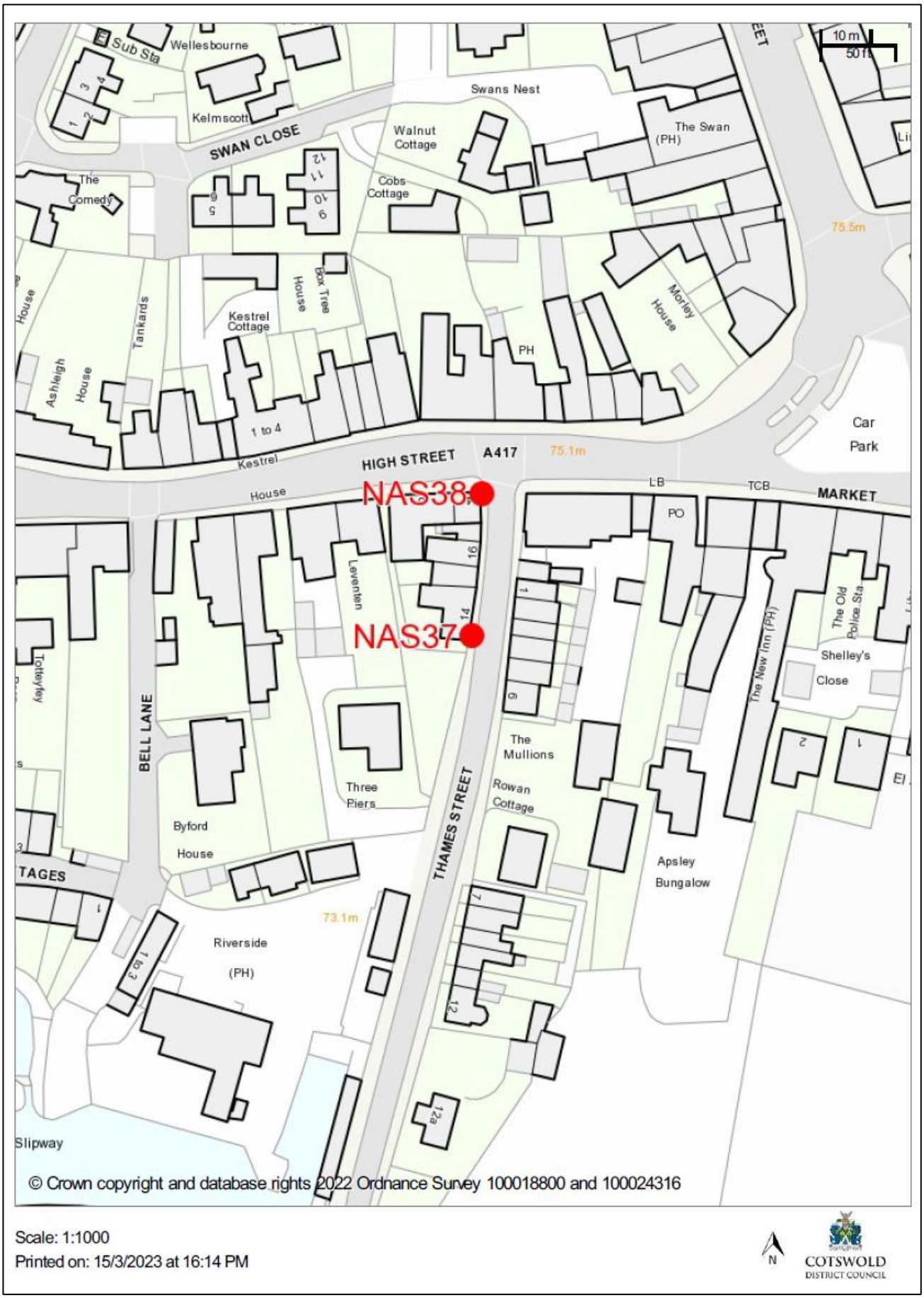


Figure D.9 – Map of Non-Automatic Monitoring Site: Air Balloon Roundabout - NAS39,

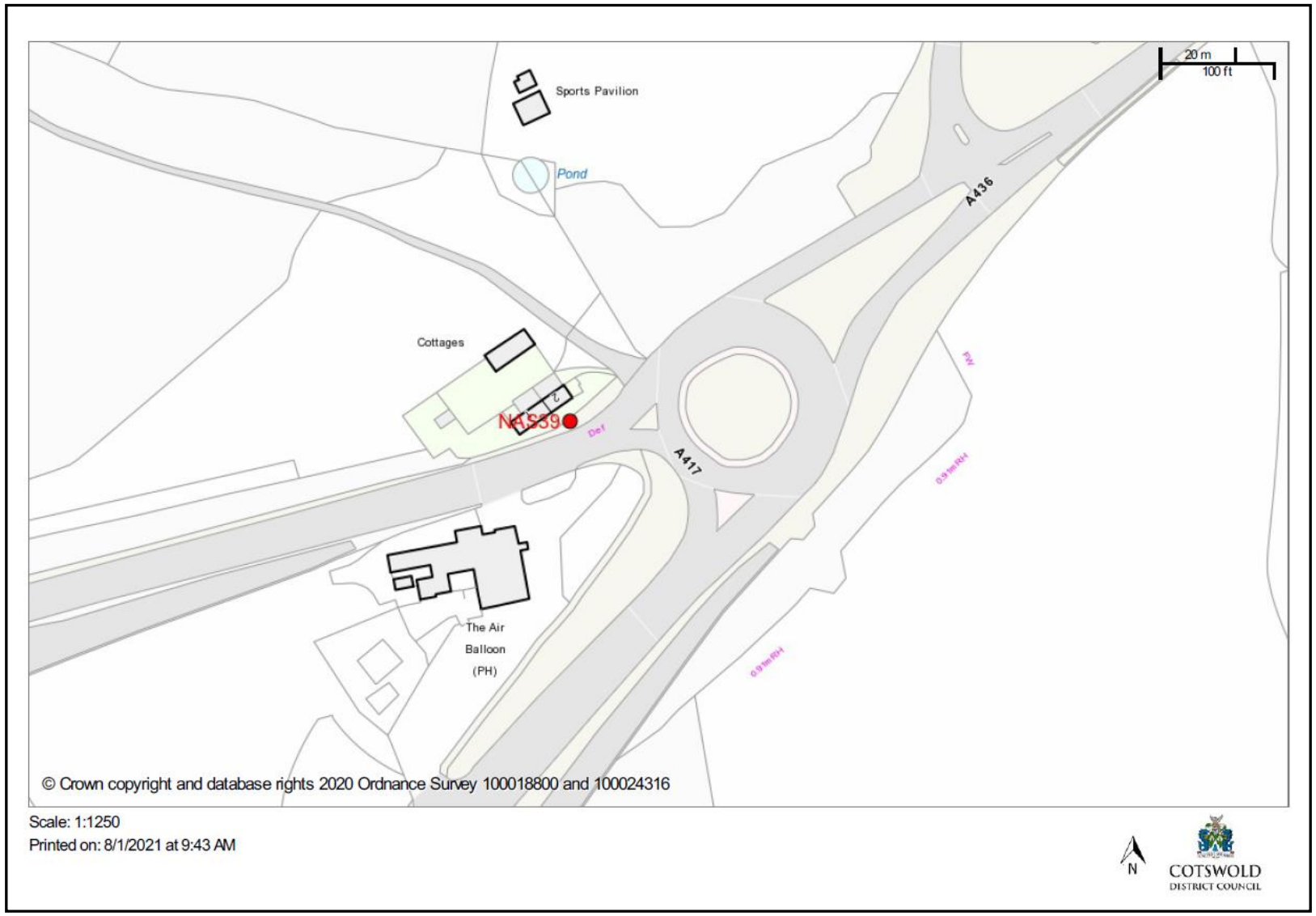
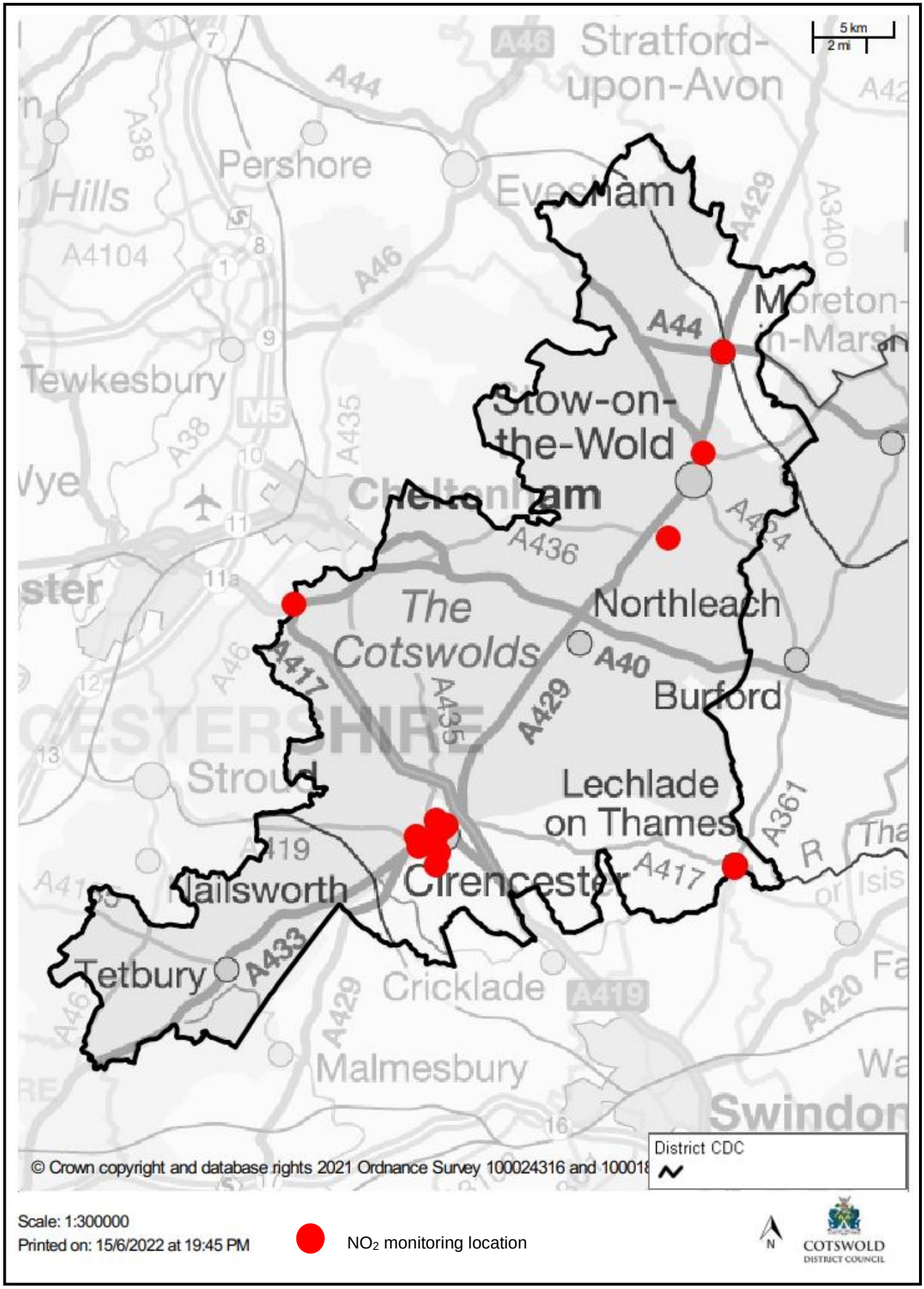


Figure D.10 – Map of Non-Automatic Monitoring Site: Moreton-in-Marsh – NAS42 and NAS48

Figure D.11 – Map of Non-Automatic Monitoring Site: Stow-on-the-Wold – NAS49

Figure D.12 – Distribution of Non-Automatic Monitoring Sites across Cotswold District



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 School Streets Scheme, Cirencester

The School Streets scheme aims to improve air quality and road safety by closing roads near certain schools to traffic during drop-off and pick-up times. This is being delivered by Gloucestershire County Council together with participating schools, with funding from the Government's Air Quality grant scheme.

School travel accounts for approximately 20% of vehicle trips on Gloucestershire's road network during peak times of the day and is a significant contributing factor to congestion and parking pressures outside of school gates.

On roads where the Schools Streets are being trialled, the streets around the school will temporarily become 'pedestrian, scooter and cycle zones' only at set times in the morning and afternoon. Vehicles are not permitted to enter the street between these times unless they have been granted an exemption.

From February 2022, two air quality monitoring stations were set up in the vicinity of Stratton Church of England Primary School, Cirencester in advance of the trial commencing in order to assess air quality (nitrogen dioxide) before the scheme commenced.

The tubes are supplied by Gloucestershire County Council and is analysed separately from the District's diffusion tubes. It will assess levels of nitrogen dioxide in the vicinity of the school at the locations shown in Figure F.1 below.

Figure F.1 Location of School Streets Monitoring in Stratton

The results of the monitoring are summarised in Table F.1

Further information about the scheme can be found by following this link:

Link to School Streets Scheme

Table F.1 Results of Monitoring in vicinity of Stratton Church of England Primary School, Cirencester

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 0.76
GCC/22A/ NA1S1	Corner of Haresfield and Vaisey, Stratton	401642	203872	NR	9.5	12.9	7.3	6.4	5	8.7	6.4	8.0	8.6	10.4	13.3	8.8	6.7
GCC/22A/ NA1S2	Stratton C of E Primary, Thessaly Rd, Stratton	401503	203879	NR	8.8	10.1	6.6	5	25	7.5	5.3	6.0	7.4	9.2	12.3	9.4	7.1

NR – No Result

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

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