Northumberland
County Council

2021 Air Quality Annual Status Report (ASR)

Northumberland County Council

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: December 2021

Document Details

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Executive Summary: Air Quality in Our Area

This is the local air quality Annual Status Report for Northumberland County Council produced in 2021 for the reporting year 2020. The report fulfils this part of the Council's commitment to the continuing Local Air Quality Management (LAQM) process. The report provides an annual update for air quality issues in Northumberland during 2020, including monitoring results for the calendar year.

The main findings for 2020 are:

- The Council is involved in a number of projects which have the aim of improving air quality either directly or indirectly (ie promoting alternative modes of transport, economic, fuel economy, health benefits etc.)
- The Council has continued to monitor air quality at two monitoring stations in Blyth with two real-time, automatic particulate monitors. The results of which have met the national air quality objectives for 2020.
- The Council maintains a network of nitrogen dioxide diffusion tubes across the county which have indicated that none of the monitored locations require more detailed monitoring or investigation.
- Previous feedback from DEFRA on the Annual Status Reports have suggested that where diffusion tube locations did not indicate an issue with nitrogen dioxide, then they should be moved to other locations. Tubes are moved around on a risk-based approach to reflect this feedback; however, the Council do have a number of diffusion tubes deployed in what are felt to be key, long-term monitoring locations which are unlikely to ever move. Other tubes are moved on a regular basis to reflect political, local or environmental need.
- The national air quality objectives have been met for annual means and daily exceedances for particulates (PM_{10}) at two permanent air quality stations in Blyth.
- The national air quality objective has been met for annual mean exceedances for nitrogen dioxide (NO_2) at a number of locations across Northumberland.
- $PM_{2.5}$ meets the unofficial cap limit at two permanent air quality stations in Blyth, and for comparison meets the stricter objective set in Scotland. One of the monitoring stations is sited next to one of the busiest urban roads in Northumberland, with relevant receptors present.

- No further detailed assessment is required for any of the pollutants monitored within Northumberland.
- Northumberland County Council will progress to an LAQM Annual Status Report in 2022 reporting the data collected in 2021.

Air Quality in Northumberland

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].

For a number of years in succession, the air quality in Northumberland has continued to meet the national air quality objectives and there appears to be a downward trend in both particulates and nitrogen dioxide at the Cowpen Road site and particulates at the Blyth Library site.

Monitoring since 2007 has indicated a trend of decreasing nitrogen dioxide and particulate levels at our automatic monitoring stations. Continuous nitrogen dioxide monitoring ceased at Blyth Library in 2013 and has now ceased for the Cowpen Road site (end of 2018).

Air quality objectives for NO_2 and PM_{10} continue to be met in Northumberland and potential locations with high road traffic volumes and relevant receptors are kept under review to inform future locations for diffusion tubes.

Air quality impacts are routinely addressed through engagement with the planning process, particularly where property developments involve significant changes in road traffic numbers or layout. Generally, compliance with a DMRB air quality screening assessment is required as part of any such application submission.

[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017
[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Air quality appraisal: damage cost guidance, July 2020
[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

The deployment of diffusion tubes (NO_2 and BTEX) has been successively reduced since local government reorganisation in 2009, due to long-term compliance. Northumberland no longer employs any BTEX tubes in any location.

The Blyth Air Quality Management Area (AQMA) declared for particulates (PM_{10}) was revoked in 2012, as detailed in our 2012 Updating and Screening Assessment. Northumberland currently has no declared Air Quality Management Areas (AQMAs) and based upon current and historic monitoring results, this is unlikely to change.

Northumberland County Council's Environmental Protection Team previously participated in a Local Air Quality Partnership with Rio Tinto (and formerly Alcan) and the Environment Agency, the former being the operators of the only remaining coal-fired power station in Northumberland. The power station was sold to Energetický a Průmyslový Holding (EPH), a Czech-based company and has been converted to biomass with fuel deliveries to the plant commencing in March 2018. The Environment Agency are Regulators for the site, but it is hoped that a new air quality partnership will be formed.

Dualling of the A1 road north of Morpeth is now planned to start in 2022, this is to be carried out by Highways England. Air quality is to be addressed in the development, however it is likely that this dualling, once completed, will not result in an increase in traffic merely provide a more stable flow of vehicles many of which are presently restricted in convoy behind slower vehicles on single carriageway sections. The net result of the realignment of the southern part of the carriageway is a reduction in the number of receptors near the A1, including a first school.

Planning applications are likely to determined late in 2021 for the railway stations and other infrastructure for the resumption of a passenger train service on the so-called "Northumberland Line". This is a former passenger line, currently used for freight services to Lynemouth Power station (biomass fuel) and North Blyth/Cambois (mainly alumina). It is planned to construct or re-open the following stations on this line; Northumberland Park (North Tyneside), Seaton Delaval, Newsham, Bebside, Bedlington and Ashington. It is expected that this will provide a commuter service for people working and shopping in Newcastle and so reduce the number of road vehicles on daily journeys.

In June 2019, Northumberland County Council declared a climate emergency and pledged to make the County carbon neutral by 2030 focusing on energy generation, energy consumption, emissions capture, policy and engagement. A Climate Change Action Plan was due to be put before members for approval early in 2020.

Although carbon dioxide does not form part of the LAQM process, there are associated benefits to the reduction of other atmospheric pollutants at a local level. These are principally associated with changes to fleet vehicles; through route optimisation, driver training and investment in newer and more efficient vehicles. These points are addressed separately in this report and are contained in Table 3.1.

Northumberland has no other individual, major commercial air pollution sources other than those controlled through the Environmental Permitting legislation (i.e. quarries, solvent painting/coating etc.).

The main impact upon air quality within Northumberland is road traffic which we continue to monitor at a number of locations using either automatic or non-automatic methods.

Data for all pollutants has previously indicated a downward trend although this seems to be levelling off somewhat. Trends from diffusion tube data is more difficult to assess since only a smaller portion of the remaining tubes deployed are at long-term locations. For the eleven longest established diffusion tube locations, many of the sites do show a clear downward trend, however a few show a less clear pattern and this may be because of local circumstances.

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 Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Below is a summary of our actions/projects. These are described in more detail in Section 2 of this report and a full list is contained in Table 3.1.

[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

- **Northumberland Line** – restoration of a passenger rail service to some of the larger towns in south-east of Northumberland (Seaton Delaval, Blyth, Bedlington and Ashington)
- **A1 Dualling in Northumberland** - Morpeth to Felton and Alnwick to Ellingham
- **Taxi Fleets** – a regional approach to taxi fleets is to be consulted on and there are plans to establish a regional approach based on EURO standards (allowing for existing fleets) and determine standards for new taxis and for how long they will be required.
- **Biomass Appliances** - identify commercial biomass appliances through the planning process and require additional information about them.
- **Planning Process** - requirement for an air quality assessment for larger applications where the LAQM trigger vehicle numbers are exceeded.
- **Council Fleet Vehicles** - driver management systems installed to improve overall fuel consumption and emissions. This has now been extended to more fleet vehicles, including “pool cars”. All new fleet vehicles over 3.5 tonne to be either Euro 5 or 6.
- **Agile Working at Northumberland County Council** - enabling staff to work from alternative locations and reduce travel and therefore reduce emissions.
- **Northumberland County Council Local Transport Plan (2011-2026)** - commits the Council to reduce carbon emissions by 2020.
- **Transforming Cities Fund (TCF)** - a bid to central government for up to £377M for the north east to include; £99m earmarked to help restore passenger trains to the railway line running between Newcastle and Northumberland, via Ashington and Blyth and a cycle route between Newcastle Airport, Callerton and Ponteland.
- **Traffic Regulation Orders for Moving Traffic (TROM)** - ongoing programme of introducing urban speed reduction areas in Northumberland with a consequential improvement in emissions from road vehicles.

Conclusions and Priorities

No exceedances for any objective for NO_2 (diffusion tubes), PM_{10} or the unofficial “cap” limit for $PM_{2.5}$ were identified in Northumberland during 2020. This has been the situation in Northumberland since at least the formation of the Northumberland unitary authority in 2009. Therefore, no detailed assessment for any pollutant has been identified.

Northumberland has consistently met national Air Quality Objective (AQO) limits and as such there has been no impetus to develop any air quality action plans or strategies. Momentum now seems to be growing (in conjunction with other regional Authorities and Agencies), towards improving air quality above and beyond AQS limits.

It is envisaged that the Environmental Protection Team will play a pivotal role in future co-ordination of projects which have a positive improvement in air quality such as attending the North East Combined Authority (NECA) air quality strategy meeting with Environmental Health professionals and transport planners.

Within our Service Plan, there is a priority to proactively engage with internal and external partners to raise awareness of LAQM. We have already initiated engagement with the Director of Public Health for Northumberland, other council departments, agencies and groups to inform and influence decisions where air quality is a consideration.

Areas where further information may be needed are:

- Assessing the impact of small biomass appliances including wood burning stoves within the more populated towns in the county.
- Further engagement with the Director of Public Health, to raise awareness of air quality in relation to the Public Health Outcomes Framework.
- Engaging with other council departments to feed into projects or programmes which have any aspect relating to air quality.
- Raising public awareness of air quality issues through members of the public being able to contact the Environmental Protection Team for information and advice on air quality included on the Council website:

  http://www.northumberland.gov.uk/Protection/Pollution/Air.aspx

Our webpage content will be reviewed and updated again in 2022.

Northumberland County Council will continue to monitor particulates at the two stations in Blyth and nitrogen dioxide through our networks of diffusion tubes.

Local Engagement and How to get Involved

Members of the public can contact the Public Health Protection Unit for information and advice on air quality using the contact details in the frontispiece of this report and further information is included on the Council website:

http://www.northumberland.gov.uk/Protection/Pollution/Air.aspx

Previous annual air quality reports can be found under the “Useful air quality documents” section. There is also a link on the website to live data from our two particulate monitors at Blyth Library and on Cowpen Road, Blyth.

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1 Local Air Quality Management

This report provides an overview of air quality in Northumberland 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 Northumberland County 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 **Error! Reference source not found.**.

2 DEFRA's Appraisal Comments for the Northumberland 2020 Annual Status Report

Bureau Veritas on behalf of DEFRA made a number of comments on last year's report which are designed to help inform future reports and are listed below with the appropriate responses:

1. The Council have provided a thorough report which contains the required content.

   No action or comment required.

2. The Council continued to achieve compliance with all relevant AQOs during 2019, with no requirement for any AQMAs or associated AQAPs.

   No action or comment required.

3. Annual mean NO2 results from the CR automatic monitoring site do not appear to have been included in Table A.3, despite monitoring of NO2 indicated at this site in Table A.1. The report indicates that 1-hour mean NO2 monitoring results are no longer available, therefore suggesting that continuous monitoring of NO2 is no longer carried out. The Council are required to review and update table A.1 as appropriate, and include annual mean NO2 data for CR in Table A.3 if applicable.

   The Cowpen Road (CR) nitrogen dioxide automatic monitor had been included in Table A.3 in error and this entry was removed in the final copy made public. This automatic monitor was discontinued in 2019.

4. Distance correction has been applied to all sites, however please be advised that distance correction for relevant exposure is only appropriate where monitoring concentrations exceed 36 µg/m3 and the site is not considered representative of relevant exposure.

   As the actual siting of monitoring devices are not always in themselves locations of relevant receptors, NCC have always presented monitoring data concentrations at relevant receptors. This is to ensure that any member of the public who have any concerns over air quality at their properties can see what the concentrations are at the building façade/gardens and not at the monitor's location. The uncorrected concentrations are always presented in the data regardless.

5. It is encouraging to see the Council responding to comments made during previous appraisals. This is commended and welcomed in future reports.

No action or comment required.

6. The report provides trend graphs to show changes in monitored concentrations. Discussion of these graphs is encouraged.

   A brief discussion of the trends presented in graphical form was added to the final report.

7. The report draws brief links to the Public Health Outcomes Framework, however does not consider the fraction of mortality attributable to PM2.5 emissions. The Council are encouraged to include this in future reports, in addition to a discussion of historical trends, a comparison between Northumberland County and England as a whole, and a comparison to neighbouring authorities. For further guidance, please refer to LAQM Technical Guidance TG.16.

   As there is currently no requirement to monitor for PM2.5 in England (although NCC do monitor this pollutant) this discussion was felt to be duplication of the work presented by Public Health England. A short commentary on the trends within Northumberland from both PHE and our own PM2.5 data were added.

   Anyone who wishes to look at the longer-term trends of this indicator can find data for 2010 to 2019 and updates to present at:

   https://fingertips.phe.org.uk/search/particulates#page/9/gid/1000002/

3 Actions to Improve Air Quality

3.1 Air Quality Management Areas

Northumberland County Council does not have any Air Quality Management Areas and there is no current expectation that any would need to be declared in the county.

3.2 Progress and Impact of Measures to Address Air Quality in Northumberland County Council

DEFRA's appraisal of last year's ASR concluded:

- The report is well structured, detailed, and provides the information specified in the Guidance.
- The Council have provided details of measures taken to improve air quality across the County, which is commended.
- On the basis of the evidence provided by the local authority the conclusions reached are **accepted** for all sources and pollutants. The next step is for Northumberland County Council to submit an Annual Status Report in 2021.

Northumberland County Council has taken forward a number of measures during 2020 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 3.1.

However, please note that much of this information was presented in the 2020 ASR as the impact of Covid-19 upon the development and delivery of strategic and actual projects in 2020 has been significant.

Northumberland County Council's priorities for the coming year are to proactively engage with & influence local decisions where air quality impacts may be relevant.

Within the Public Health Protection Unit Service Delivery plan 2019/20, three of our key priorities were related directly to air improving air quality:

1. Protect and improve public health by proactively ensuring air quality within Northumberland meets national standards through the regulation of permitted industrial premises and the investigation of air pollution incidents.
2. To proactively engage with internal and external partners to raise awareness of Local Air Quality Management. Work in partnership with internal and external bodies to positively influence compliance with National Air Quality Objectives in Northumberland.

3. Respond to planning consultations by the provision of expert technical advice on noise, air quality, land contamination, lighting & private water supplies and attend planning committees as required.

Below is a summary of some of the main actions and projects which improve air quality in Northumberland, please note that some of these projects are continuing ones and/or span a number of years and have been reported previously and will be in subsequent years. Where there are any specific air quality reported progress or milestones then these will be highlighted.

A1 Dualling – Morpeth to Felton and Alnwick to Ellingham

Preliminary works are being carried out for the dualling of the A1 road north of Morpeth to the dualled section of the Felton Bypass and from north of Alnwick to Ellingham (at the short, duelled section at Brownieside). This will create an entirely duelled section north of Morpeth to Ellingham, some 32 kilometres in length.

Although, it is not expected that there will be any reduction in road traffic through this dualling, it will have two main benefits in respect of improving air quality;

- The section between Morpeth and Eshott Airfield will be realigned further to the west reducing the number of receptors in close proximity to the carriageway from 24 to 9 and also removes the playing fields of Tritlington C of E First School.
- Currently, convoying occurs frequently with cars being stuck behind HGVs with the only safe passing places being on the Felton to Alnwick section and the short section of existing dualled section at Brownieside. It is expected that the dualling will result in more freely flowing traffic along the entire length from Morpeth to Ellingham. This should result in less emissions from traffic.

The deadline for Secretary of State to make decision on this is 05/01/2022, although at this time the final decision from the Planning Inspectorate following an extensive public enquiry is still awaited.

Should the scheme be given a “green light” by the Planning Inspectorate and the Secretary of State then it is expected the dualling will be completed by 2024/25.

Further details will be reported in subsequent annual status reports.

The Northumberland Line

Preliminary works are being carried out for the reintroduction of a passenger rail service on a branch line from Benton Junction on the East Coast Main Line (ECML) running to

Ashington with stations at Northumberland Park (North Tyneside), Seaton Delaval, Newsham, Bebside, Bedlington and Ashington.

It is expected this will provide an accessible alternative to road transport into Newcastle for workers and shoppers, and therefore reducing the number of road vehicles travelling on roads to Newcastle and reducing the number of vehicles entering the proposed Clean Air Zone (CAZ) in Newcastle.

The Public Health Protection Unit has been working with the applicant to address the air quality impacts associated with this proposal.

Desktop air quality impact assessments have been carried out for all the stations to used for the scheme in Northumberland. These have "scoped out" train traffic as these fall below the threshold for assessment in section 7.18 of TG16. As a result of some of the road traffic flow data used in the air quality modelling software, potential air quality issues have been identified at some of the stations. Therefore, the air quality consultant is to carry out short-term air quality monitoring for nitrogen dioxide to ratify the model's predictions.

Late in 2021 an application for Transport and Works Act Order will be submitted to Secretary of State along with an enquiry under the order.

It is expected that the passenger service will resume in 2024.

Further details will be reported in subsequent annual status reports.

Taxis

Previously, Northumberland County Council's Licensing Team required that taxis are upgraded to Euro 5 emission standards.

From 1st April 2017 all new vehicles licensed by the Council had to meet the following requirements:

- The Euro 5 Technology standard in respect of passenger cars.
- The Euro 6 Technology standard in respect of light commercial vehicles

The Euro 5 standard now includes an emission limit for particulates.

At a meeting of the Licensing and Regulatory Committee held on Wednesday 23 October 2019 it was resolved that members approve the Licensing Authority to consult on the following proposed amendments to the Hackney Carriage and Private Hire Licensing Policy:-

1. New Licences. A 4 year vehicle age policy with effect from April 2020 for all newly licensed vehicles. This means the Euro 6 emissions standard applies from April 2020 to all new licences.
2. Existing Vehicles. Adopt a maximum 8 year vehicle life with a start date of April 2023. The taxi trade therefore has 4 years to comply (3 years from April 2020). This means that from April 2023, all diesel and petrol engines will be Euro 6.
4. Wheelchair Accessible Vehicles. Existing vehicles will have an extra 2 years added to the age restriction, meaning that April 2025 is the compliance date. As a consequence, it is possible that a relatively low number of wheelchair accessible vehicles will be Euro 5 between April 2023 to April 2025.
5. Full electric and zero emission at source. Vehicles would be exempt.

This was instigated by the North East Public Protection Partnership (NEPPP) asking the North East Strategic Licensing Group. (NESLG) to address the impact of taxi emissions on air quality and consider if the 12 participating local authorities could work together to progressively improve taxi vehicle exhaust emissions.

Biomass Appliances

The Environmental Protection Team, through their engagement with the planning process, identify planning applications which indicate a biomass combustion component (The Clean Air Act 1993).

Since the previous annual status report, the Ready to Burn scheme has been introduced in the UK under The Air Quality (Domestic Solid Fuel Standards)(England) Regulations 2020. This will be discussed in the 2022 Annual Status Report.

Planning Process

Air quality assessments for larger developments usually include some assessment of air quality impacts, related to any short-term construction and long-term operation phases. These are were previously assessed using the Design Manual for Roads and Bridges (DMRB) methodology until it's withdrawal and subsequently replaced. Consultants have come in with similar screening assessments which have been acceptable.

The triggers for requiring an air quality assessment are contained in:

"*Land-Use Planning & Development Control: Planning for Air Quality - Guidance from Environmental Protection UK and the Institute of Air Quality Management for the*

consideration of air quality within the land-use planning and development control processes. Environmental Protection UK & IAQM, May 2015 (v1.1)"

Other triggers are included in TAQM.16 such as those for assessing the impacts from trains/railways.

The Environmental Protection Team, recommend the following biomass informative for all relevant planning applications:

"For solid fuel biomass appliances with a rated output of greater than 50kW, notification, approval of arrestment and chimney height approval is required under Section 14 of The Clean Air Act 1993 with the Public Protection service at Northumberland County Council. Operation of such an appliance, without agreement may be an offence under the Act. An information form is available to download, complete and return from:

http://www.northumberland.gov.uk/Protection/Pollution/Pollution.aspx#pollutioncontrol-cleanairactapproval.

Please note that this biomass boiler information and requirement does not form part of your application or the decision for your planning permission."

It is understood that the government is to introduce new air quality legislation in 2021 covering the specification of wood fuels (among other things) and this will be discussed in future reports and once the legislation has been introduced.

Fleet Vehicles

Northumberland County Council employs three internal driver management systems (Ashwood's Lightfoot, Masternaut and CMS's SupaTrak), which are intended to reduce air emissions by attempting to modify driving styles in their fleet vehicles. These can give voice warnings to the driver where inappropriate driving has occurred (poor gear choices, excessive acceleration etc.) and delivers reports to management where a violation occurs and/or tracks vehicles movements.

The Council's vehicle fleet replacement program also requires all new vehicles over 3.5 tonne to conform to either Euro 5 or Euro 6 emission standard.

Agile Working at Northumberland County Council

Northumberland County Council is promoting alternative ways of delivering its services and one of the fundamental changes it is adopting is to allow its staff to work in non-traditional ways. It issued a new Policy in January 2017.

The background to agile working is:

"*Agile working is a way of working in which an organisation empowers its people to work where, when and how they choose – with maximum flexibility and minimum constraints – to optimise their performance and deliver value and customer service.*

It uses communications and information technology to enable people to work in ways, which best suit their needs without the traditional limitations of where and when tasks must be performed.

It is based on the concept that work is an activity we do, rather than a place we go. With the technology available to modern business, there are numerous tools to help us work in new and different ways, to meet customer needs, reduce costs, increase productivity and improve sustainability.

Agile working is a transformational tool to allow organisations to work smarter by eliminating all barriers to working efficiently."

This is being enabled by providing computer hardware and software which enables access to software and systems to allow normal work to be carried out onsite (ie on inspections, visits) and/or at alternative work locations or even at home.

This has the potential of reducing the distances that staff are required to travel and with a result in reducing fuel consumption and emissions to air.

This is an ongoing project and, as the moment, there is no measurable performance indicator for this.

However, since 23 March 2020 most Council staff have been working from home as a result of Covid-19 restrictions with a significant drop in vehicle journeys to and from a place of work and for attending internal/external meetings and training.

The Northumberland County Council Local Transport Plan (2011-2026)

This is available at:

http://www.northumberland.gov.uk/Highways/Transport-policy/Transport-plan.aspx

Among other air quality related issues, the LTP commits Northumberland County Council to:

"*...reducing carbon emissions by 2020, however CO2 emissions from road transport in the North East are forecast to increase. The need to maintain the current good air quality in the county and ensure it is not put at risk by transport emissions*".

Traffic Regulation Orders for Moving Traffic (TROM)

Northumberland has imposed a number of speed restrictions and one-way traffic controls in 2020 which should all benefit air quality. These include:

- Three new 20 mph speed restrictions (two located at or near to schools).
- Nine new 30 mph speed restrictions.
- Two new 40 mph speed restrictions.
- Three new 50 mph speed restrictions.
- Five new multiple speed restriction schemes (one located new to a school).
- Eight other speed/access restriction schemes/

Details can be found on the following web page:

http://www.northumberland.gov.uk/Highways/Roads/Traffic.aspx

Ongoing Traffic Projects

These include:

- Specified HGV routing for quarries / surface mines and timber haulage routes.
- Replacement taxis to meet Euro 5 emissions limits (mandatory from 1st April 2017).
- Promotion and support of homeworking and agile working for staff in council departments.
- Parking enforcement in town centres including rural market towns.
- Fleet vehicles fitted with driving style modifiers / reporting systems (Lightfoot, Masternaut, SupaTrak etc.).
- Offering MOT Vehicles emission testing for Council employees and non-employees.

Forecast of Progress

Northumberland County Council will continue with its established network of air quality monitoring and expects to again meet air quality objectives across the County in 2021.

Funding Sources

No external sources of funding are used in the management of our local air quality management function.

Table 3.1 – 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	For special events (Morpeth Gathering & Fair Day, Tall Ships at Blyth)	Alternatives to private vehicle use	Bus based Park & Ride	Unknown		NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	N/A	On going	/
2	HGV routing used by the LPA for some quarries / surface mine schemes	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	Unknown		NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	N/A	On going	/
3	All taxis to be EURO 5	Promoting Low Emission Transport	Taxi emission incentives			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	Complete conversion of taxi fleets to Euro 5	01/04/2017	http://www.northumberland.gov.uk/Business/Licences/Taxi.aspx
4	Home working some departments (such as IT)	Promoting Travel Alternatives	Promoting Travel Alternatives	2017/18		NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	/	On going	/
5	Go Smarter	Promoting Travel Alternatives	Personalised Travel Planning			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	/	2015/16	From LSTF funding. http://gosmarter.co.uk/
6	Go Smarter, Cyclescheme offering VAT free cycles with up to 50% of prices with salary sacrifice scheme	Promoting Travel Alternatives	Promotion of cycling			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	/	On going	http://gosmarter.co.uk/
7	Go Smarter promoting Modeshift STARS	Promoting Travel Alternatives	School Travel Plans			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	/	On going	http://modeshiftstars.org/
8	Travel planner and cycle routes	Public Information	Via the Internet			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	/	On going	http://www.northumberland.gov.uk/Highways/Cycling.aspx
9	Informal anti-idling policy through taxi licensing	Traffic Management	Anti-idling enforcement			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	/	On going	/
10	20mph zones imposed in many residential areas especially surrounding schools	Traffic Management	Reduction of speed limits, 20mph zones			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	/	On going	http://www.northumberland.gov.uk/Highways/Roads/Traffic.aspx#4trafficregulationorderprepared
11	Parking enforcement on highways carried out by Council	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway			NCC	Unknown	NO	Unknown	Unknown	Unknown	/	/	On going	http://www.northumberland.gov.uk/Highways/Parking.aspx#civilparkingenforcement
12	Several cycle networks, including; Coast & Castles, Pennine Cycleway, Reivers Route and Hadrian's Cycleway. Several others which aren't part of the Sustrans network.	Transport Planning and Infrastructure	Cycle network			NCC	Unknown	NO	Unknown	Unknown	Unknown	/	/	On going	http://www.northumberland.gov.uk/Highways/Cycling.aspx
13	Over 110 fleet vehicles fitted with Ashwoods Lightfoot to encourage more efficient driving styles.	Vehicle Fleet Efficiency	Driver training and ECO driving aids			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	N/A	On going	https://www.lightfoot.co.uk/case-study/northumberland-county-council
14	Over 800 fleet vehicles fitted	Vehicle Fleet Efficiency	Driver training and ECO driving aids			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	N/A	On going	http://www.masternaut.com/

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
	with Masternaut vehicle tracking														
15	Bid for Euro 6 buses	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport			NECA	Unknown	NO	Unknown	Unknown	Unknown	/	/	On going	http://www.simplygo.com/news/greener-cleaner-buses-for-go-north-east/
16	Vehicle emission testing as part of fleet MOT testing, all taxis and service to public	Vehicle Fleet Efficiency	Testing Vehicle Emissions			NCC	Unknown	NO	Unknown	Unknown	Unknown	/	N/A	On going	http://www.northumberland.gov.uk/Highways/Roads/Commercial.aspx#mottesting
17	Proactively engage with internal and external partners to raise awareness of Local Air Quality Management	Public Information	Via other mechanisms			NCC	Unknown	NO	Unknown	Unknown	Unknown	/	Internal KPI / Stakeholder Engagement Day	Annual	/
18	Agile working for NCC staff	Promoting Travel Alternatives	Encourage / Facilitate home-working			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	N/A	On going	/
19	Liaise with the Director for Public Health for Northumberland on issues and measures to improve AQ	Other Policy	Policy Guidance and Development Control	N/A		NCC	Unknown	NO	Unknown	Unknown	Unknown	/	N/A	On going	http://www.northumberland.gov.uk/NorthumberlandCountyCouncil/media/JSNA/strategy%20documents/DPH-Annual-Report-Northumberland-2016-3.pdf
20	Northumberland Line	Promoting Travel Alternatives			2024	NCC	NCC / Central Government	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions		2022/23 (Phase 1) 2024 (Phase 2)	https://www.northumberland.gov.uk/Highways/Transport-policy/northumberland-line.aspx
21	A1 Dualling	Transport Planning and Infrastructure	Other		2025	Highways England	Highways England / Central Government	NO	Unknown	Unknown	Unknown			2024/25	https://highwaysengland.co.uk/projects/morpeth-to-ellingham-dualling/

3.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm 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.

Key indicators of the state of public health have been developed through the Public Health Outcomes Framework (PHOF) following the Health and Social Care Act 2012. The Public Health Outcomes Framework data tool, compiled by Public Health England, includes an indicator applicable to air pollution. Indicator 3.01: Fraction of mortality attributable to particulate air pollution; provides data on the mortality burden of $PM_{2.5}$ within England and on a region and county/local authority scale. The fraction of mortality attributable to $PM_{2.5}$ pollution across England is 5.1 per cent (2019 data), the fraction within the North East region is 3.6 per cent and the fraction within Northumberland County is 3.1 per cent. The North East region has the lowest level within England and Northumberland has the lowest within the North East Region.

For Northumberland, this represents just less than 10,000 deaths per year attributable to particulate air pollution in 2019. The trend in deaths associated with this indicator has been downward since 2010 although the decrease has been less pronounced at the national level than in Northumberland or the North East Region. From 2010 to 2019 the modelling suggests a drop in some 2300 deaths attributable to fine particulate pollution over this nine year period.

Within the county of Northumberland, the annual "cap" limit of 25 $\mu g/m^3$ is comfortably met.at the roadside of one of the county's busiest urban roads (A193 - Cowpen Road, Blyth).

The Authority invested in new monitoring equipment in 2013 in anticipation that monitoring of $PM_{2.5}$ was to become a mandatory requirement of LAQM. However, as TG16 states:

"*…PM2.5 is still not incorporated into LAQM Regulations, and therefore there is no statutory requirement to review and assess PM2.5 for LAQM purposes (except now in Scotland). Whilst an increase in PM2.5 monitoring across the UK is desirable given the links to the Public Health Outcomes Frameworks, it is also recognised that the costs involved can be prohibitive.*"

Northumberland County Council is taking the following measures to address $PM_{2.5}$:

- Continuing to monitor $PM_{2.5}$ at specific locations in Northumberland

- Reporting the levels of $PM_{2.5}$ at these locations on an annual basis.
- Monitoring for any exceedance of the “cap” limit of 25 $\mu g/m^3$.
- Continuing to instigate and support initiatives which directly or indirectly improve air quality within Northumberland.
- Initiate better engagement with the Director of Public Health in Northumberland and look towards better integration of air quality and the Public Health Outcomes Framework.

Five years of $PM_{2.5}$ monitoring data adjacent to Cowpen Road and Blyth Library has shown compliance with the “cap” limit of 25 $\mu g/m^3$ and also compliance with the stricter 10 $\mu g/m^3$ objective imposed in Scotland.

DEFRA background maps for $PM_{2.5}$ (2020) provide a useful tool for looking at the rest of the County as a whole, which correlates with our approach that there is no significant $PM_{2.5}$ levels and no modelled levels above 10 $\mu g/m^3$ in Northumberland.

This position may be revised if the reviewing and assessing of $PM_{2.5}$ become a statutory requirement.

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

Summary of Monitoring Undertaken

4.1.1 Automatic Monitoring Sites

Northumberland County Council continues to operate two automatic (real-time) monitoring stations at two sites during 2020. Table A.1 in Appendix A shows the details of the sites.

The Authority also act as LSOs on behalf of DEFRA for a poly-aromatic hydrocarbon (PAH) Digitel (solid phase) monitor on the AURN network at Lynemouth. National monitoring results for this PAH sampler is available at:

https://uk-air.defra.gov.uk/networks/site-info?uka_id=UKA00556

Further details on how the monitors are calibrated and how the data has been adjusted and annualised (where required) are included in Appendix C and Appendix H.

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

4.1.2 Non-Automatic Monitoring Sites

Northumberland County Council deployed passive diffusion tube monitoring for NO_2 at 19 sites during 2020, these remain unchanged since 2018.

The highest bias-adjusted NO_2 annual mean was 22.4 $\mu g/m^3$ (20.3 $\mu g/m^3$ at the nearest receptor) of all the monitoring sites which falls well below the 60 $\mu g/m^3$ annual mean which would indicate an exceedance of the 1-hour mean objective for NO_2.

Table A.2 in Appendix A shows the details of these non-automatic sites.

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

Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

It should be noted that Covid-19 had impacts upon our diffusion tube monitoring in 2020. Following the announcement by the government on the 23 March 2020 of Covid-19 lockdown measures, some council work was discontinued as being deemed non-essential, this included the changing of nitrogen dioxide diffusion tubes. Following the diffusion change on or about the 04 March 2020, the tubes were not changed again until on or about the 29 July 2020.

It was agreed with the supplier and analyst of our diffusion tubes (Socotec) to freeze the supply of replacement tubes until normal working patterns were resumed by officers at Northumberland County Council. Because of an administration error, new diffusion tubes were not sent out by Socotec from August until December 2020.

Therefore, the diffusion tube data for 2020 in Northumberland consists of five different values for the year, months March to July and August to November being same values for exposure period longer than the normal one month.

Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias[7] and/or "annualisation" (where the data capture falls below 75%), and distance correction[8]. Further details on adjustments are provided in Appendix C and Appendix H.

4.1.3 Nitrogen Dioxide (NO_2)

Northumberland County Council decommissioned its one remaining automatic nitrogen dioxide monitor (Teledyne API200E) at the Cowpen Road site in 2019 because of ongoing instrument problems. This was discussed in the 2019 Annual Status Report.

Data from this instrument is no longer presented or discussed in this or subsequent annual reports.

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B.

Trends of nitrogen dioxide from diffusion tube data is more difficult to assess since only a smaller portion of the remaining tubes deployed are located at long-term locations. For the eleven longest established diffusion tube locations, many of the sites do show a clear downward trend (Figure A.2), however a few show a less clear pattern and this may be because of local circumstances.

4.1.4 Particulate Matter (PM_{10})

Northumberland County Council maintains two automatic particulate monitors at the Cowpen Road and Blyth Library sites, both instruments have comprehensive service contracts in place and are returned to Turnkey Instruments for service and calibration annually. Data capture for the Cowpen Road and Blyth Library sites in 2020 was 85.6 and

[7] https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html
[8] Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

62.9 per cent, respectively. The data capture for the Library site was impacted by a reoccurrence of a failure of the circuit breaker on the electrical connection to the unit which required the Council's street lighting team to identify and correct.

These are indicative monitors and were, in part, purchased to replace older equipment specifically when it was indicated that monitoring of $PM_{2.5}$ was to become a requirement in England. Additionally, changes at one monitoring site specifically required a post-mounted solution which none of the alternative monitoring equipment could at that time achieve.

The Osiris monitors are not "accredited" and were not considered as candidate instruments in the DEFRA UK equivalence program, however the DEFRA equivalence scheme is now over 12 years old and not relevant to many particulate monitors now commercially available.

Osiris monitors from unit TNO2296 onwards are MCerts certified in the measurement range of 0 to 100 $\mu g/m^3$ (Sira MC090157/05).

Turnkey have carried out their own demonstration of equivalence of the Osiris monitors for PM_{10} in accordance with CEN EN 12341:

http://www.turnkey-instruments.com/images/documents/Osiris-PM10-Equivalence.pdf

This has shown that "...*the expanded relative uncertainty of the OSIRIS instruments when compared to the CEN reference method is 15.7%. This is much better than the 25% maximum measurement uncertainty required to meet the performance requirements of the EU Air Quality Directive 2008/50/EC*".

The annual mean for the Cowpen Road Osiris in 2020 was 12.2 $\mu g/m^3$. The annual mean for the Blyth Library Osiris in 2020 was 13.6 $\mu g/m^3$ (annualised to 13.1 $\mu g/m^3$). The annual mean objective for this pollutant is 40 $\mu g/m^3$.

The number of measured exceedances of the 24-hour mean objective (50 $\mu g/m^3$) for the Cowpen Road Osiris in 2020 was zero (the objective being 35 or less exceeds of the 50 $\mu g/m^3$ limit).

The number of measured exceedances of the 24-hour mean objective (50 $\mu g/m^3$) for the Blyth Library Osiris in 2020 was zero (the objective being 35 or less exceeds of the 50 $\mu g/m^3$ limit). Since data capture was below 85 per cent, the 90.4th percentile was calculated as 26.7, well below the 50 $\mu g/m^3$ limit.

Table A.5 in Appendix A compares the monitored PM_{10} annual mean concentrations for the past five years with the annual mean objective of 40 $\mu g/m^3$.

Table A.6 in Appendix A compares the monitored PM_{10} daily mean concentrations for the past five years with the daily mean objective of 50 $\mu g/m^3$, not to be exceeded more than 35 times per year.

Trends in PM_{10} monitoring suggest a long-term reduction, however this appears to be mainly as a result on a change in monitoring equipment in the period 2013-14 (BAM to nephelometer). The current "trend" for the last five years is relatively stable (Figure A.3) given the low recorded annual means.

4.1.5 Particulate Matter ($PM_{2.5}$)

The annual mean for the Cowpen Road Osiris in 2020 was 6.8 $\mu g/m^3$. The annual mean for the Blyth Library Osiris in 2020 was 5.7 $\mu g/m^3$ (annualised to 6.0 $\mu g/m^3$). The unofficial "cap" annual mean objective for $PM_{2.5}$ is 25 $\mu g/m^3$.

These results are very similar to previous years and substantially below the "cap" limit of 25 $\mu g/m^3$ and below the stricter limit set in Scotland for $PM_{2.5}$.

Table A.7 in Appendix A presents the monitored $PM_{2.5}$ annual mean concentrations for the past five years.

4.1.6 Sulphur Dioxide (SO_2)

Northumberland County Council no longer routinely monitors sulphur dioxide anywhere within the county.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
BL	Blyth Library	Urban Centre	431536	581531	PM10; PM2.5	NO	Nephelometer	3	3	3
CR	Cowpen Road	Roadside	428817	581815	PM10; PM2.5	NO	Nephelometer	3	3	3

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 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
8N	Bondgate Without, Alnwick	Roadside	419025	613070	NO_2	NO	2	2	NO	3
B1	Waterloo Road, Blyth	Urban Centre	431537	581537	NO2	NO	28	1	NO	3
B3	Cowpen Rd. West, Blyth	Roadside	428815	581813	NO2	NO	13.5	2	NO	3
BER1	32 Castlegate, Berwick	Roadside	399596	653213	NO2	NO	1	2	NO	1.5
B11	Blyth YCMA, Blyth	Urban Centre	431160	581415	NO2	NO	2	1	NO	3
CM8	Entrance to Cecil Court, Ponteland	Urban Centre	416820	572840	NO2	NO	21	1.5	NO	3
B15	South Newsham Road, Blyth	Roadside	430552	578950	NO2	NO	8	1.7	NO	3
C1	High Pit Road, Cramlington	Roadside	427593	576555	NO2	NO	4	1.7	NO	3
BER2	Prince Edward Road, Tweedmouth	Roadside	399345	625512	NO2	NO	11	1	NO	2.5
HEX1	4 Haugh Lane, Hexham	Roadside	393684	564214	NO2	NO	1	1.5	NO	2
C11	Storey Street (B1505), Cramlington	Roadside	427523	576136	NO2	NO	8	1.7	NO	3
CM2	Newgate St, Morpeth	Roadside	419525	586380	NO2	NO	1	1	NO	1.5
CM4	Bridge St, Morpeth	Roadside	419947	585937	NO2	NO	70	3	NO	3
CM5	Thorpe Ave, Morpeth	Roadside	420134	586329	NO2	NO	9	1.7	NO	2
HALT1	Westgate Road, Haltwhistle	Roadside	370647	564060	NO2	NO	17	1	NO	1.5
B16	24 Cowpen Road	Roadside	430666	581604	NO2	NO	7	2	NO	2
W17	Front Street East, Bedlington	Urban Centre	426014	581879	NO2	NO	20	1	NO	3
W21	Newbiggin Road, Ashington	Roadside	427939	586210	NO2	NO	5	1	NO	2.5
SD1	Salvation Army, Seaton Delaval	Roadside	430387	575433	NO2	NO	6	1.7	NO	3

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) 1	Valid Data Capture for 2020 (%) 2	NO2 Annual Mean Concentration(µm/m3) 3 4				
							2016	2017	2018	2019	2020
8N	419025	613070	Roadside	Diffusion Tube	N/A	100.0	30.0	31.0	31.3	24.7	16.8
B1	431537	581537	Urban Centre	Diffusion Tube	N/A	100.0	29.0	31.0	31.4	27.8	21.5
B3	428815	581813	Roadside	Diffusion Tube	N/A	100.0	32.0	23.0	22.3	31.0	22.4
BER1	399596	653213	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	N/A	16.6	13.3
B11	431160	581415	Urban Centre	Diffusion Tube	N/A	100.0	26.0	27.0	26.8	21.2	16.9
CM8	416820	572840	Urban Centre	Diffusion Tube	N/A	100.0	24.0	21.0	18.2	17.9	12.5
B15	430552	578950	Roadside	Diffusion Tube	N/A	100.0	19.0	24.0	22.0	17.2	11.4
C1	427593	576555	Roadside	Diffusion Tube	N/A	100.0	23.0	20.0	23.2	23.2	17.8
BER2	399345	625512	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	N/A	13.5	9.3
HEX1	393684	564214	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	N/A	28.0	21.1
C11	427523	576136	Roadside	Diffusion Tube	N/A	100.0	19.0	20.0	15.9	19.1	13.1
CM2	419525	586380	Roadside	Diffusion Tube	N/A	58.3	19.0	24.0	24.7	14.3	10.1
CM4	419947	585937	Roadside	Diffusion Tube	N/A	100.0	22.0	21.0	26.3	19.4	12.7
CM5	420134	586329	Roadside	Diffusion Tube	N/A	100.0	21.0	26.0	22.0	15.8	11.5
HALT1	370647	564060	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	N/A	12.6	9.5
B16	430666	581604	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	N/A	23.7	18.5
W17	426014	581879	Urban Centre	Diffusion Tube	N/A	66.7	20.0	23.0	24.0	22.3	16.3
W21	427939	586210	Roadside	Diffusion Tube	N/A	100.0	24.0	25.0	23.9	20.2	16.5
SD1	430387	575433	Roadside	Diffusion Tube	N/A	100.0	25.0	27.0	22.8	22.0	16.7

☒ Diffusion tube data has been bias corrected.

☒ Annualisation has been conducted where data capture is <75%.

Notes:

Exceedances of the NO_2 annual mean objective of 40 $\mu g/m^3$ are shown in **bold**.

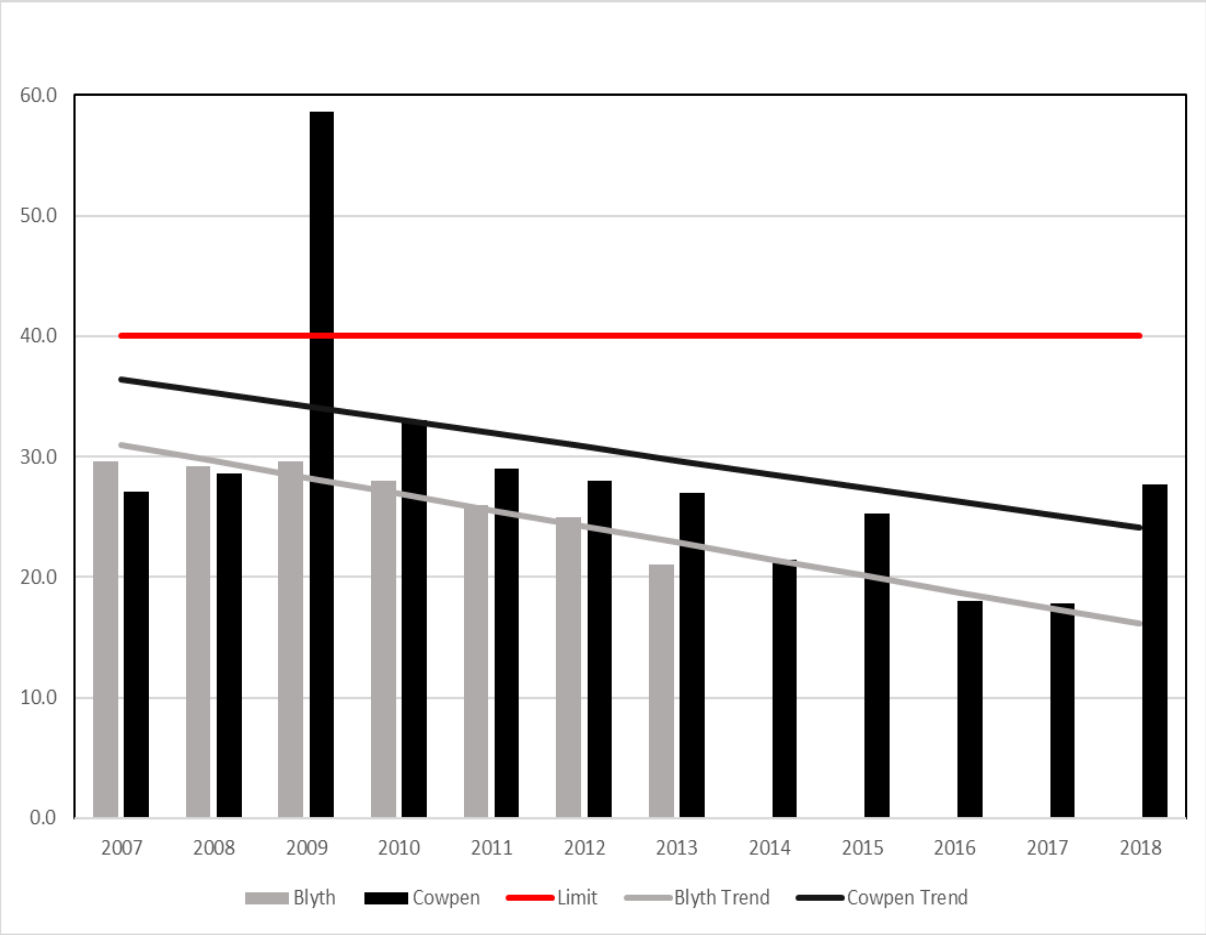
NO_2 annual means exceeding 60 $\mu g/m^3$, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(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%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C and Appendix H for details.

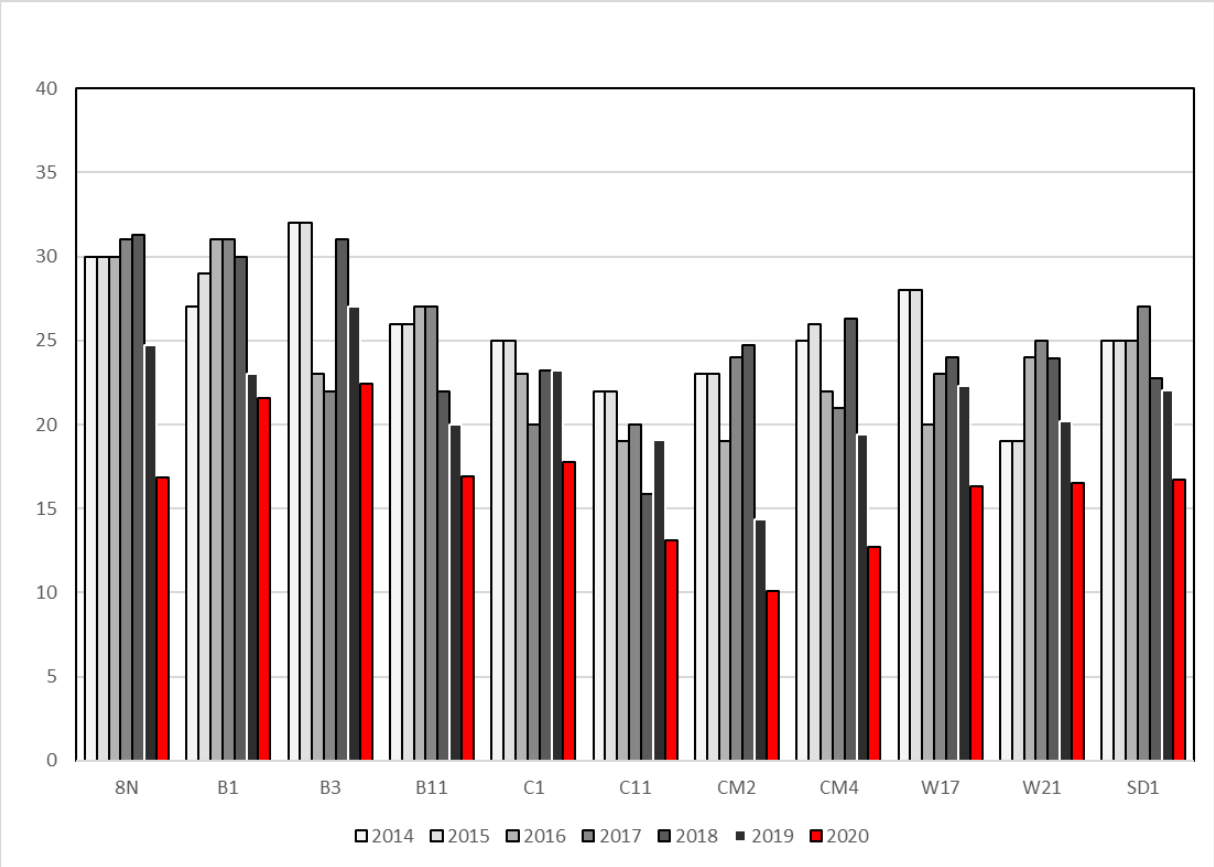
Figure A.1 – Trends in Annual Mean NO_2 Concentrations from Automatic Monitors



Note: Measurements in micrograms per cubic metre ($\mu g/m^3$).

No data has been added to these trends since 2019 and is shown for reference only**.**

Figure A.2 – Trends in Annual Mean NO_2 Concentrations from Diffusion Tubes



Note: Measurements in micrograms per cubic metre ($\mu g/m^3$).

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Automatic NO_2 monitoring is no longer carried out by Northumberland County Council

Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) 1	Valid Data Capture for 2019 (%) 2	PM10 Annual Mean Concentration(µm/m3) 3 4				
						2016	2017	2018	2019	2020
BL	431536	581531	Urban Centre	N/A	62.9	17.9 (17.6)	13.4 (14.8)	15.5 (16.5)	14.3 (13.3)	13.6 (13.1)
CR	428817	581815	Roadside	N/A	85.6	15	13.5 (15.3)	15.6	16.2	12.2

☒ **Annualisation has been conducted where data capture is <75%.**

Notes:

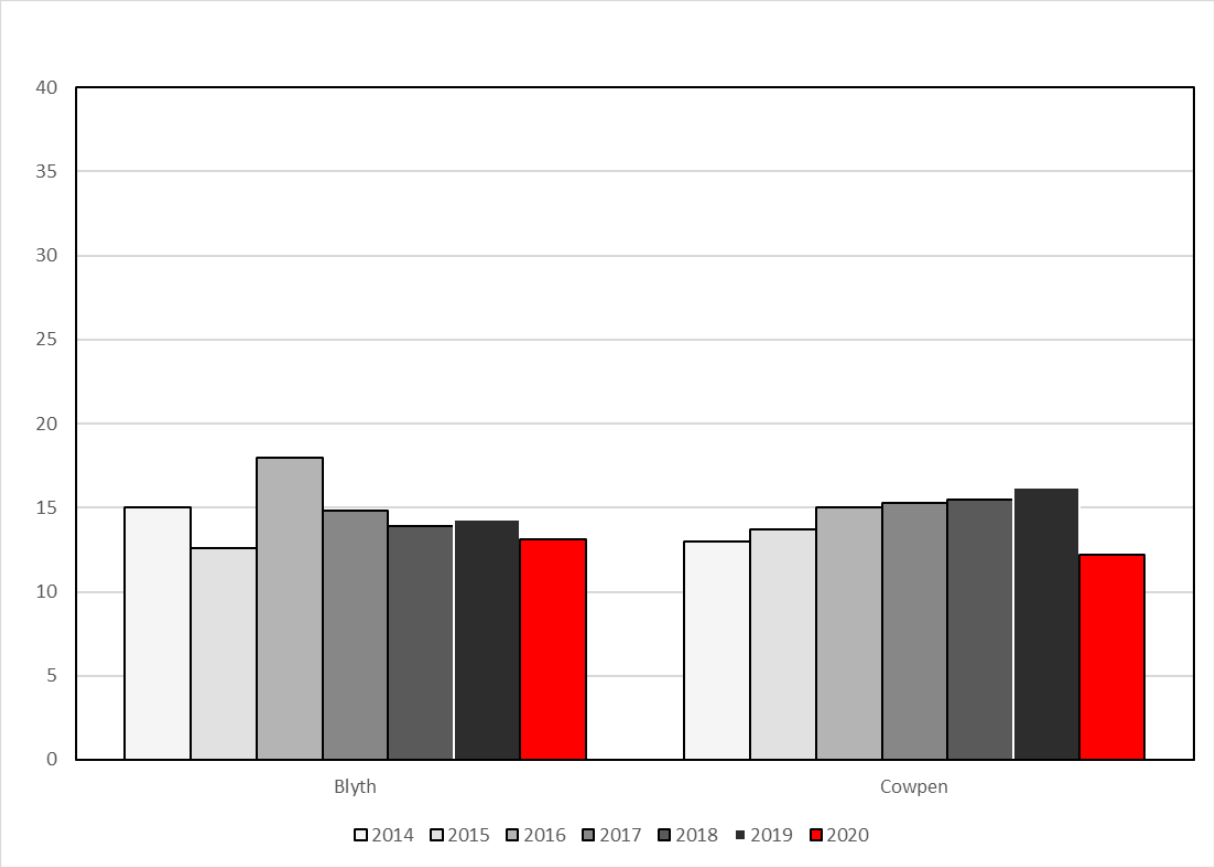
Exceedances of the PM_{10} annual mean objective of 40 $\mu g/m^3$ are shown in **bold.**

(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%).

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C and Appendix H for details.

Figure A.3 – Trends in Annual Mean PM_{10} Concentrations



Note: Measurements in micrograms per cubic metre ($\mu g/m^3$).

Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) 1	Valid Data Capture for 2019 (%) 2	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
						2016	2017	2018	2019	2020
BL	431536	581531	Urban Centre	N/A	62.9	8(32)	4 (30)	1 (28)	3 (26)	0 (27)
CR	428817	581815	Roadside	N/A	85.6	0	0 (30)	1	6	0

Notes:

Exceedances of the PM_{10} 24-hour mean objective (50 μg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**

(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%).

(3) If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

Table A.7 – $PM_{2.5}$ Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) 1	Valid Data Capture for 2019 (%) 2	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
						2016	2017	2018	2019	2020
BL	431536	581531	Urban Centre	N/A	62.9	7.1	6.2 (6.8)	7.3 (6.7)	8.0 (7.6)	5.7 (6.0)
CR	428817	581815	Roadside	N/A	85.6	5.8	5.5 (6.0)	6.7	7.2	6.8

☒ Annualisation has been conducted where data capture is <75%.

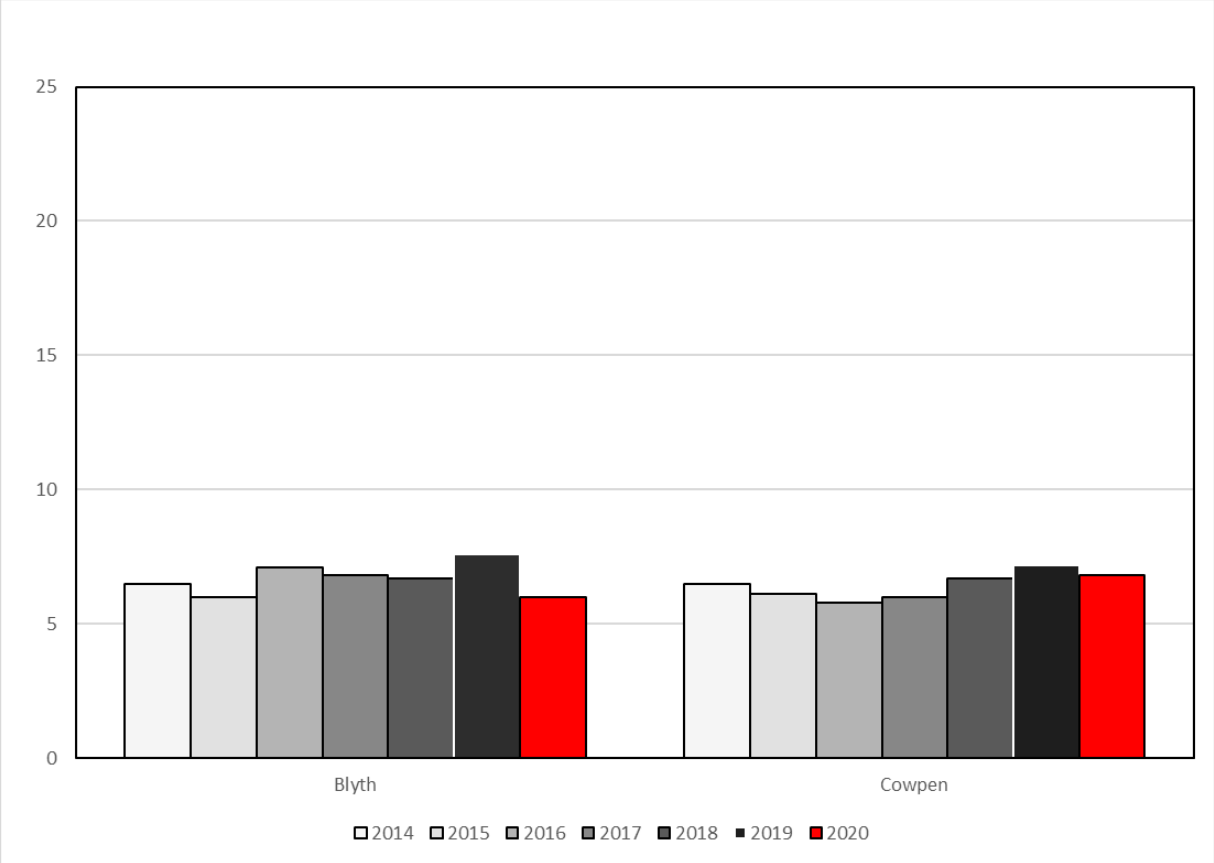
Notes:

(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%).

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix H for details.

Figure A.4 – Trends in Annual Mean $PM_{2.5}$ Concentrations



Note: Measurements in micrograms per cubic metre ($\mu g/m^3$).

Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2020

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.76) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
8N	38.9	33.6	18.2	18.2	18.2	18.2	18.2	17.5	17.5	17.5	17.5	32.2	22.1	16.8	16.1
B1	49.9	40.2	19.1	19.1	19.1	19.1	19.1	30.7	30.7	30.7	30.7	31.8	28.4	21.5	18.1
B3	43.8	38.5	19.4	19.4	19.4	19.4	19.4	35.1	35.1	35.1	35.1	34.2	29.5	22.4	20.3
BER1	14.1	12.9	12.0	12.0	12.0	12.0	12.0	26.3	26.3	26.3	26.3	17.2	17.5	13.3	13.0
B11	29.7	23.1	18.9	18.9	18.9	18.9	18.9	23.3	23.3	23.3	23.3	26.6	22.3	16.9	16.2
CM8	23.9	19.6	10.8	10.8	10.8	10.8	10.8	19.6	19.6	19.6	19.6	20.8	16.4	12.5	11.3
B15	23.2	14.7	10.3	10.3	10.3	10.3	10.3	17.8	17.8	17.8	17.8	19.7	15.0	11.4	10.8
C1	25.1	21.6	17.8	17.8	17.8	17.8	17.8	28.7	28.7	28.7	28.7	30.5	23.4	17.8	17.0
BER2	15.9	13.3	7.7	7.7	7.7	7.7	7.7	1.6	1.6	1.6	1.6	72.2	12.2	9.3	8.8
HEX1	39.2	33.7	19.9	19.9	19.9	19.9	19.9	31.2	31.2	31.2	31.2	35.7	27.7	21.1	18.2
C11	16.8	14.4	16.3	16.3	16.3	16.3	16.3	17.5	17.5	17.5	17.5	24.1	17.2	13.1	12.7
CM2	17.0	14.8	M	M	M	M	M	14.4	14.4	14.4	14.4	20.7	15.7	10.1	9.8
CM4	16.9	16.3	12.8	12.8	12.8	12.8	12.8	19.8	19.8	19.8	19.8	24.7	16.8	12.7	10.9
CM5	21.7	16.2	9.2	9.2	9.2	9.2	9.2	18.0	18.0	18.0	18.0	25.4	15.1	11.5	10.6
HALT1	17.7	14.7	9.6	9.6	9.6	9.6	9.6	13.0	13.0	13.0	13.0	17.8	12.5	9.5	8.2
B16	29.2	25.8	18.5	18.5	18.5	18.5	18.5	28.4	28.4	28.4	28.4	31.5	24.4	18.5	17.3
W17	32.3	24.0	15.4	15.4	15.4	15.4	15.4	M	M	M	M	28.5	20.2	16.3	13.9
W21	32.5	24.3	13.0	13.0	13.0	13.0	13.0	27.1	27.1	27.1	27.1	30.3	21.7	16.5	15.1
SD1	32.4	25.5	16.8	16.8	16.8	16.8	16.8	22.6	22.6	22.6	22.6	31.7	22.0	16.7	15.8

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

☒ **Annualisation has been conducted where data capture is <75%.**

☒ **Where applicable, data has been distance corrected for relevant exposure (see Appendix C).**

Notes:

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

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

(1) See Appendix C and Appendix H for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

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

New or Changed Sources Identified Within Northumberland During 2020

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

Additional Air Quality Works Undertaken by Northumberland During 2020

Northumberland County Council has not completed any additional works within the reporting year of 2020.

Factors from Local Co-location Studies

Northumberland County Council did not carry out any co-location studies in 2020.

Processing of Automatic Monitor Data

Results from the Turnkey Osiris units require no data processing and are serviced and calibrated annually by Turnkey Instruments.

Diffusion Tube Bias Adjustment Factors

The tubes are prepared and analysed by Socotec Didcot. The method used involves the reaction of gaseous nitrogen dioxide with 50% triethanoline (TEA) contained on grids within the diffusion tubes prepared with 50% acetone. This is then reacted with reagents to produce a stable-coloured complex, which can then be compared to standards prepared from sodium nitrite and analysed using visible spectroscopy.

The Socotec laboratory follows the procedures set out in the Harmonisation Practical Guidance.

Northumberland County Council has not compared the diffusion tubes with the reference method in a co-location study.

The bias factor is calculated by the using data from the DEFRA Website:

http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

National Diffusion Tube Bias Adjustment Spreadsheet Version Number: 06/21. The bias factor was calculated to be 0.76 for SOCOTEC (Didcot) using 50% TEA in acetone.

The results of the laboratory performance scheme (AIR PT) are included below; Socotec received a performance score of 100 percent for January-February 2020 and also for Sept-October 2020. No performance results are reported for the rest of 2020 and it is assumed this was as a result of Covid-19.

Figure C.1 – National Diffusion Tube Bias Adjustment Spreadsheet for 06/21 showing results for SOCOTEC (Didcot) using 50% TEA in acetone.

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 06/21

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 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 Sept 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[4]	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	R	Dacorum Borough Council	10	24	19	25.2%	G	0.80
Socotec Didcot	50% TEA in acetone	2020	R	Huntingdonshire District Council	12	36	25	47.1%	G	0.68
SOCOTEC Didcot	50% TEA in acetone	2020		Overall Factor[3] (24 studies)				Use		0.76

Figure C.2 - LAQM Helpdesk – November 2019 - Summary of Laboratory Performance in AIR NO_2 Proficiency Testing Scheme (January 2018 – November 2019).

LAQM Helpdesk – March 2021

Summary of Laboratory Performance in AIR NO_2 Proficiency Testing Scheme (January 2019 – March 2021).

Reports are prepared by LGC for BV/NPL on behalf of Defra and the Devolved Administrations.

Background

AIR is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Executive (HSE). AIR PT is a new scheme, started in April 2014, which combined two long running PT schemes: LGC Standards STACKS PT scheme and HSE WASP PT scheme.

AIR offers a number of test samples designed to test the proficiency of laboratories undertaking analysis of chemical pollutants in ambient indoor, stack and workplace air. One such sample is the AIR NO_2 test sample type that is distributed to participants in a quarterly basis.

AIR NO_2 PT forms an integral part of the UK NO_2 Network's QA/QC, and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). With consent from the participating laboratories, LGC Standards provides summary proficiency testing data to the LAQM Helpdesk for hosting on the web-pages at http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html. This information will be updated on a quarterly basis following completion of each AIR PT round.

Defra and the Devolved Administrations advise that diffusion tubes used for Local Air Quality Management should be obtained from laboratories that have demonstrated satisfactory performance in the AIR PT scheme. Laboratory performance in AIR PT is also assessed, by the National Physical Laboratory (NPL), alongside laboratory data from the monthly NPL Field Intercomparison Exercise carried out at Marylebone Road, central London.

The information is used to help the laboratories to identify if they have problems and may assist devising measures to improve their performance and forms part of work for Defra and the Devolved Administrations under the Local Air Quality Management Services Contract.

AIR NO_2 PT Scheme overview

Purpose of scheme

The AIR PT scheme uses laboratory spiked Palmes type diffusion tubes to test each participating laboratory's analytical performance on a quarterly basis and continues the format used in the preceding WASP PT scheme. Such tubes are not designed to test other parts of the measurement system e.g. sampling. Every quarter, roughly January, April, July and October each year, each laboratory receives four diffusion tubes doped with an amount of nitrite, known to LGC Standards, but not the participants. At least two of the tubes are usually duplicates, which enables precision, as well as accuracy, to be assessed. The masses of nitrite on the spiked tubes are different each quarter, and reflect the typical analytical range encountered in actual NO_2 ambient monitoring in the UK.

NO2 PT Summary – AIR PT Rounds AR030, 31, 33, 34, 36, 37, 38, 40 and 42 Page 1 of 5

LAQM Helpdesk – March 2021

Preparation of test samples

Diffusion tubes are spiked using a working nitrite solution prepared from a stock solution. The concentration of this stock solution is initially assayed using a titrimetric procedure. All steps in the subsequent test sample production process, involving gravimetric and volumetric considerations, are undertaken using calibrated instruments employing traceable standards. As an additional cross check, 12 spiked Palmes tubes are picked at random from each spike loading level and submitted to a third party laboratory which is accredited to ISO 17025 to undertake this analysis using an ion chromatographic procedure.

In summary, the tube spiking precision is calculated to be better than 0.5 %, expressed as a standard deviation, and this is derived from repeat gravimetric checking of the pipette device used to spike the test samples. The calculated spike values, derived from titrimetric, gravimetric and volumetric considerations, are found to be typically within ± 3 % of results obtained by the third party laboratory using an ion chromatographic analytical procedure.

Scheme operation

The participants analyse the test samples and report the results to LGC Standards via their on-line PORTAL data management system. LGC Standards assign a performance score to each laboratory's result, based on how far their results deviate from the assigned values for each test samples. The assigned values are best estimates of the levels of nitrite doped onto the test sample tubes and are calculated from the median of participant results, after the removal of test results that are inappropriate for statistical evaluation, e.g. miscalculations, transpositions and other gross errors. At the completion of the round, laboratories receive a report detailing how they have performed and how their results relate to those of their peers.

Performance scoring

The z-score system is used by LGC to assess the performance of laboratories participating in the AIR PT NO_2 scheme.

The Z_{score}, may be defined as:

$$Z_{score} = \frac{\left(x_{lab} - \bar{x}_{assigned}\right)}{\sigma_{SDPA}}$$

Where:

x_{lab} = participant result from a laboratory

$\bar{x}_{assigned}$ = assigned value

σ_{SDPA} = standard deviation for performance assessment (currently set at 7.5 % of $\bar{x}_{assigned}$)

LAQM Helpdesk – March 2021

Performance score interpretation

A Z_{score} is interpreted as described below:

$|Z_{score}| \leq 2$ indicates satisfactory laboratory performance

$2.0 < |Z_{score}| < 3$ indicates questionable (warning) laboratory performance

$|Z_{score}| \geq 3$ indicates unsatisfactory (action) laboratory performance

As a general rule of thumb, provided that a laboratory does not have systematic sources of bias in their laboratory measurement system, then on average, 19 out of every 20 z-scores should be $\leq \pm 2$. In this scheme each laboratory receives 4 test samples per round and therefore submits 4 z-scores per round. Hence over 5 rounds laboratories would receive 20 test samples and report 20 z-scores.

Assessing the performance of a laboratory

End users that avail of analytical services from laboratories should satisfy themselves that such laboratories meet their requirements. A number of factors ideally need to be considered including

- Expertise and skills of staff within the laboratory?
- Does the laboratory follow accepted measurement standards, guidance?
- Does the laboratory operate a robust internal quality control system?
- Is the laboratory third party accredited to relevant standards such as ISO 17025?
- Does the laboratory successfully participate in relevant external proficiency testing schemes?
- How good is their customer care (communication, turnaround times, pricing etc)?

Participation therefore, in an external proficiency-testing scheme such as AIR PT, represents but one factor in such considerations.

Participation in a single round of an external proficiency-testing scheme represents a "snap-shot" in time of a laboratory's analytical quality. It is more informative therefore to consider performance over a number of rounds.

Following on from above, therefore over a rolling five round AIR PT window, one would expect that 95 % of laboratory results should be $\leq \pm 2$. If this percentage is substantially lower than 95 % for a particular laboratory, within this five round window, then one can conclude that the laboratory in question has significant sources of error within their analytical procedure.

A summary of the performance, for each laboratory participating in the AIR PT scheme, is provided in Table 1. This table shows the percentage of results where the absolute z-score, for each laboratory, was less than or equal to 2, i.e. those results which have been assessed as satisfactory.

LAQM Helpdesk – March 2021

Contacts

Further **specific** information on the LGC AIR NO_2 PT scheme is available from LGC proficiency testing on 0161 7622500 or by email at customerservices@lgcgroup.com.

For **general** questions about the scheme within the context of wider LAQM activities please contact Nick Martin at NPL on 0208 943 7088 or nick.martin@npl.co.uk.

Table 1: Laboratory summary performance for AIR NO_2 PT rounds AR0030, 31, 33, 34, 36. 37, 39, 40 and 42

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of $\leq \pm 2$ as defined above.

AIR PT Round	AIR PT AR030	AIR PT AR031	AIR PT AR033	AIR PT AR034	AIR PT AR036	AIR PT AR037	AIR PT AR039	AIR PT AR040	AIR PT AR042
Round conducted in the period	January – February 2019	April – May 2019	July – August 2019	September – November 2019	January – February 2020	May – June 2020	July – August 2020	September – October 2020	January – March 2021
Aberdeen Scientific Services	75 %	100 %	100 %	100 %	100 %	NR [3]	NR [3]	100 %	100 %
Edinburgh Scientific Services	100 %	NR [2]	100 %	25 %	50 %	NR [3]	NR [3]	100 %	25 %
SOCOTEC	87.5 % [1]	100 % [1]	100 % [1]	100 % [1]	100 % [1]	NR [3]	NR [3]	100 % [1]	100 % [1]
Glasgow Scientific Services	100 %	100 %	100 %	50 %	100 %	NR [3]	NR [3]	100 %	50 %
Gradko International	75 %	100 %	100 %	100 %	75 %	NR [3]	NR [3]	75 %	25 %
Lambeth Scientific Services	50 %	100 %	50 %	100 %	100 %	NR [3]	NR [3]	100 %	100 %
Milton Keynes Council	100 %	100 %	50 %	100 %	100 %	NR [3]	NR [3]	25 %	0 %
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	NR [3]	NR [3]	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	75 %	100 %	NR [3]	NR [3]	100 %	100 %
Staffordshire County Council	100 %	75 %	75 %	75 %	100 %	NR [3]	NR [3]	50 %	100 %
Tayside Scientific Services (formerly Dundee CC)	100 %	NR [2]	100 %	NR [2]	100 %	NR [3]	NR [3]	100 %	NR [2]
West Yorkshire Analytical Services	100 %	100 %	100 %	50 %	100 %	NR [3]	NR [3]	NR [2]	NR [2]

[1] Participant subscribed to two sets of test results (2 x 4 test samples) in each AIR PT round.
[2] NR, No results reported.
[3] Round was cancelled due to pandemic.
Cardiff Scientific Services, Exova (formerly Clyde Analytical), Kent Scientific Services, Kirklees MBC and Northampton Borough Council; these labs are not detailed as they no longer carry out NO2 diffusion tube monitoring and therefore did not submit results for any of the AIR NO_2 PT rounds listed.

Diffusion Tube - NO_2 Fall Off with Distance to Receptor

Results of the annual average nitrogen dioxide levels have been distance corrected to the nearest receptors using the guidance document NO_2 Concentrations and Distance from Roads, Air Quality Consultants (ref 504/1/F1 Issue No. 3 dated 18th July 2008).

This uses the equation:

Cz = ((Cy-Cb) / (-0.5476 x Ln(Dy) + 2.7171)) x (-0.5476*Ln(Dz)+2.7171) + Cb

Where:

Cy is the total measured concentration ($\mu g/m^3$) at distance Dy;
Dy is the distance from the kerb at which concentrations were measured;
Cz is the total predicted concentration ($\mu g/m^3$) at distance Dz
Dz is the distance from the kerb (m) at which concentrations are to be predicted;
Cb is the background concentration ($\mu g/m^3$)*
Ln(D) is the natural log of the number Dy or Dz+

* Background concentrations are obtained from the DEFRA LAQM background maps available from:

https://uk-air.defra.gov.uk/data/laqm-background-home

For the resulting calculation for the 2020 are as follows:

Site ID	Bias adjusted annual mean concentration 2020 (µg/m3)	Nearest Receptor	2020 Background Concentration	Kerb-Tube Distance	Logn Kerb-Tube	Kerb-Receptor Distance	Logn Kerb-Receptor	Distance Corrected (µg/m3)
8N	16.8	2	5.0	2	0.30	4	0.60	**16.1**
B1	21.5	28	9.8	1	0.00	29	1.46	**18.1**
B3	22.4	13.5	11.2	2	0.30	15.5	1.19	**20.3**
BER1	13.3	1	6.5	2	0.30	3	0.48	**13.0**
B11	16.9	2	9.8	1	0.00	3	0.48	**16.2**
CM8	12.5	21	7.6	1.5	0.18	22.5	1.35	**11.3**
B15	11.4	8	7.7	1.7	0.23	9.7	0.99	**10.8**
C1	17.8	4	10.4	1.7	0.23	5.7	0.76	**17.0**
BER2	9.3	11	7.2	1	0.00	12	1.08	**8.8**
HEX1	21.1	12	6.8	1.5	0.18	13.5	1.13	**18.2**
C11	13.1	8	10.4	1.7	0.23	9.7	0.99	**12.7**
CM2	10.1	1	6.6	1	0.00	2	0.30	**9.8**
CM4	12.7	70	6.9	3	0.48	73	1.86	**10.9**
CM5	11.5	9	6.4	1.7	0.23	10.7	1.03	**10.6**
HALT1	9.5	17	4.5	1	0.00	18	1.26	**8.2**
B16	18.5	7	9.7	2	0.30	9	0.95	**17.3**
W17	16.3	20	7.2	1	0.00	21	1.32	**15.1**
W21	16.5	5	7.8	1	0.00	6	0.78	**15.1**
SD1	16.7	6	9.9	1.7	0.23	7.7	0.89	**15.8**

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

Figure D.1 – Blyth Automatic and NO_2 Diffusion Tube Monitoring Locations

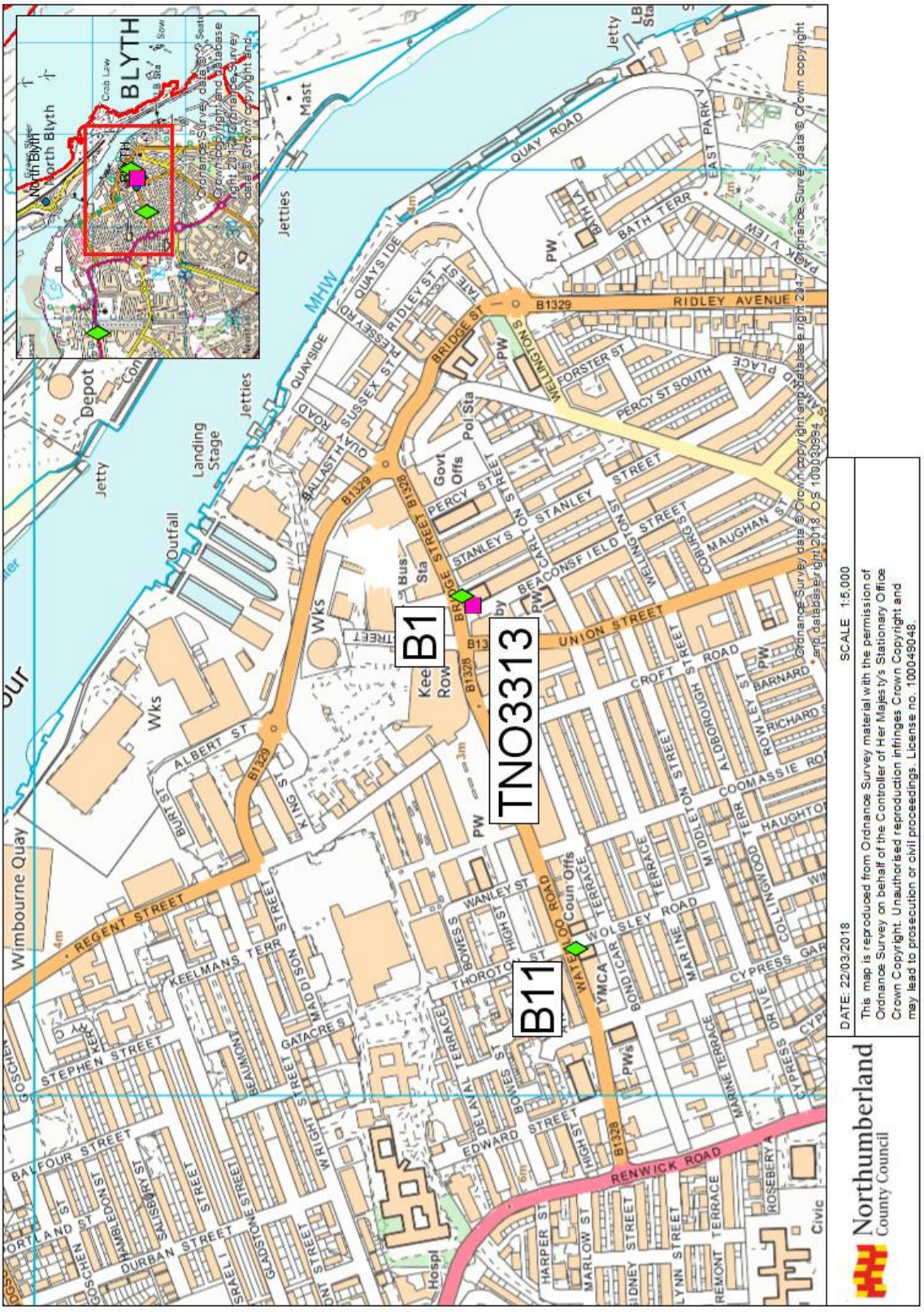


Figure D.2 – Cowpen Automatic and NO_2 Diffusion Tube Monitoring Locations

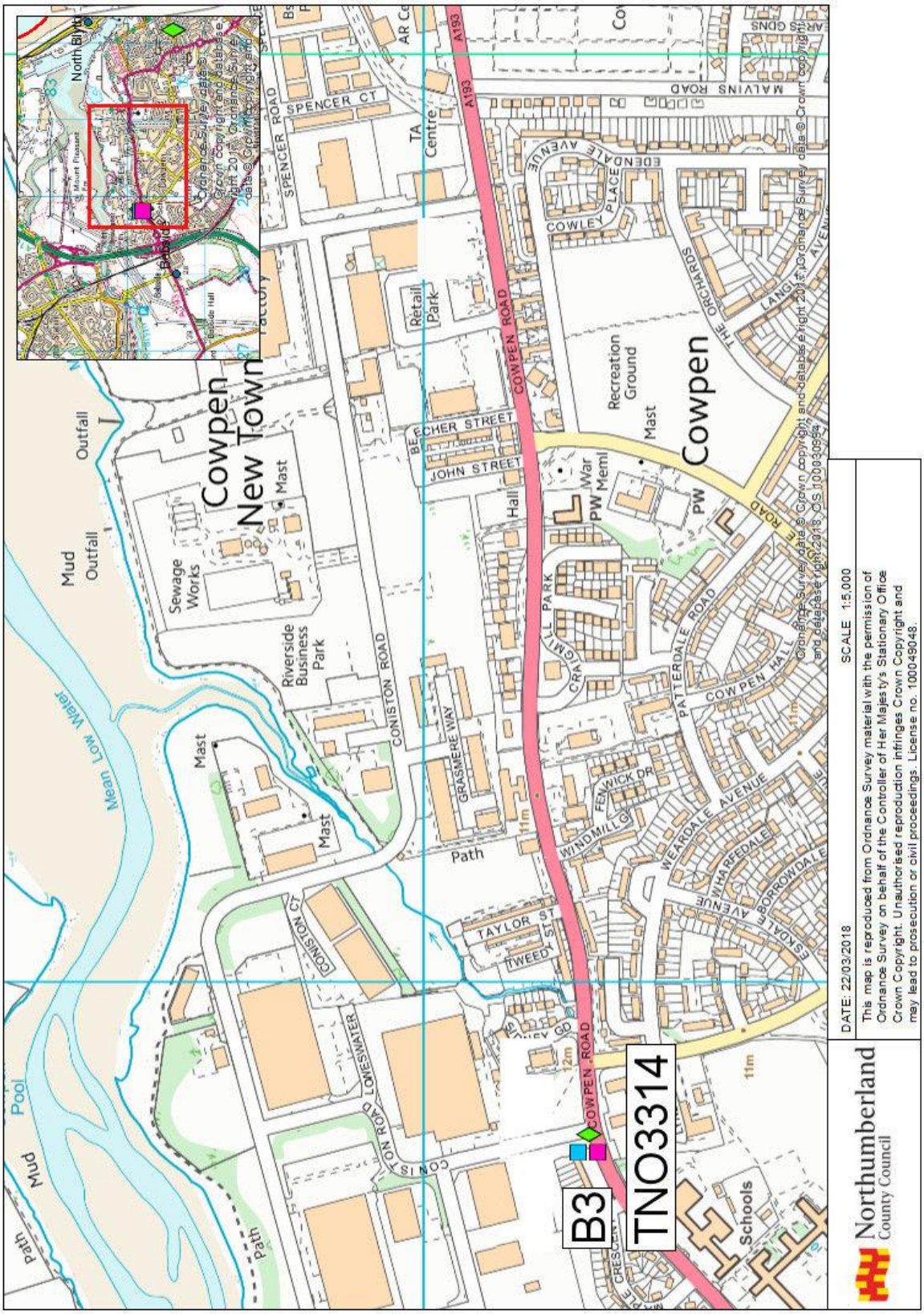


Figure D.3 – Alnwick NO_2 Diffusion Tube Monitoring Locations

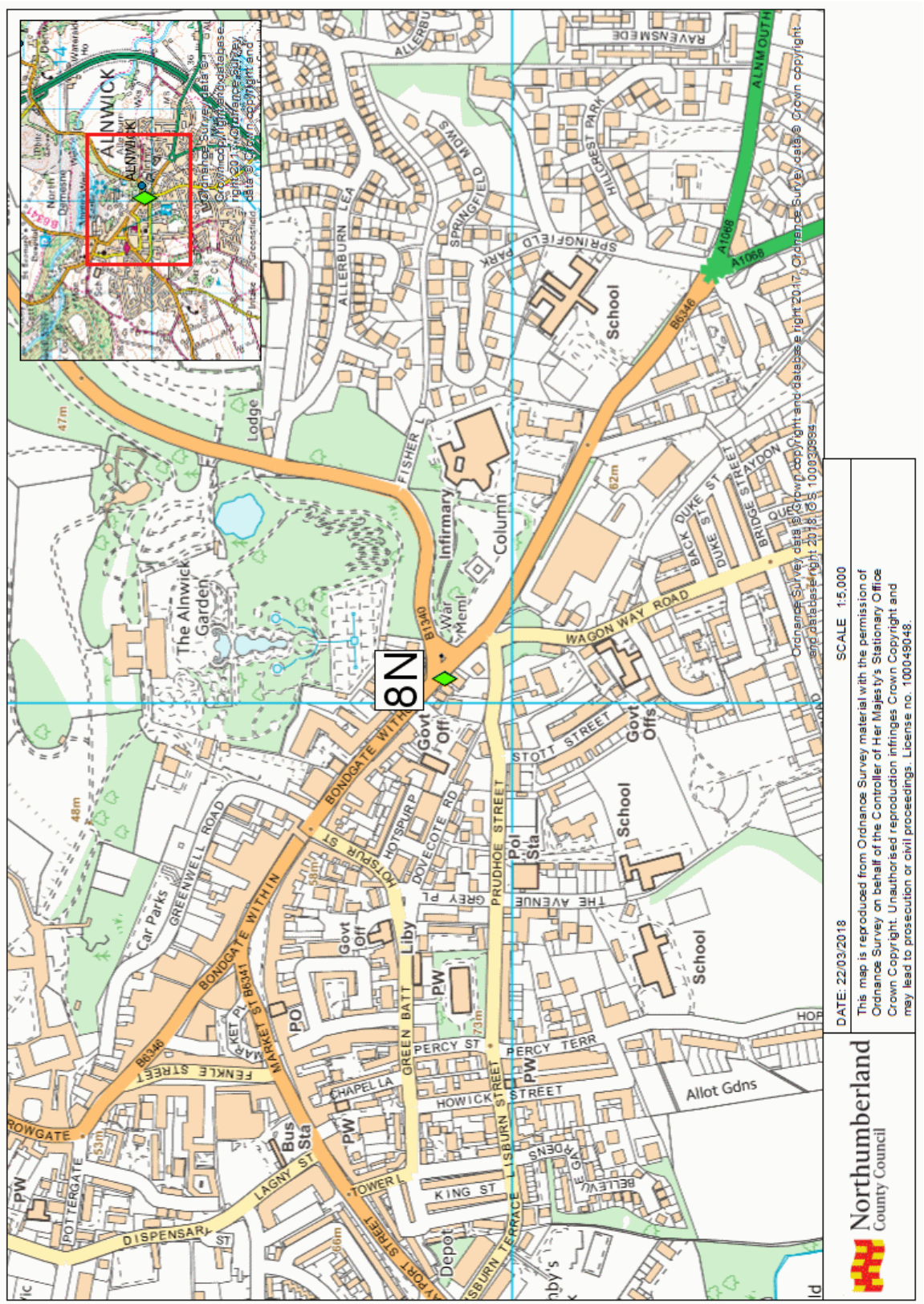


Figure D.4 – Morpeth NO_2 Diffusion Tube Monitoring Locations

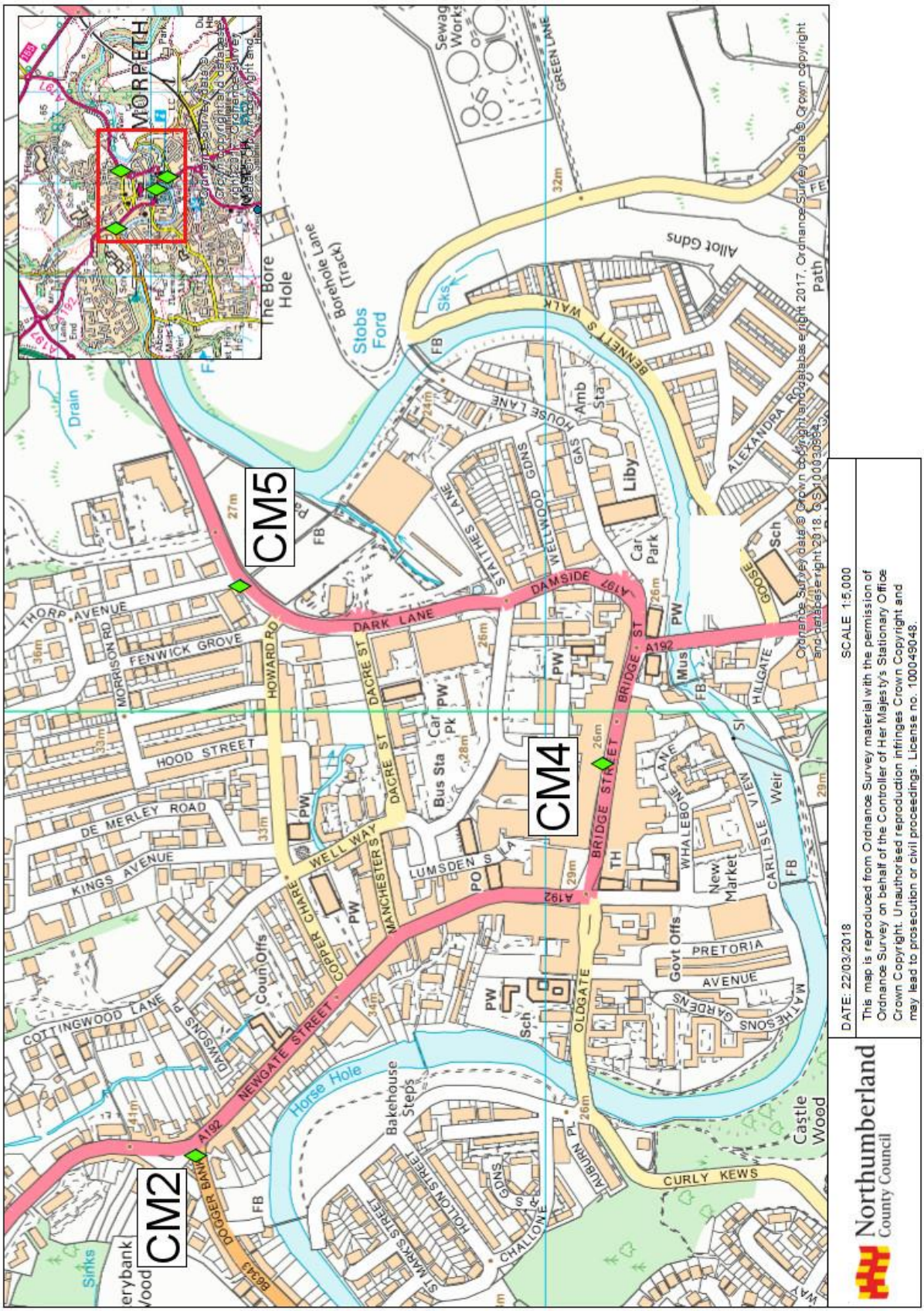


Figure D.5 – Ponteland NO_2 Diffusion Tube Monitoring Location

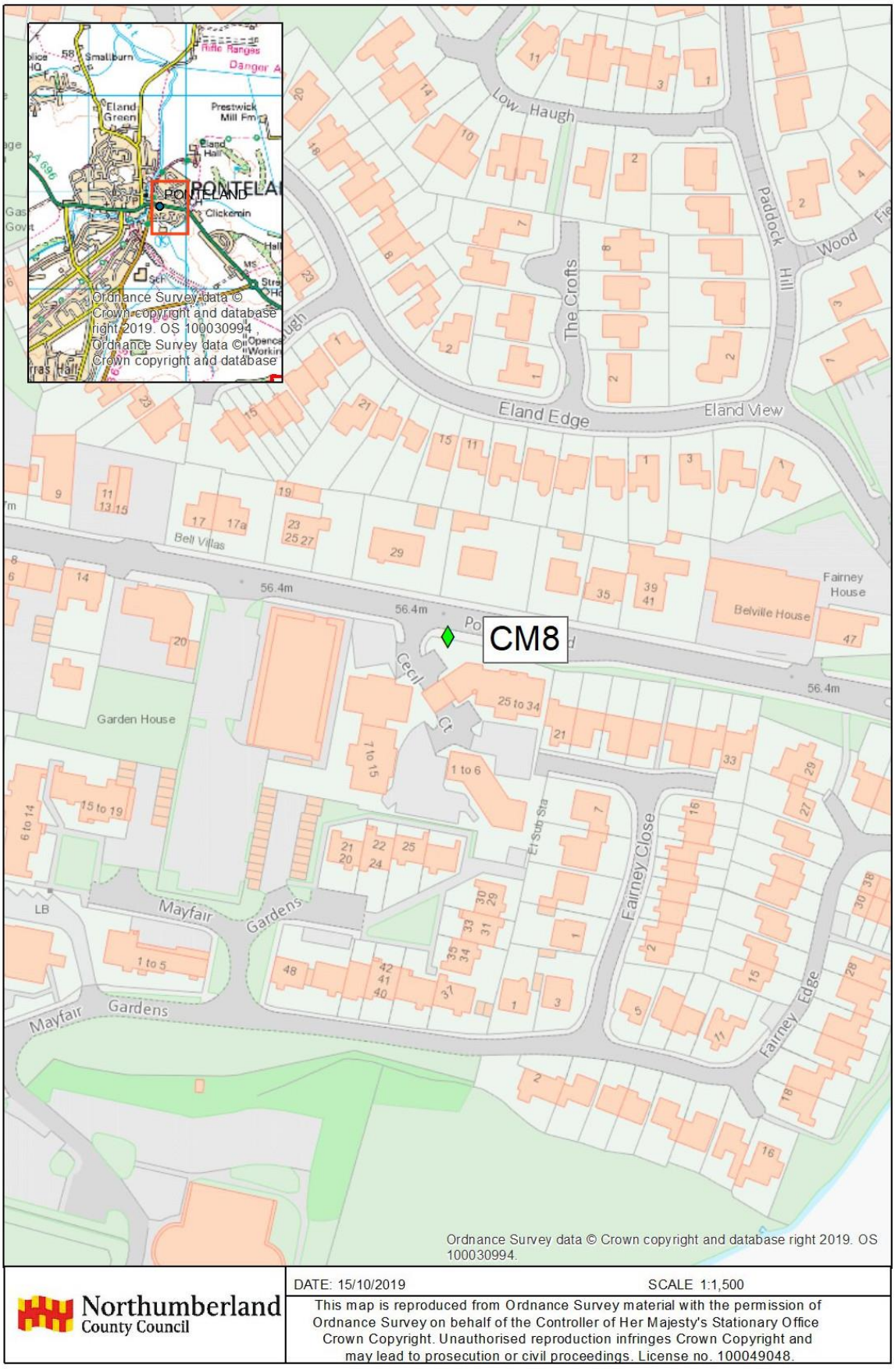


Figure D.6 – East Cramlington NO_2 Diffusion Tube Monitoring Locations

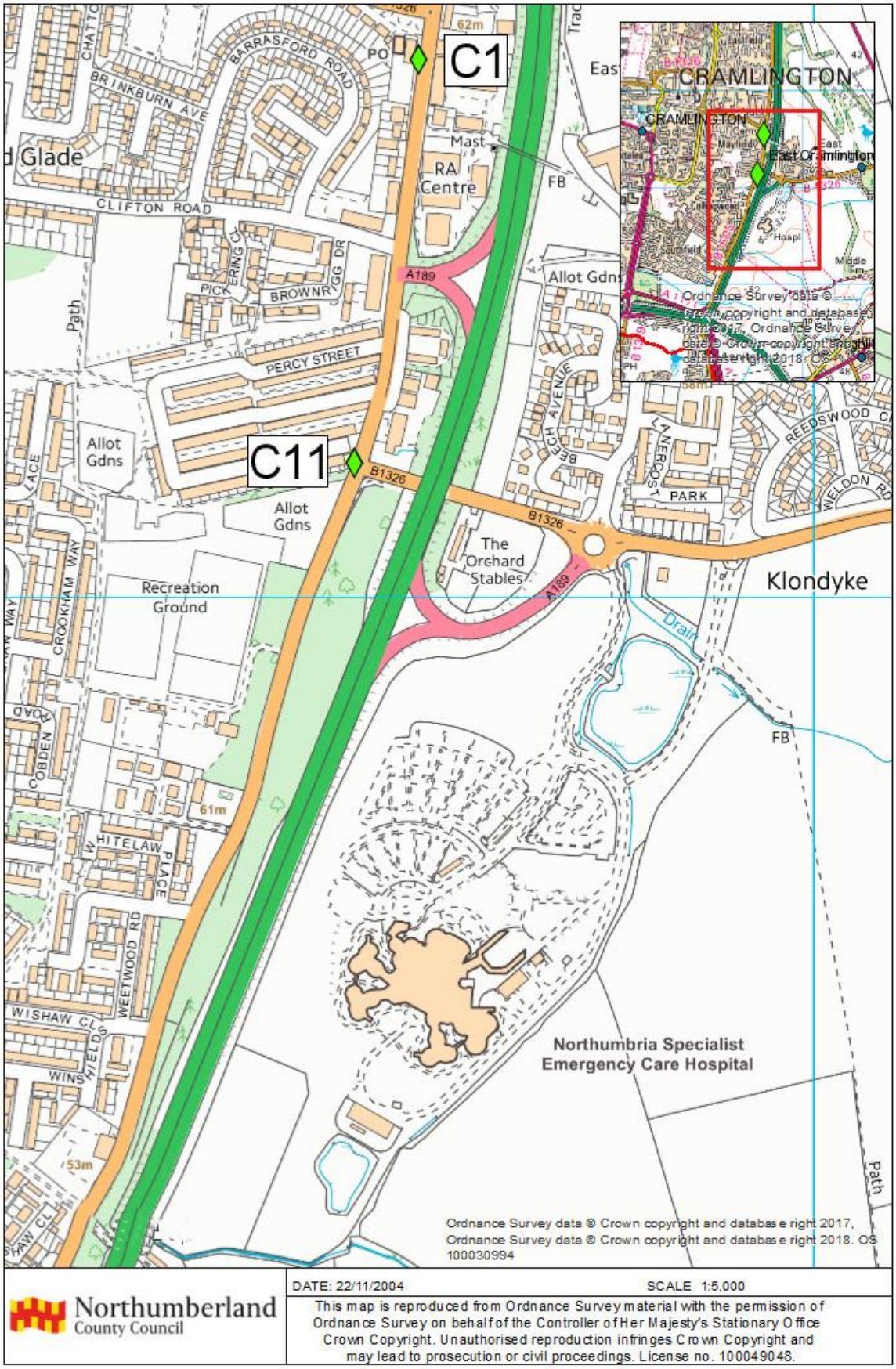


Figure D.7 – Berwick and Tweedmouth NO_2 Diffusion Tube Monitoring Locations

Figure D.8 – Ashington NO_2 Diffusion Tube Monitoring Locations

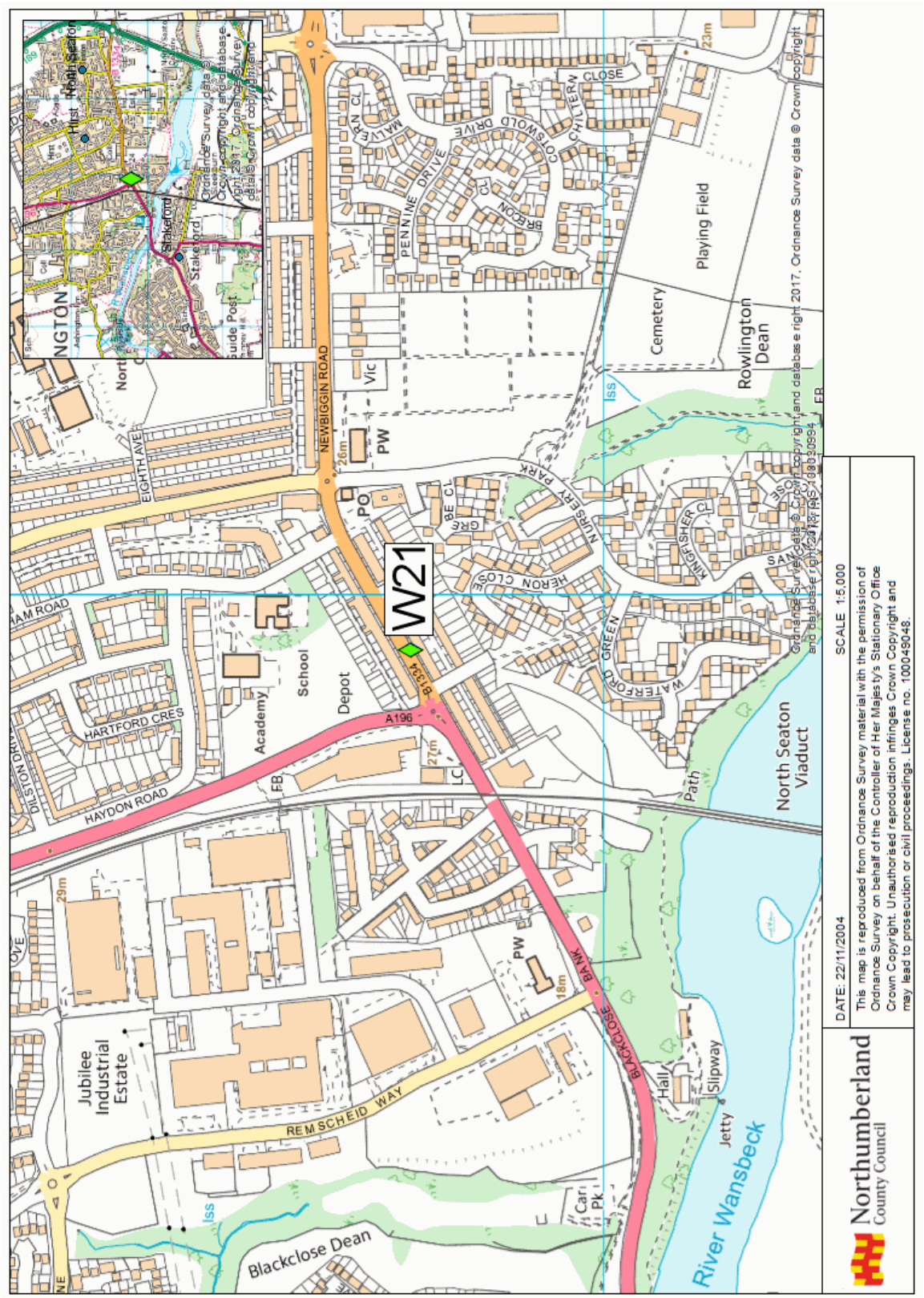


Figure D.9 – Bedlington NO_2 Diffusion Tube Monitoring Locations

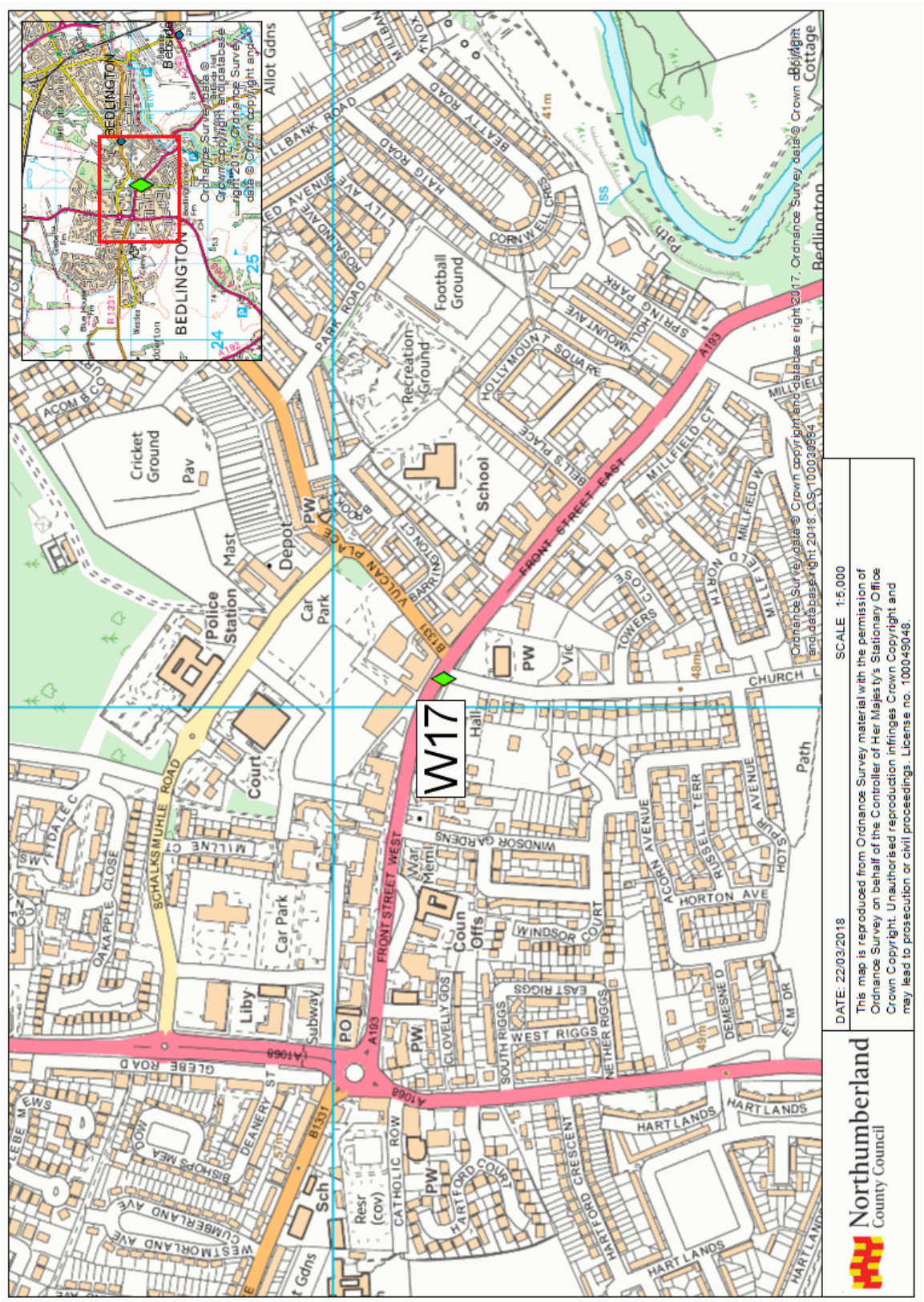
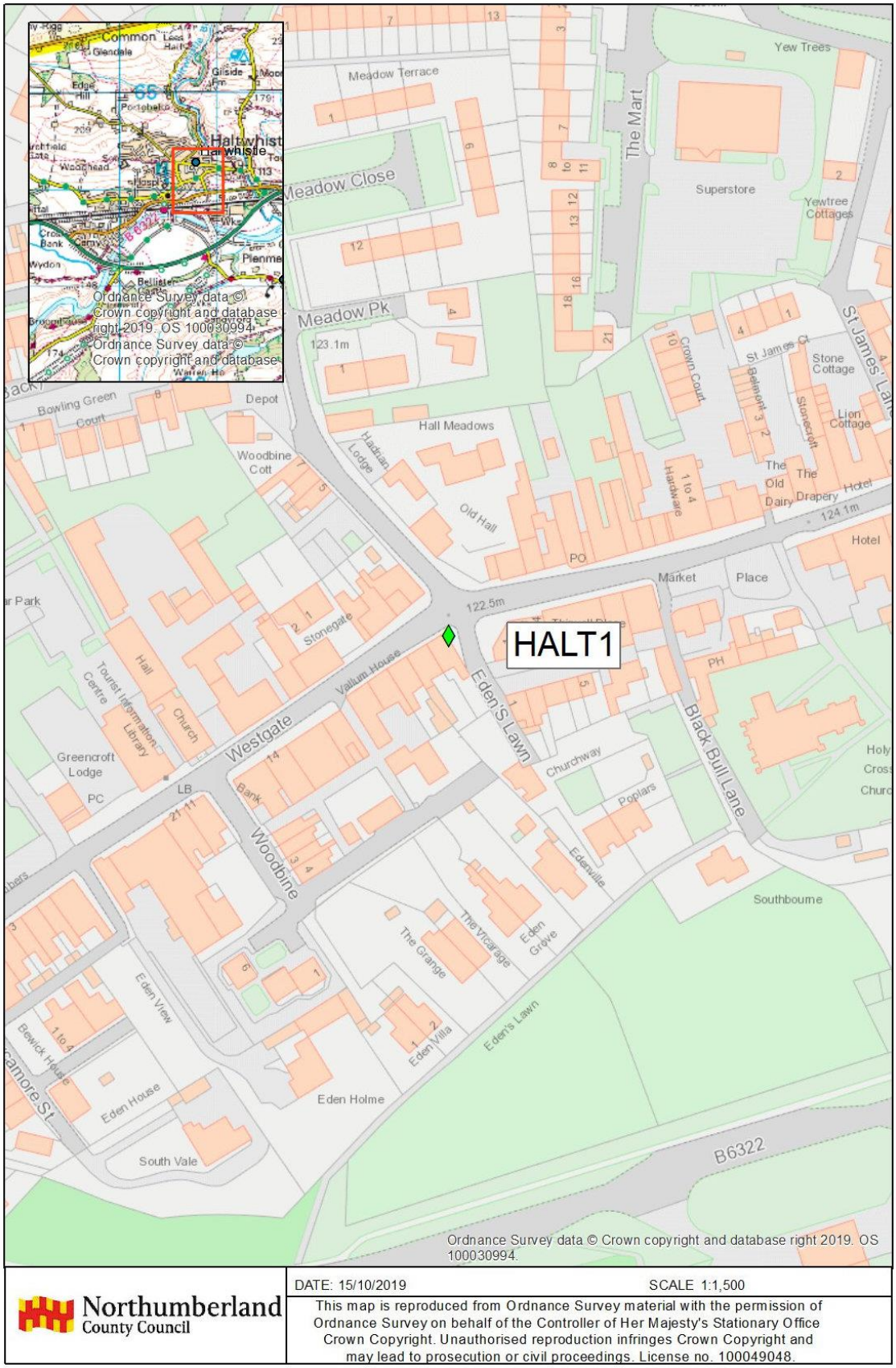


Figure D.10 – Hexham NO_2 Diffusion Tube Monitoring Location

Figure D.11 – Haltwhistle NO_2 Diffusion Tube Monitoring Location



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[9]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean
	40 $\mu g/m^3$	Annual mean
Particulate Matter (PM_{10})	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean
	40 $\mu g/m^3$	Annual mean
Sulphur Dioxide (SO_2)	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean

[9] The units are in microgrammes of pollutant per cubic metre of air ($\mu g/m^3$).

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[10] 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)[11] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During

[10] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020
[11] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

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 Northumberland

- Like other reported monitoring in the United Kingdom during 2020, measured particulate levels do not appear to be markedly different than other years and this is possibly due to a larger proportion of measured roadside particulates not being from tailpipe emissions but redistribution of existing particulates on the road surface. However, measured nitrogen dioxide levels seem to be lower than previous years with measured levels in 2020 being between 6 and 29 per cent lower than in 2019.

Because of lockdown restrictions no additional work was carried out and these apparently lower concentrations have not been associated with any road traffic data.

Opportunities Presented by COVID-19 upon LAQM within Northumberland

No LAQM related opportunities have arisen as a consequence of COVID-19 within Northumberland

Challenges and Constraints Imposed by COVID-19 upon LAQM within Northumberland

No challenges or constraints relating to LAQM have arisen during 2020 as a consequence of COVID-19 within Northumberland

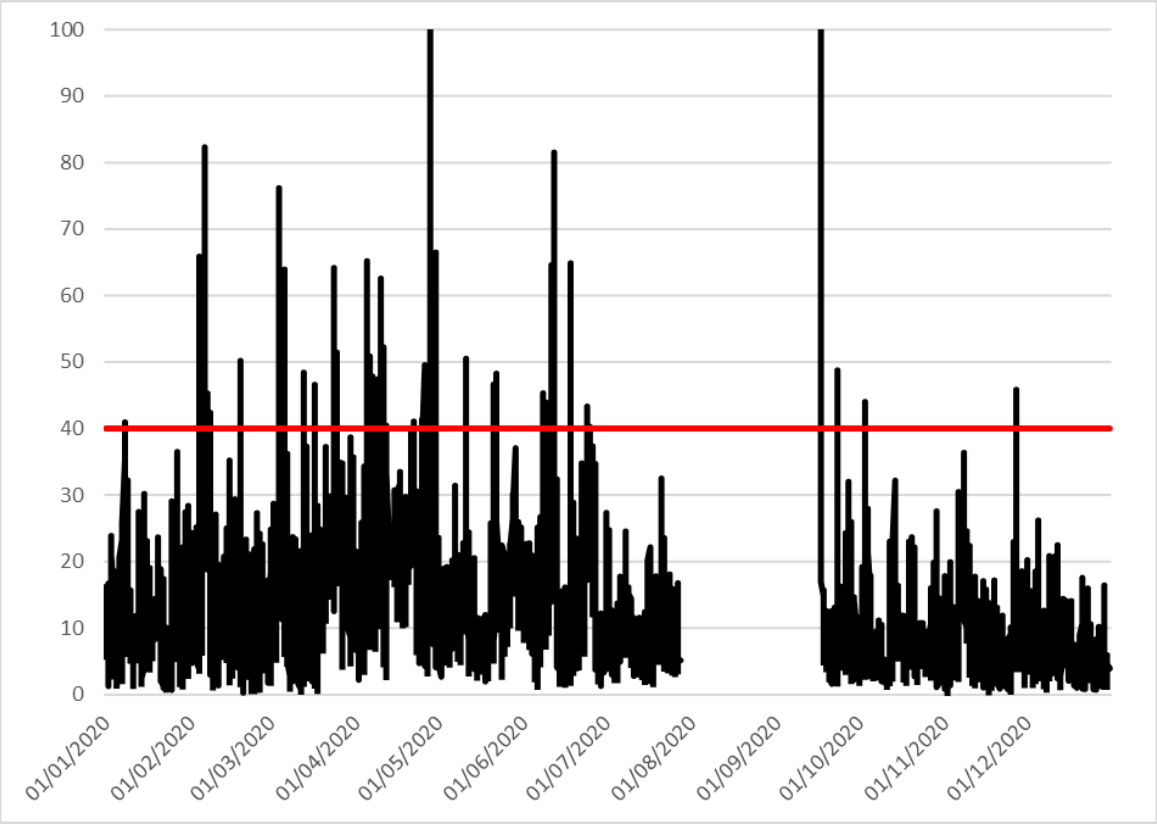
Appendix G: Data Summaries and Time Series Plots

Table G.1 – Cowpen Road AQ Monitoring Station - Air Quality Data Summary

	PM2.5	PM10
Number Very High	0	0
Number High	0	0
Number Moderate	0	2
Number Low	313	311
Maximum 15-minute Mean	39.9 μg m^3	259.6 μg m^3
Maximum Hourly Mean	37.1 μg m^3	135.2 μg m^3
Maximum running 8-hour Mean	102.5 μg m^3	195.7 μg m^3
Maximum running 24-hour Mean	64.8 μg m^3	124.7 μg m^3
Maximum Daily Mean	25.7 μg m^3	49.0 μg m^3
90.4th Percentile (PM_{10}) - Daily	-	-
99.8th Percentile (NO_2) - Hourly	-	-
Average	6.8 μg m^3	12.2 μg m^3
Data Capture	85.6 %	85.6 %

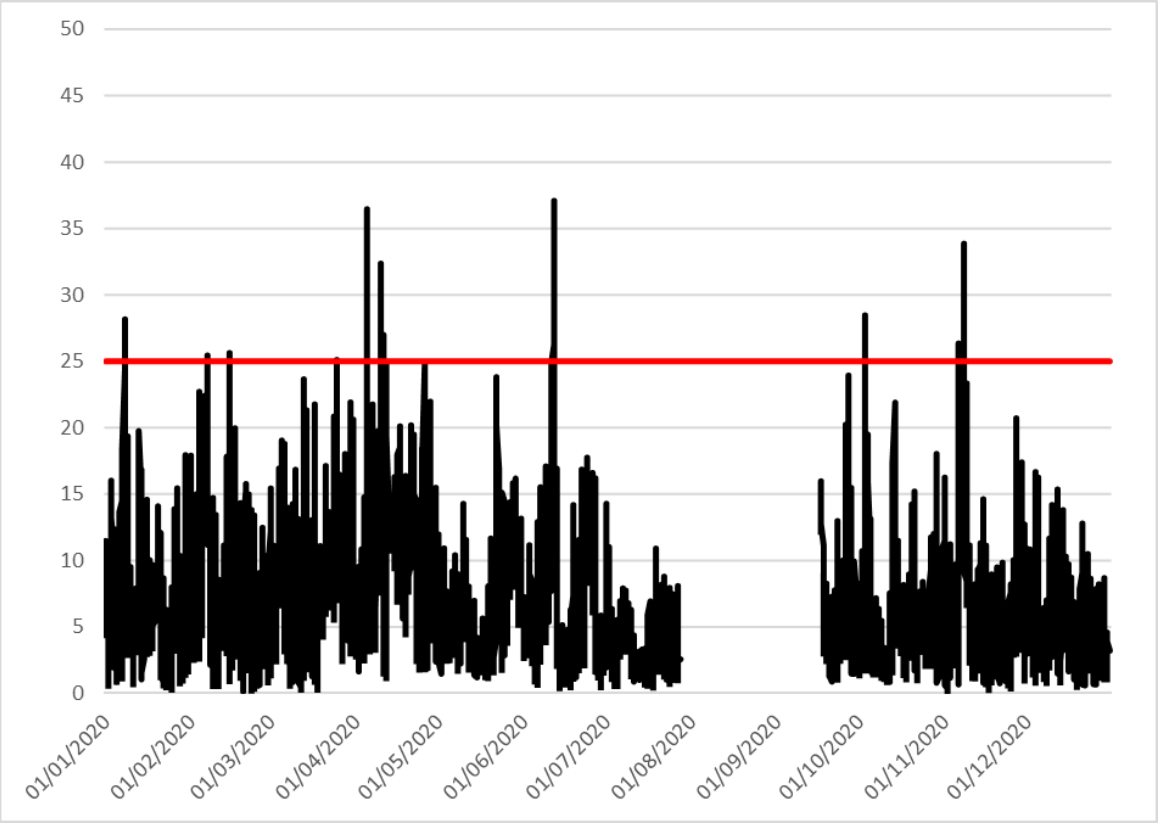
Hourly Time Series Plots

Figure G.1 – Cowpen Road Particulates (PM_{10}) Time Series Plot



Note: Measurements in micrograms per cubic metre (μg/m^3).

Figure G.3 – Cowpen Road Particulates ($PM_{2.5}$) Time Series Plot



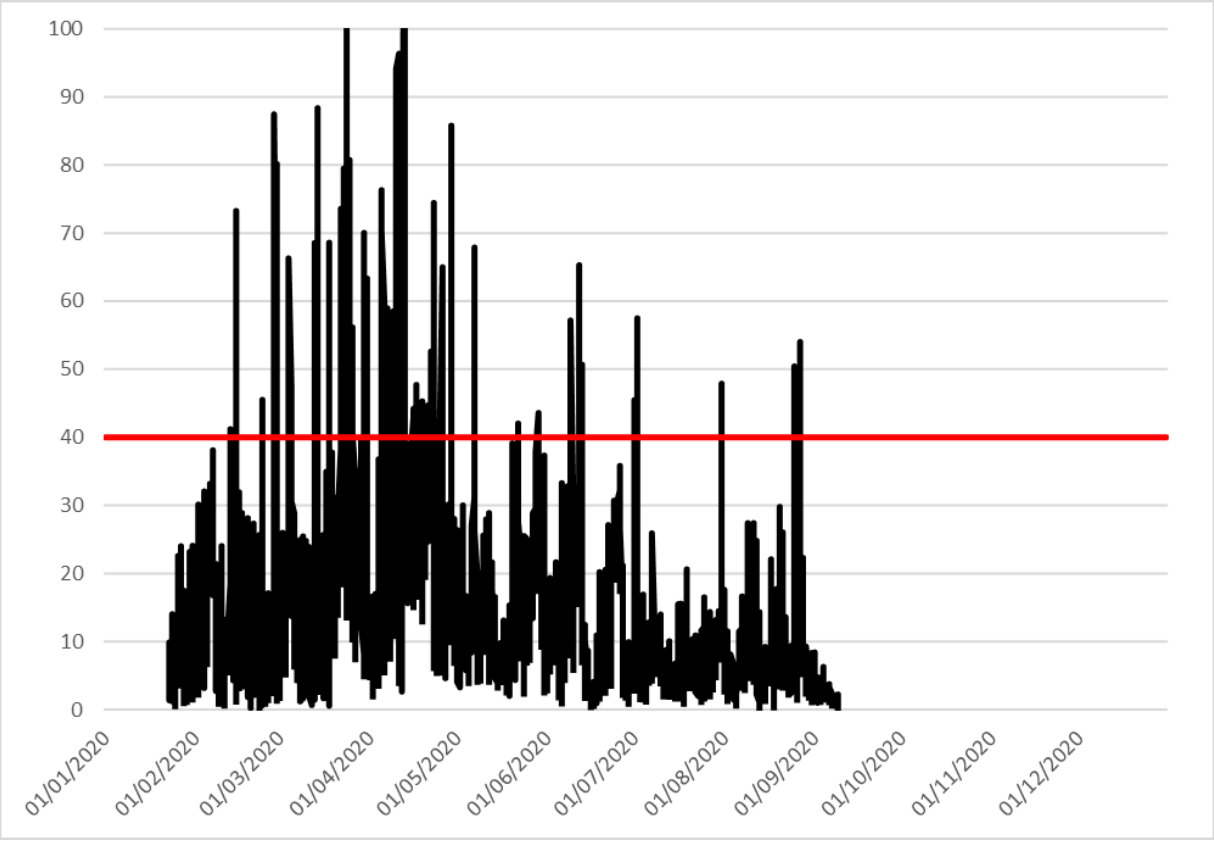
Note: Measurements in micrograms per cubic metre ($\mu g/m^3$).

Table G.2 – Blyth Library / Town Centre AQ Monitoring Station - Air Quality Data Summary

	PM2.5	PM10
Number Very High	0	0
Number High	0	0
Number Moderate	7	0
Number Low	224	231
Maximum 15-minute Mean	23.6 μg m^3	389.2 μg m^3
Maximum Hourly Mean	56.1 μg m^3	165.5 μg m^3
Maximum running 8-hour Mean	55.0 μg m^3	128.8 μg m^3
Maximum running 24-hour Mean	20.3 μg m^3	45.9 μg m^3
Maximum Daily Mean	20.3 μg m^3	45.9 μg m^3
90.4th Percentile (PM_{10}) - Daily	-	26.7 μg m^3
99.8th Percentile (NO_2) - Hourly	-	-
Average	5.7 μg m^3	13.6 μg m^3
Annualised Average	6.0 μg m^3	13.1 μg m^3
Data Capture	62.9 %	69.2 %

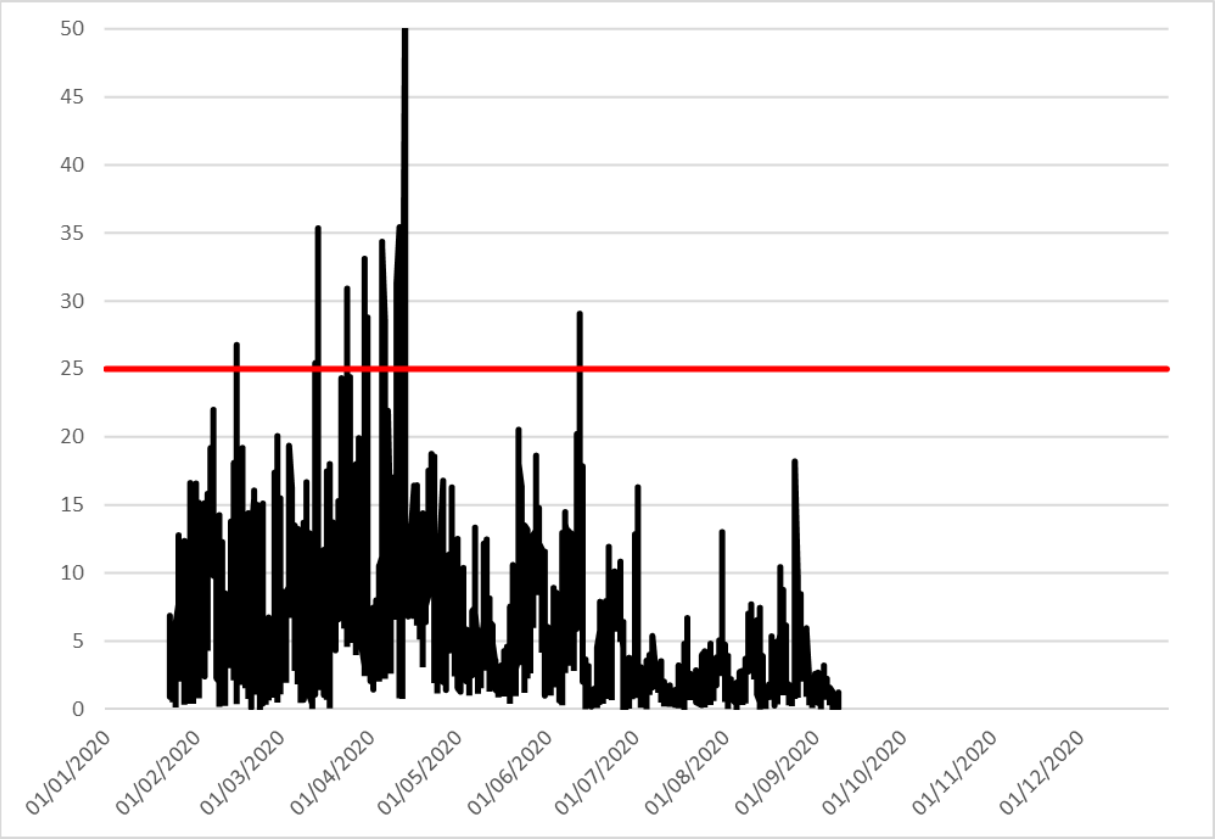
Hourly Time Series Plots

Figure G.4 – Blyth Library Particulates (PM_{10}) Time Series Plot



Note: Measurements in micrograms per cubic metre (μg/m^3).

Figure G.5 – Blyth Library Particulates ($PM_{2.5}$) Time Series Plot



Note: Measurements in micrograms per cubic metre ($\mu g/m^3$).

Appendix H: Annualisation of Data

Particulates (PM_{10} and $PM_{2.5}$) - TNO3313 - Blyth Library

The data capture for the Blyth Library Osiris particulate monitor was 62.9 per cent in 2020, being less than the accepted 85 per cent data, this requires annualising under the guidance and the 90.4th percentile calculated for the one hour mean. Data was "missing" in two main blocks from 01 January to 23 January and 09 September to 31 December.

Particulate (PM monitors on the AURN network within 50 miles of the Blyth Library site include Newcastle City Centre (11.1 miles), Newcastle Cradlewell (10.1 miles), Sunderland Silksworth (18.2 miles), Stockton Eaglescliffe (42.2 miles) and Middlesbrough (40.2 miles). These five stations collected 95.2, 93.0, 99.5, 93.8 and 94.2 per cent data in 2020, respectively.

Table H.1 – Blyth Library PM_{10} Annualising Calculation

	Data Capture (%)	***Annual Mean 2020 (AM)***	***Period Mean 2020 (PM)***	***Annualised Value***
Blyth Library Osiris	62.9	13.6	N/A	**13.1**
Long Term Sites		***Annual Mean 2020 (AM)***	***Period Mean 2020 (PM)***	***Ratio (AM/PM)***
Newcastle Citry Centre	95.2	13.4	13.8	0.97
Newcastle Cradlewell Bypass	93.0	13.8	14.2	0.97
Sunderland Silksworth	99.5	10.9	11.2	0.97
Stockton Eaglescliffe	93.8	13.9	14.6	0.95
Middlebrough	94.2	14.7	15.1	0.97
			Average (Ra)	0.97

Given the lack of choice over available monitors on the AURN network within a 50 mile radius, some of the monitoring sites are not "urban background" sites. Newcastle Cradlewell is an "Urban Traffic" site, Middlesborough is an "Urban Industrial", however both Sunderland Silksworth and Newcastle City Centre are "Urban Background" sites.

For PM_{10}, the ratio of the annual mean and period mean was 0.97, the ratio varies little between 0.95 to 0.97 at the five sites, with four of the stations having the same ratio of 0.97.

The result is that the annualised value for the Blyth Library Osiris PM_{10} annual mean is decreased from 13.6 $\mu g/m^3$ to 13.1 $\mu g/m^3$.

The choice of particulate monitors on the AURN network within 50 miles of the Blyth Library site measuring $PM_{2.5}$ was slightly different to those reporting PM_{10}, these include Newcastle City Centre (11.1 miles), Sunderland Silksworth (18.2 miles), Stockton A1305 Roadside (42.2 miles), Stockton Eaglescliffe (42.2 miles) and Middlesbrough (40.2 miles). The five stations collected 93.3, 99.6, 91.5, 92.5 and 88.8 per cent data in 2020, respectively

Table H.2 – Blyth Library $PM_{2.5}$ Annualising Calculation

	Data Capture (%)	*Annual Mean 2020 (AM)*	*Period Mean 2020 (PM)*	*Annualised Value*
Blyth Library Osiris	62.9	5.7	N/A	**6.0**
Long Term Sites		*Annual Mean 2020 (AM)*	*Period Mean 2020 (PM)*	*Ratio (AM/PM)*
Newcastle Citry Centre	93.3	7.3	7.3	1.00
Sunderland Silksworth	99.6	6.4	6.3	1.02
Stockton-on-Tees A1305 Roadside	91.5	8.3	7.9	1.05
Stockton Eaglescliffe	92.5	8.1	7.6	1.06
Middlebrough	88.8	7.6	6.9	1.11
			Average (Ra)	1.05

For $PM_{2.5}$, the ratio of the annual mean and period mean was 1.03, the ratio varies little between 1.00 to 1.11 at the five sites.

The result is that the annualised value for the Blyth Library Osiris $PM_{2.5}$ annual mean is decreased from 5.7 $\mu g/m^3$ to 6.0 μg/m3.

The annualisation of diffusion tube data is now carried out using the DEFRA supplied Diffusion Tube Data Processing Tool (v1.1 created on the 26/03/2020) and uses data inputs from Newcastle Centre, Newcastle Cradlewell and Sunderland Wessington Way.

Table H.3 – Diffusion Tube Annualising Calculation

Diffusion Tube ID	*Annualisation Factor Newcastle Centre*	*Annualisation Factor Newcastle Cradlewell Roadside*	*Annualisation Factor Sunderland Wessington Way*	*Average Annualisation Factor*	*Raw Data Simple Annual Mean (µg/m3)*	*Annualised Data Simple Annual Mean (µg/m3)*	*Bias Adjusted Annulised Mean (µg/m3)*
CM2	0.8428	0.8631	0.8214	0.8424	15.7	13.3	10.1
W17	1.0813	1.0506	1.0497	1.0605	20.2	21.4	16.3

Appendix I: Glossary of Terms

Abbreviation	Description
AM	Annual Mean
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
AQO	Air Quality Objectives, sometimes referred to as the Air Quality Standards (AQS)
ASR	Annual Status Report (for air quality)
AURN	Automatic Urban Rural Network
BAM	Beta Attenuation Monitor
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
DEFRA	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – includes an air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LGR	Local Government Reorganisation
LSO	Local Site Operatives
LTP	Local Transport Plan
NO	Nitrous Oxide
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PAH	Poly-Aromatic Hydrocarbons
PM	Period Mean
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10 μm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5 μm or less
QA/QC	Quality Assurance / Quality Control
SO_2	Sulphur Dioxide
…	…

Appendix J: References

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