Northumberland
County Council

2022 Air Quality Annual Status Report (ASR)

Northumberland County Council

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: August, 2022

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 2022 for the reporting year 2021. 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 2021, including monitoring results for the calendar year.

The main findings from 2021 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 2021.

- 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.

- Data capture for the Cowpen Road particulate monitor fell below 85 per cent and has therefore been "annualised" following guidance for the annual mean and the 90.4^{th} percentile presented for the 24-hour mean objective.

- $PM_{2.5}$ 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.

● The national air quality objective has been met for annual mean exceedances for nitrogen dioxide (NO_2) at a number of locations across Northumberland.

● The drop in NO_2 levels detected in the eleven long-term diffusion tube locations in 2020 have risen back but mostly below the 2019 levels (3no tube locations have exceeded the 2019 level) but all are higher than the 2020 levels.

● Both PM_{10} and $PM_{2.5}$ trends have shown another drop in levels, the third year in a row at both monitoring locations.

● 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 2023 reporting the data collected in 2022.

Air Quality in Northumberland County Council

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[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 particulates at the Cowpen Road and Blyth Library sites. The apparent widespread drop in NO_2 levels detected in the eleven long-term diffusion tubes in 2020 would appear to be related to the reduction in road traffic because of Covid-19 lockdowns and restrictions. It will

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[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017
[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Air quality appraisal: damage cost guidance, July 2021
[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

take a few more years of monitoring to see whether these will resume completely to pre-2020 level or show some other trend.

Both PM_{10} and $PM_{2.5}$ trends have shown another drop in levels, the third year in a row at both monitoring locations.

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 the Blyth Library site in 2013 and at Cowpen Road site at the end of 2018. Please refer to previous ASRs for Northumberland for information on monitored NO_2 levels and trends from continuous monitors.

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 monitoring 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. Generally, compliance with a DMRB air quality screening assessment is required as part of any such application submission following the IAQM screening criteria.

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 at some stage.

Dualling of the A1 Road north of Morpeth was planned to start in 2022, this is to be carried out by National Highways (formerly Highways England). However as of the end of 2021, the government's Transport Secretary has asked for more time to consider the upgrade of the

route between Morpeth and Ellingham. 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 but provide a more stable flow of vehicles many of which are presently restricted in convoys behind slower vehicles on single carriageway sections. The net result of the realignment of the southern part of the carriageway will be a reduction in the number of receptors near the A1, including a first school.

The main Planning applications were determined late in 2021 for the railway stations and other associated infrastructure for the resumption of a passenger train service on the "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 Council), 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. Approaching one thousand new car parking spaces are being provided at the stations in Northumberland with around five per cent being electric car charging spaces.

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 is now in place to inform on the approach and measures being taken by the Council to address this:

https://www.northumberland.gov.uk/Climate-Change/Climate-Change.aspx

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 (ie CHPs, 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.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades and should continue to improve as a result of 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 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 the actions/projects in Northumberland which are likely to have a direct or indirect improvement in air quality. These are described in more detail in Section 2 of this report and a full list is contained in Table 3.1.

- **Northumberland Line** – restoration of a passenger rail service to some of the larger towns in south-east of Northumberland (Seaton Delaval, Blyth Newsham, Blyth Bebside, 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 emission standards for new taxis and for how long they will be required.

- **Biomass Appliances** – identification of 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 IAQM trigger for vehicle flows (AADT) 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.

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[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 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.

- **New Air Quality Legislation**

  On the 1st May 2021, The Air Quality (Domestic Solid Fuel Standards) (England) Regulations 2020 came into force, this places widespread controls over manufactured solid fuels and wood fuels (biomass).

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 2021. 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.

The apparent widespread drop in NO_2 levels detected in the eleven long-term diffusion tubes in 2020 would appear to be related to the reduction in road traffic because of Covid-19 lockdowns and restrictions. It will take a few more years of monitoring to see whether these will resume completely to pre-2020 level or show some other trend.

Both PM_{10} and $PM_{2.5}$ trends have shown another drop in levels, the third year in a row at both monitoring locations in Blyth by 3-4 μg/m³ for PM_{10} and around 0.5 μg/m³ for PM2.5.

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:

- 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 in relation to air quality will be reviewed and updated again in 2023.

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 Environmental Protection Team for information and advice on air quality using the contact details in 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 continuous particulate monitors at Blyth Library and on Cowpen Road, Blyth.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Protection Team of Northumberland County Council and was carried out completely internally within the Housing and Public Protection Service.

There is no internal requirement to have this ASR approved by anyone other than managers within the Housing and Public Protection Service and this ASR has not been signed off by the Director of Public Health.

If you have any comments on this ASR please send them to the Environmental Protection Team at:

Address: Environmental Protection Team, Housing and Public Protection Service, Northumberland County Council, West Hartford Business Park, Cramlington, Northumberland, NE23 3JP

Telephone: 01670 623870

Email: public.protection@northumberland.gov.uk

Table of Contents

1. Local Air Quality Management

This report provides an overview of air quality in Northumberland during 2021. 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 Table E.1.

2. DEFRA's Appraisal Comments for the Northumberland 2021 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 our responses:

1. The report is well structured, detailed, and provides the information specified in the Guidance. The report is considered an example of good practice.

   Acknowledged and appreciated.

2. The report contains brief discussion on trends seen in monitored concentrations throughout 2020, which is commended.

   No comment.

3. For future submissions, please ensure the most up to date template is followed to ensure that relevant information is presented in the correct sections of the report.

   In fact, the most recent ASR template document was used for 2021 – version 2 dated 13/05/2021. The version of that document was cited in the table on the page after the front page of the report. With the additions of sections which we have chosen to add (such as this one), the section numbers will not necessarily follow those in the template.

4. The Council are commended on their ability to maintain consistency in their air quality monitoring work during the course of the Covid-19 pandemic, which has resulted in excellent data capture for 2020.

   No comment.

5. It would be beneficial for the Council to ensure any screen captures are legible and easily interpretable. Whilst this is largely the case, the screen capture of the national bias adjustment factor spreadsheet is poor resolution and is therefore difficult to interpret.

   Noted.

6. Diffusion tube mapping is sufficient, with sites labelled in accordance with the IDs listed in the results tables. However, it would be beneficial for the council to additionally include a county-wide map depicting all monitoring sites within the Council area, to allow easier interpretation of the spatial distribution of monitoring sites, and spatial variation in concentrations across the county.

Noted and although this has never been asked for previously, we will include such a map in future ASRs.

7. Appendix F: Impact of COVID-19 upon LAQM has been completed, with a brief discussion of the impacts on NCC's LAQM regime. The Council state that no opportunities or constraints have arisen upon LAQM as a result of the pandemic.

    No comment.

8. Whilst a significant decline in concentrations has been identified in NCC during 2020, it is acknowledged by the Councils that this decline is likely attributable to reduced traffic flows as a result of national lockdowns during the COVID-19 pandemic. It is therefore important that monitoring data for 2020 be interpreted with caution. Moreover, NO_2 concentrations recorded during 2020 should not be used in isolation to determine the success of any existing AQAP measures.

    Noted, no comment.

9. It is acknowledged that the implication of the pandemic has resulted in a delay in several measures being actioned, and it is subsequently advised that the Council place focus during 2021 and beyond on measures which have stalled, to ensure these are progressed in the coming years.

    No comment.

3. Actions to Improve Air Quality

3.1 Air Quality Management Areas

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

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 based upon current and previous air quality monitoring results.

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

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

- The report is well structured, detailed, and provides the information specified in the Guidance. The report is considered an example of good practice.

- The Council are commended on their ability to maintain consistency in their air quality monitoring work during the course of the Covid-19 pandemic, which has resulted in excellent data capture for 2020.

- It is acknowledged that the implication of the pandemic has resulted in a delay in several measures being actioned, and it is subsequently advised that the Council place focus during 2021 and beyond on measures which have stalled, to ensure these are progressed in the coming years.

- 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 2022.

Northumberland County Council has taken forward a number of measures during 2021 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 2021 ASR as the impact of Covid-19 upon the development and delivery of strategic and actual projects in 2020 and 2021 has been significant.

Northumberland County Council's priorities for the coming year are to proactively engage with and influence local decisions where local 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

As of the end of 2021, all the formal planning processes had been completed by National Highways (formerly Highways England) for the dualling of single carriageway sections of the A1 north of Morpeth. The planning application was being assessed by the Planning Inspectorate and the decision had been passed to the Secretary of State for approval. However, the Secretary has asked for a "…*for more time to consider our proposals for upgrading the A1 between Morpeth and Ellingham in Northumberland.*" It is expected that a final decision on the scheme is to be made in the summer of 2022.

Preliminary works have been 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, dualled 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 twenty-four to nine, including 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.

Further details on the progress of the scheme will be reported in subsequent annual status reports.

The Northumberland Line

This scheme aims to reinstate passenger operations on the Benton Junction to Ashington railway line which last saw a passenger service in the late 1960s. This would connect six stations on this line (five in Northumberland) with the East Coast Main Line (ECML), the Metro service across Tyneside and with Newcastle.

Planning permission has been granted by Northumberland County Council Local Planning Authority for the five stations within the Northumberland area:

Ashington - 21/00387/CCD - 10th September 2021

Bedlington - 21/01106/CCD - 10th November 2021

Bebside (Blyth) - 21/00878/CCD - 10th January 2022

Newsham (Blyth) - 21/03720/CCD - 3rd March 2022

Seaton Delaval - 21/02253/CCD - 9th November 2021

The principal contractor has been appointed for this scheme and preliminary works have begun 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, shoppers and visitors, 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. It is also likely that users may include those wishing to

travel between the towns in Northumberland which will have stations and the connection to the Newcastle Metro at Northumberland Park.

The Environmental Protection Team 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 be 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 was submitted to Secretary of State along with an enquiry under the order. These stages have since passed and the scheme approved.

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

Further details of the progress of the scheme 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 four 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).

New Air Quality Legislation

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 scheme effectively places the same controls of burning of domestic solid fuel as did the creation of "smoke control areas" under The Clean Air Act 1993. Additional controls have been placed upon wood fuels to limit the moisture content of these biomass fuels.

Enforcement is likely to fall to Trading Standards for point of sale and at place of manufacture and "environmental health" for any combustion of non-approved fuels.

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 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 the 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. Although as of the end of 2021, a number of teams have resumed attendance at offices, this is often not at full staffing levels and on a rota basis. Some services within Northumberland County Council (such as Public Protection) are still mostly working from home.

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 2021 which should all benefit air quality. These include:

- Six new 20 mph speed restrictions (most located at or near to schools).

- Five new 30 mph speed restrictions.

- Four new 40 mph speed restrictions.

- One new 50 mph speed restrictions.

- Three new multiple speed restriction schemes.

- Eleven other speed/access restriction schemes (some of these are exclusive pedestrian and/or cycle zones

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 once again meet air quality objectives across the County in 2022.

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	2021	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	2022	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		2015	NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	Complete conversion of taxi fleets to Euro 5	42826	
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	
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	
7	Go Smarter promoting Modeshift STARS	Promoting Travel Alternatives	School Travel Plans			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	/	On going	
8	Travel planner and cycle routes	Public Information	Via the Internet			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	/	On going	
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	
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	

	Measure	Category	Classification			Organisations Involved	Funding Source					Reduction in Pollutant	Key Performance Indicator	Progress/Target
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
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
14	Over 800 fleet vehicles fitted with Masternaut vehicle tracking	Vehicle Fleet Efficiency	Driver training and ECO driving aids			NCC	Unknown	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions	N/A	On going
15	Bid for Euro 6 buses	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport			NECA	Unknown	NO	Unknown	Unknown	Unknown	/	/	On going
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
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
20	Northumberland Line	Promoting Travel Alternatives				NCC	NCC / Central Government	NO	Unknown	Unknown	Unknown	Reduced vehicle emissions		2022/23 (Phase 1) 2024 (Phase 2)
21	A1 Dualling	Transport Planning and Infrastructure	Other			Highways England	Highways England / Central Government	NO	Unknown	Unknown	Unknown			2024/25

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.

The latest results (from April 2021) uses a new method of calculating the mortality burden from fine particulates which gives fraction of mortality attributable to PM$_{2.5}$ pollution across England is 5.6 per cent, the fraction within the North East region is 4.0 per cent and the fraction within Northumberland County is 3.4 per cent

For Northumberland, this represents just less than 10,000 deaths per year attributable to particulate air pollution in 2021. 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 national Air Quality Objectives an annual mean limit of 20 μg/m³ is cited for England, however this appears to be taken from para 25 of The Air Quality Standards Regulations 2010 which is a duty of the Secretary of State to limit exposure to PM2.5.

Within the county of Northumberland, the annual "cap" limit of 25 μg/m³ 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 (April 2021) 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 and especially those which may impact fine particulates.

- 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.

Additionally, thirty-eight smoke control areas were created historically in the former districts and boroughs of Northumberland including the whole of the south-east area (former Wansbeck and Blyth Valley areas). This is the most populated part of Northumberland with some 46 percent of the county's population within this area.

With the introduction of The Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020, solid manufactured fuels can only be burned on domestic fires if they comply with being smokeless and are certified under the regulations. Wood fuels are also controlled in respect of their moisture content. This effectively replicates the impact the creation of smoke controls areas would have and makes the whole of England an effective smoke control area. This will undoubtably have a positive impact upon emissions of fine particulates in coal burning locations not already covered by any smoke control areas.

Seven 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 in Northumberland and there are no modelled levels above 10 μg/m³ in county (maximum 7.9 μg/m³).

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

This section sets out the monitoring undertaken within 2021 by Northumberland County Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for either a seven-year period (2014 to 2021) or a five-year period (2017 and 2021) to allow monitoring trends to be identified and discussed.

4.1 Summary of Monitoring Undertaken

4.1.1 Automatic Monitoring Sites

Northumberland County Council undertook automatic, continuous monitoring at two sites during 2021. Table A.1 in Appendix A shows the details of the automatic monitoring sites.

The two continuous particulate monitors are located at the Cowpen Road (CR) and Blyth Library (BL) sites, both instruments have comprehensive service contracts in place and are returned to Turnkey Instruments for service and calibration annually.

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 suitability of these monitors is discussed in Appendix C.

Data capture for the Blyth Library and Cowpen Road sites in 2021 was 86.3 and 26.9 per cent, respectively. The data capture for the Cowpen Road site was as a result of work commitments and a firmware issue with the Osiris unit when redeployed in August which necessitated the unit being return to Turnkey Instrument which wasn't returned until the beginning of December.

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

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

4.1.2   Non-Automatic Monitoring Sites

Northumberland County Council deployed passive diffusion tube monitoring NO_2 at nineteen sites during 2021, these locations have remained unchanged since 2018.

Table A.2 in Appendix A presents the details of the 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) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

4.2 Individual Pollutants

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

4.2.1   Nitrogen Dioxide (NO₂)

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 2021 dataset of monthly mean values is provided in Appendix B.

None of the diffusion tube monitoring locations exceeded the national Air Quality Objective, with the highest bias-adjusted result being 29.3 μg/m^3. This diffusion tube location (Cowpen Road west) is collocated with the Cowpen Road Osiris particulate monitor. This monitoring location is beside the A192 (Cowpen Road) which has the highest traffic flows of any urban road with relevant receptors in Northumberland.

The bias-adjusted diffusion tube results for 2021 are well below the annual mean objective of 40 μg/m^3.

4.2.2 Particulate Matter (PM$_{10}$)

Table A.4 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM$_{10}$ annual mean concentrations for the past five years with the air quality annual mean objective of 40µg/m^3.

Table A. in Appendix A compares the ratified continuous monitored PM$_{10}$ daily mean concentrations for the past five years with the air quality 24-hour mean objective of 50µg/m^3, not to be exceeded more than 35 times per year.

The measured annual mean for the Cowpen Road Osiris in 2021 was 8.3 μg/m^3. However, since the data capture fell below 85 per cent this was annualised against four of the nearest particulate monitors in the AURN network which modified the result to 8.7 μg/m^3,

The annual mean for the Blyth Library Osiris in 2021 was 10.4 μg/m^3.

The annual mean objective for this pollutant is 40 μg/m^3.

The number of measured exceedances of the 24-hour mean objective (50 μg/m^3) for the Cowpen Road Osiris in 2021 was one, However, since data capture fell below 85 per cent, the 90.4th percentile was calculated as 13 (12.9), well below the thirty-five exceeds of 50 μg/m^3 limit.

The number of measured exceedances of the 24-hour mean objective (50 μg/m^3) for the Blyth Library Osiris in 2021 was **four**.

The 24-hour mean objective for this pollutant is no more than thirty-five exceeds of 50 μg/m^3.

The long-term trends in PM$_{10}$ monitoring suggests an overall reduction in particulate levels, however this appears to be mainly as a result on a change in monitoring equipment in the period 2013-14 (BAM to nephelometer).

These results are a reduction upon the 2020 measured levels which it might have been expected to be influenced by Covid-19 lockdowns and restrictions, but this is now the third year of a reduction in PM$_{10}$ levels.

The monitoring at these two sites shows a continuing compliance with the national Air Quality Objectives for annual mean and 24-hour mean for PM$_{10}$ particulates.

4.2.3 Particulate Matter (PM$_{2.5}$)

Table A. in Appendix A presents the ratified and adjusted monitored PM$_{2.5}$ annual mean concentrations for the past five years.

The measured annual mean for the Cowpen Road Osiris in 2021 was 6.1 μg/m^3. However, since the data capture fell below 85 per cent this was annulised against four of the nearest particulate monitors in the AURN network which modified the result to 6.3 μg/m^3

The measured annual mean for the Blyth Library Osiris in 2021 was 5.2 μg/m^3 (annualised to 6.0 μg/m^3).

The unofficial "cap" annual mean objective for PM$_{2.5}$ in England is 25 μg/m^3.

These results are a reduction upon the 2020 measured levels which it might have been expected to be influenced by Covid-19 lockdowns and restrictions, but this is now the third year of a reduction in PM2.5 levels.

These results are substantially below the "cap" limit of 25 μg/m³ and below the stricter limit of 10 μg/m³ set in Scotland for PM$_{2.5}$.

The monitoring at these two sites shows a continuing compliance with the national Air Quality Objectives for the unofficial annual mean for PM2.5 particulates.

4.2.4 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 (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which 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	NO2	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) Zero metres 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.3 – Annual Mean NO₂ Monitoring Results: Non-Automatic Monitoring
(μg/m³)

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 2021 (%) 2	NO2 Annual Mean Concentration(µm/m3) 3 4				
							2017	2018	2019	2020	2021
8N	419025	613070	Roadside	Diffusion Tube	N/A	91.7	31.0	31.3	24.7	16.8	21.1
B1	431537	581537	Urban Centre	Diffusion Tube	N/A	100.0	31.0	31.4	27.8	21.5	25.3
B3	428815	581813	Roadside	Diffusion Tube	N/A	100.0	23.0	22.3	31.0	22.4	29.3
BER1	399596	653213	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	16.6	13.3	14.2
B11	431160	581415	Urban Centre	Diffusion Tube	N/A	100.0	27.0	26.8	21.2	16.9	19.6
CM8	416820	572840	Urban Centre	Diffusion Tube	N/A	100.0	21.0	18.2	17.9	12.5	15.3
B15	430552	578950	Roadside	Diffusion Tube	N/A	100.0	24.0	22.0	17.2	11.4	14.2
C1	427593	576555	Roadside	Diffusion Tube	N/A	100.0	20.0	23.2	23.2	17.8	21.3
BER2	399345	625512	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	13.5	9.3	10.8
HEX1	393684	564214	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	28.0	21.1	23.8
C11	427523	576136	Roadside	Diffusion Tube	N/A	100.0	20.0	15.9	19.1	13.1	17.6
CM2	419525	586380	Roadside	Diffusion Tube	N/A	100.0	24.0	24.7	14.3	10.1	11.8
CM4	419947	585937	Roadside	Diffusion Tube	N/A	100.0	21.0	26.3	19.4	12.7	18.1
CM5	420134	586329	Roadside	Diffusion Tube	N/A	100.0	26.0	22.0	15.8	11.5	13.8
HALT1	370647	564060	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	12.6	9.5	10.6
B16	430666	581604	Roadside	Diffusion Tube	N/A	91.7	N/A	N/A	23.7	18.5	22.3
W17	426014	581879	Urban Centre	Diffusion Tube	N/A	91.7	23.0	24.0	22.3	16.3	18.9
W21	427939	586210	Roadside	Diffusion Tube	N/A	100.0	25.0	23.9	20.2	16.5	18.0
SD1	430387	575433	Roadside	Diffusion Tube	N/A	100.0	27.0	22.8	22.0	16.7	20.7

☐ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**
☒ **Diffusion tube data has been bias adjusted.**
☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction**
Notes:
The annual mean concentrations are presented as μg/m³.
Exceedances of the NO₂ annual mean objective of 40μg/m³ are shown in **bold**.
NO₂ annual means exceeding 60μg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

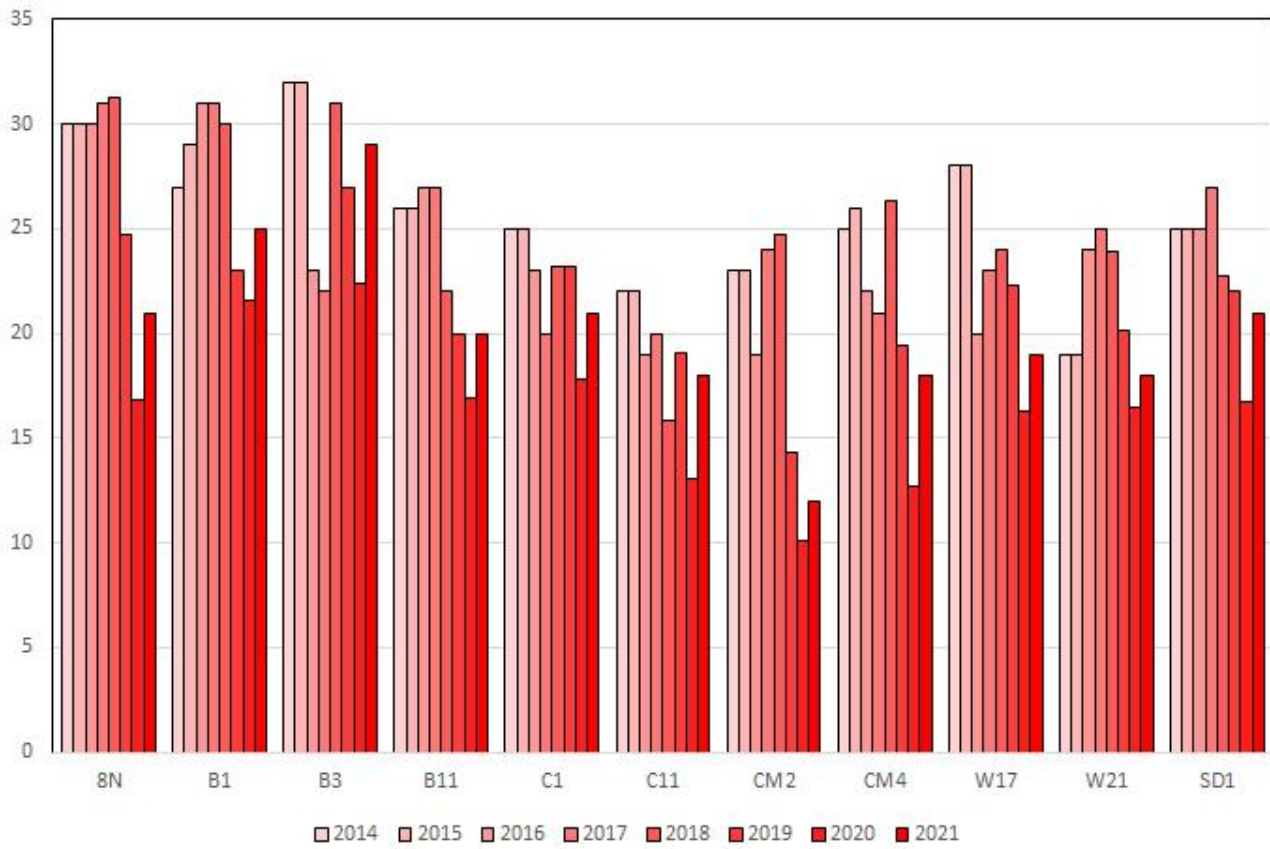**Figure A.1 – Trends in Annual Mean NO$_2$ Concentrations (μg/m^3)**

Table A.4 – Annual Mean PM$_{10}$ Monitoring Results (μg/m^3)

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 2021 (%) 2	PM10 Annual Mean Concentration(μm/m3) 3 4				
						2017	2018	2019	2020	2021
BL	431536	581531	Urban Centre	N/A	86.3	13.4 (14.8)	15.5 (16.5)	14.3 (13.3)	13.6 (13.1)	10.4
CR	428817	581815	Roadside	N/A	26.9	13.5 (15.3)	15.6	16.2	12.2	8.3 (8.7)

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16**

Notes:

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

Exceedances of the PM$_{10}$ annual mean objective of 40μg/m^3 are shown in **bold**.

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

(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%).

Table A.5 – Blyth Library Particulates (PM$_{10}$) - Air Quality Data Summary

	PM10
Number Very High	0
Number High	0
Number Moderate	2
Number Low	310
Maximum 15-minute Mean	101.6 µg m³
Maximum Hourly Mean	52.9 µg m³
Maximum running 8-hour Mean	42.7 µg m³
Maximum running 24-hour Mean	39.3 µg m³
Maximum Daily Mean	86.2 µg m³
90.4th Percentile (PM) - Daily	
Average	10.4 µg m³
Data Capture	86.3 %

Hourly Time Series Plots

Figure A.2 – Blyth Library Particulates (PM$_{10}$) - Time Series Plot (μg/m^3)
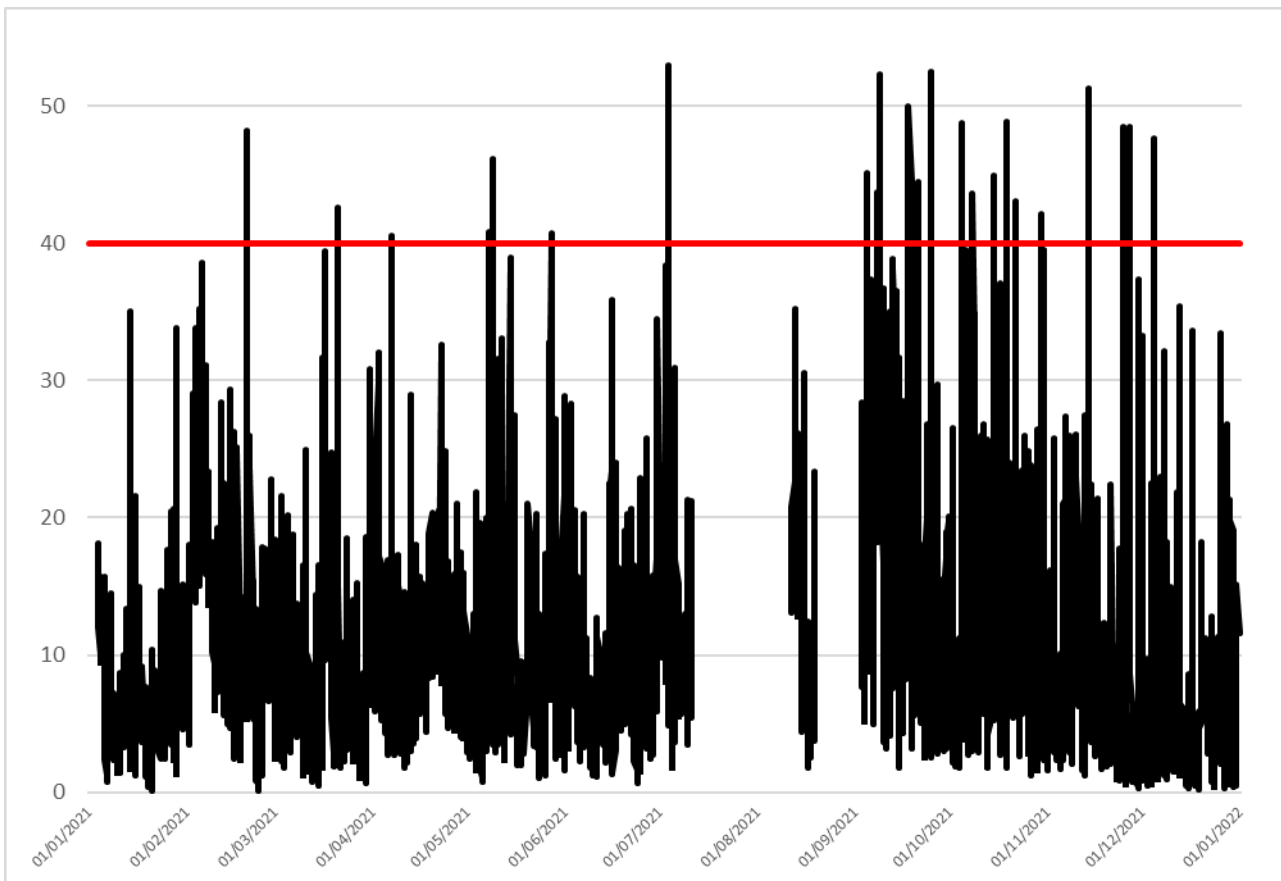
Table A.6 – Cowpen Road Particulates (PM$_{10}$) - Air Quality Data Summary

	PM10
Number Very High	0
Number High	0
Number Moderate	0
Number Low	99
Maximum 15-minute Mean	218.7 µg m³
Maximum Hourly Mean	116.4 µg m³
Maximum running 8-hour Mean	35.7 µg m³
Maximum running 24-hour Mean	21.2 µg m³
Maximum Daily Mean	21.2 µg m³
90.4th Percentile (PM) - Daily	12.9
Average	8.2 µg m³
Data Capture	26.9 %

Hourly Time Series Plots

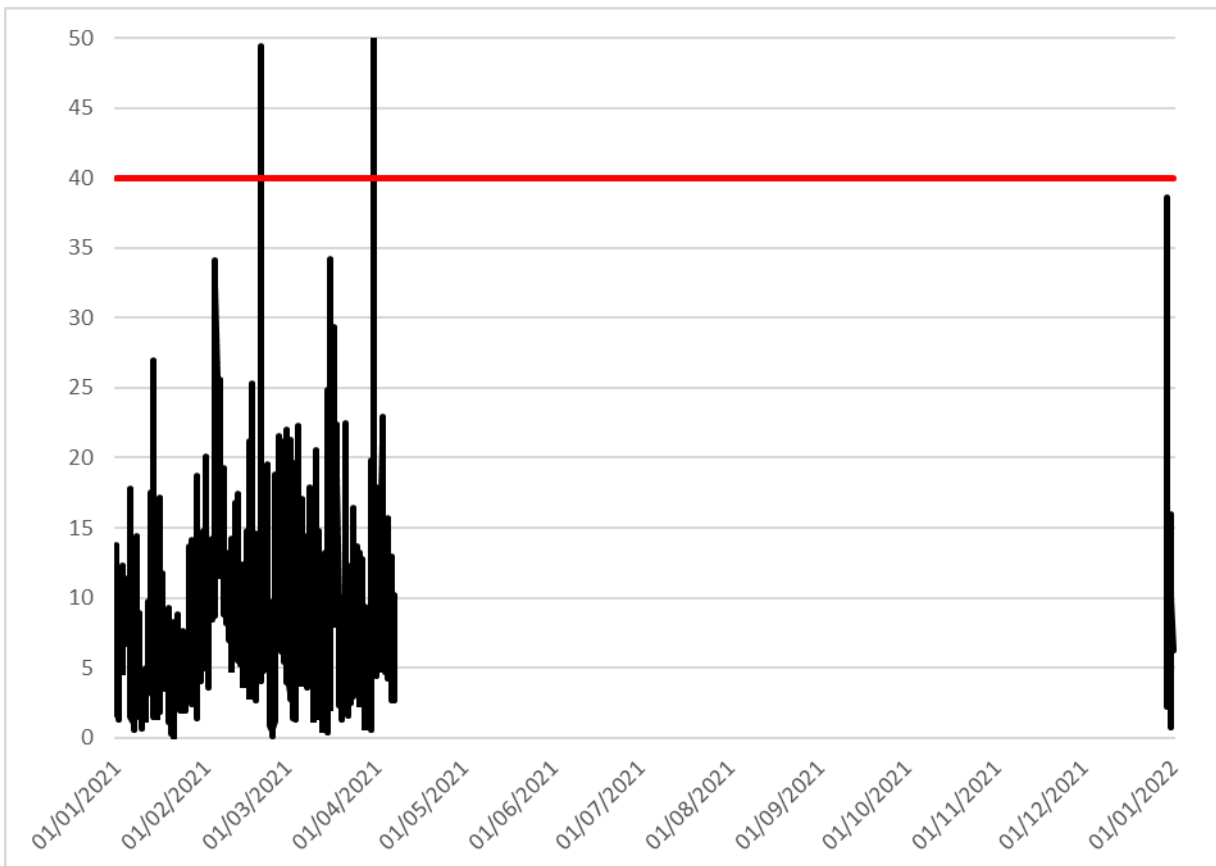**Figure A.3 – Cowpen Road Particulates (PM$_{10}$) - Time Series Plot (μg/m³)**

Figure A.4 – Trends in Annual Mean PM$_{10}$ Concentrations (μg/m^3)
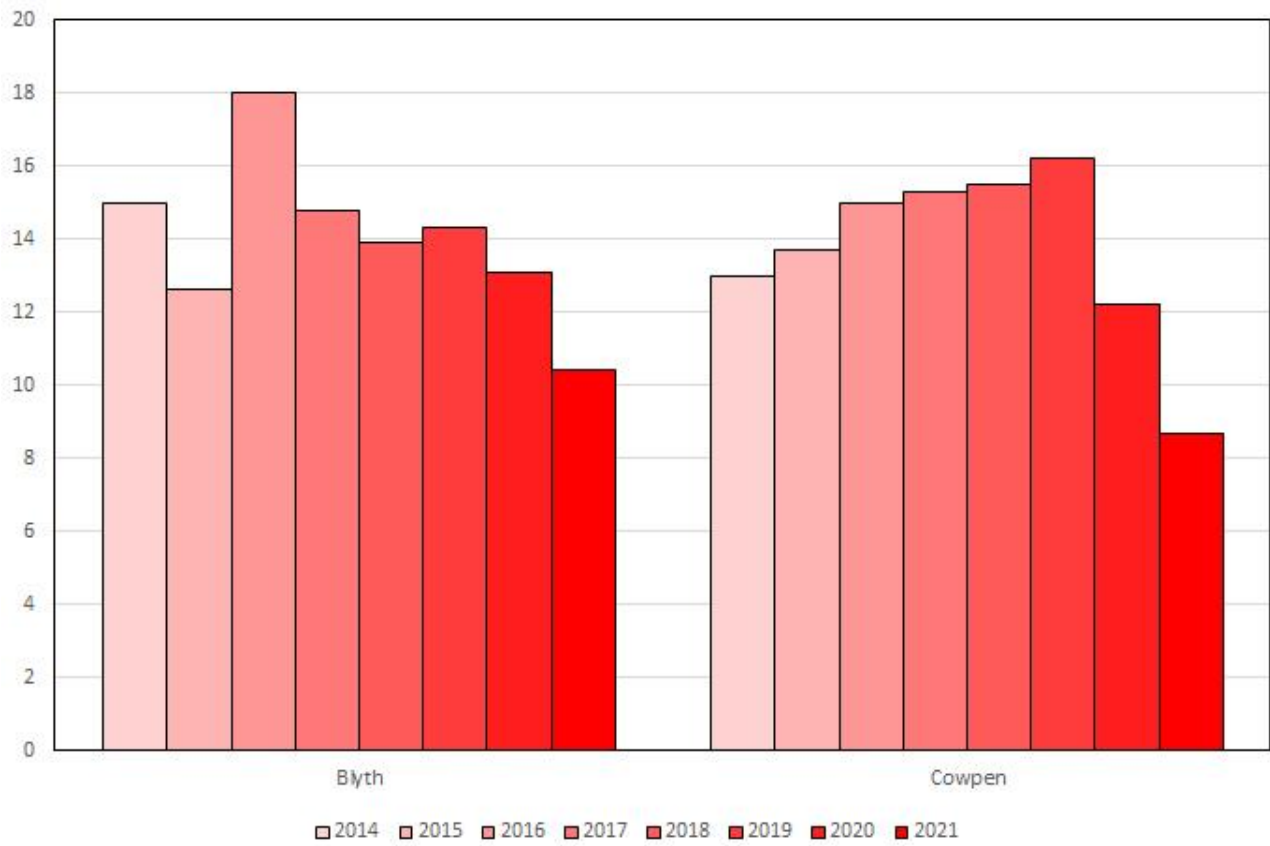
Table A.7 – 24-Hour Mean PM₁₀ Monitoring Results, Number of PM₁₀ 24-Hour Means

$$> 50 \mu g/m^3$$

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 2021 (%) 2	PM₁₀ 24-Hour Means > 50µg/m³ (3)				
						2017	2018	2019	2020	2021
BL	431536	581531	Urban Centre	N/A	86.3	4 (30)	1 (28)	3 (26)	0 (27)	4
CR	428817	581815	Roadside	N/A	26.9	0 (30)	1	6	0	1 (13)

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m³ have been recorded.

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold**.

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

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
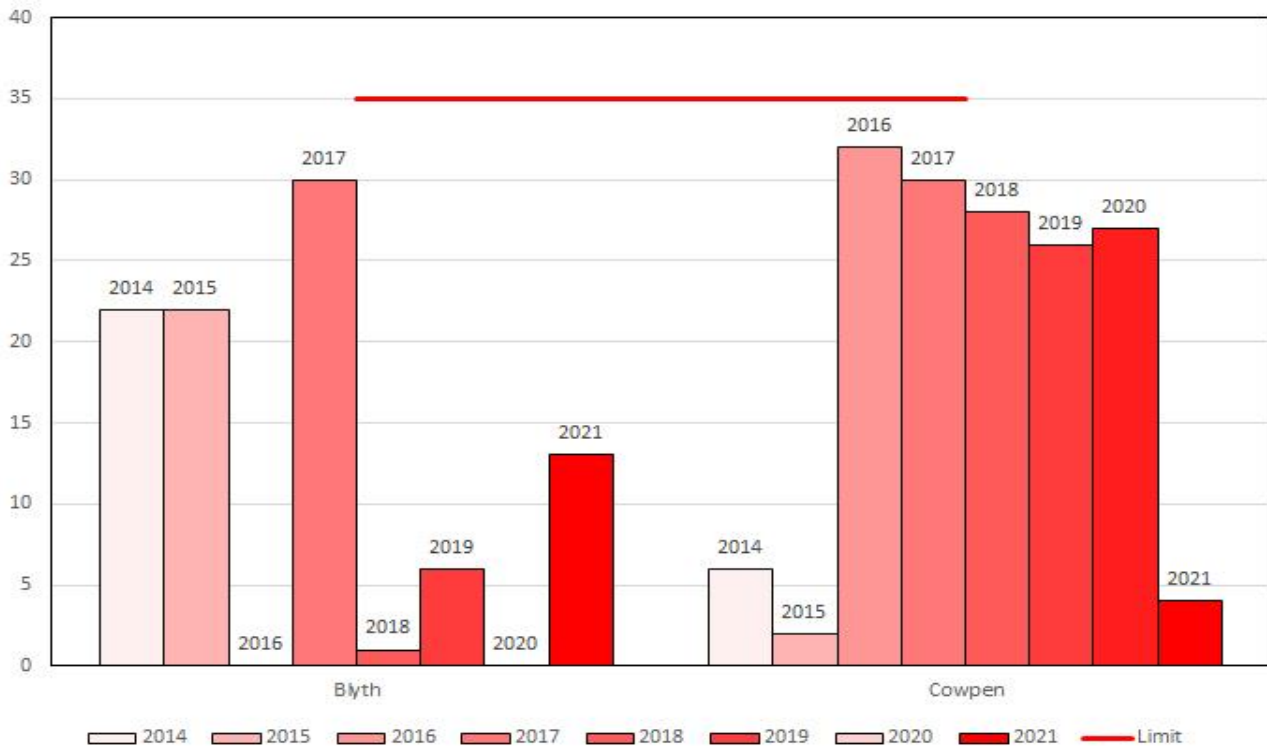
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.5 – Trends in Number of 24-Hour Mean PM$_{10}$ Results > 50μg/m^3 (Measured)
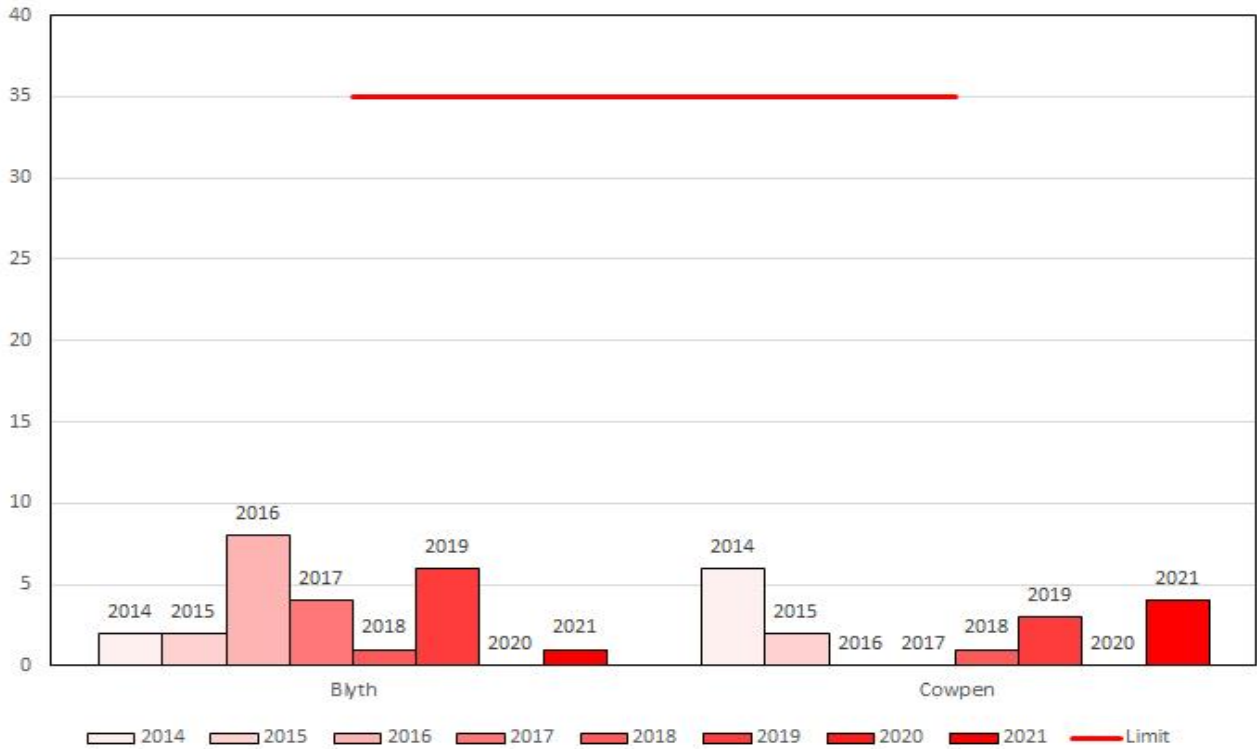
Measured Data Only

Figure A.6 – Trends in Number of 24-Hour Mean PM$_{10}$ Results > 50μg/m^3 (Percentile and Measured)

90.4th Percentile and Measured Data

Table A.8 – Annual Mean PM$_{2.5}$ Monitoring Results (μg/m^3)

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 2021 (%) 2	PM$_{2.5}$ Annual Mean Concentration (μg/m^3) [3]				
						2017	2018	2019	2020	2021
BL	431536	581531	Urban Centre	N/A	86.3	6.2 (6.8)	7.3 (6.7)	8.0 (7.6)	5.7 (6.0)	5.2
CR	428817	581815	Roadside	N/A	26.9	5.5 (6.0)	6.7	7.2	6.8	6.1 (6.3)

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16**
Notes:
The annual mean concentrations are presented as µg/m^3.
All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.
(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%).

Table A.9 – Blyth Library Particulates (PM2.5) - Air Quality Data Summary

	PM2.5
Number Very High	1
Number High	4
Number Moderate	13
Number Low	293
Maximum 15-minute Mean	54.6 µg m³
Maximum Hourly Mean	43.1 µg m³
Maximum running 8-hour Mean	30.4 µg m³
Maximum running 24-hour Mean	23.3 µg m³
Maximum Daily Mean	49.4 µg m³
90.4th Percentile (PM) - Daily	
Average	5.16 µg m³
Data Capture	86.3 %

Hourly Time Series Plots

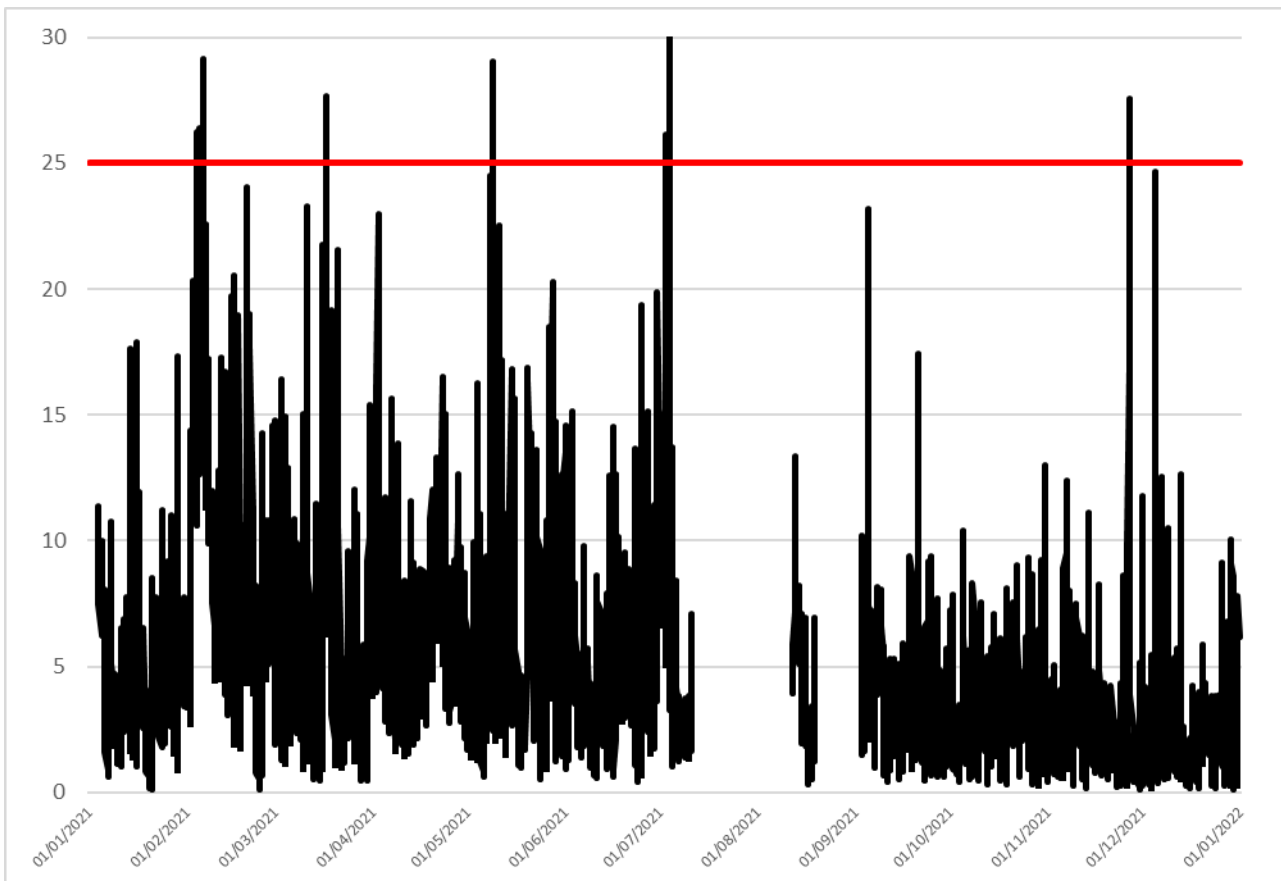**Figure A.7 – Blyth Library Fine Particulates (PM2.5) - Time Series Plot (μg/m^3)**

Table A.10 – Cowpen Road Particulates (PM2.5) - Air Quality Data Summary

	PM2.5
Number Very High	0
Number High	0
Number Moderate	0
Number Low	99
Maximum 15-minute Mean	37.8 μg m³
Maximum Hourly Mean	27.4 μg m³
Maximum running 8-hour Mean	22.1 μg m³
Maximum running 24-hour Mean	14.9 μg m³
Maximum Daily Mean	14.9 μg m³
90.4th Percentile (PM) - Daily	
Average	6.1 μg m³
Data Capture	26.9 %

Hourly Time Series Plots

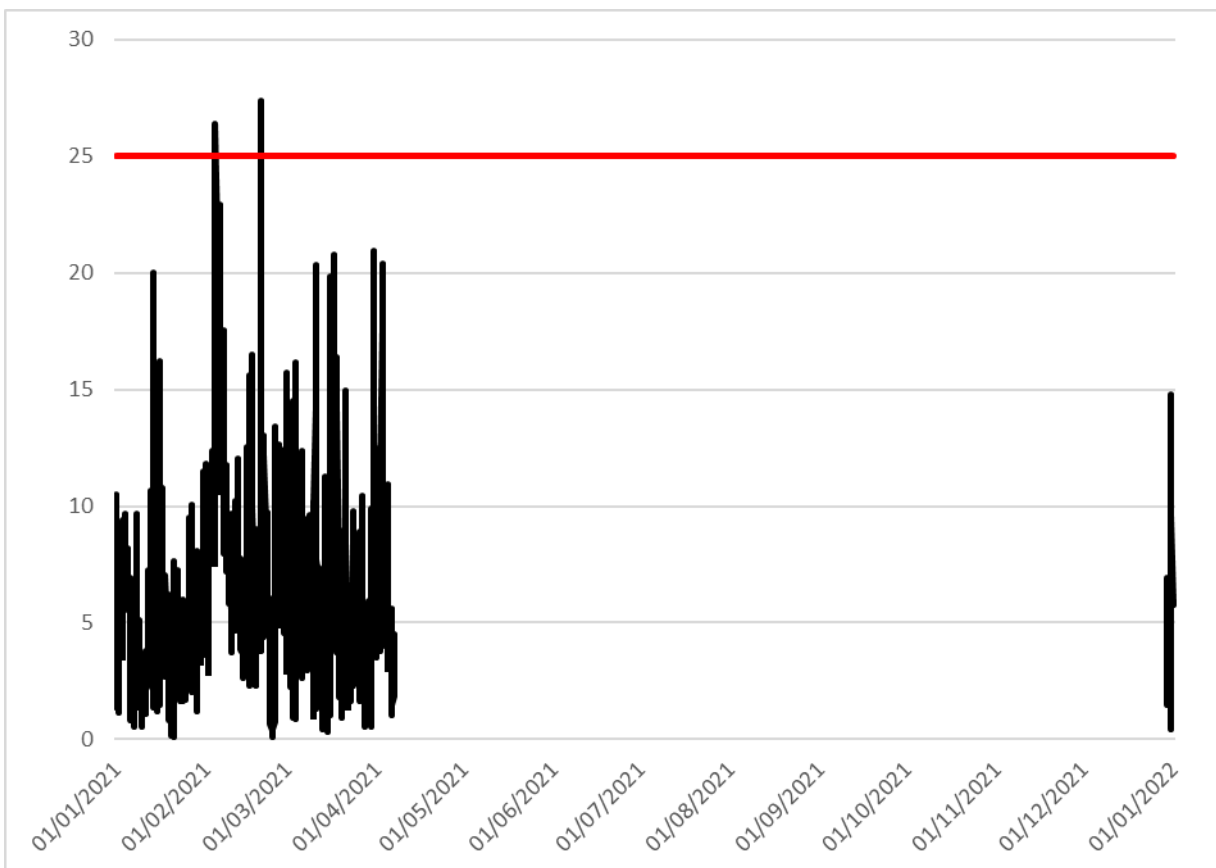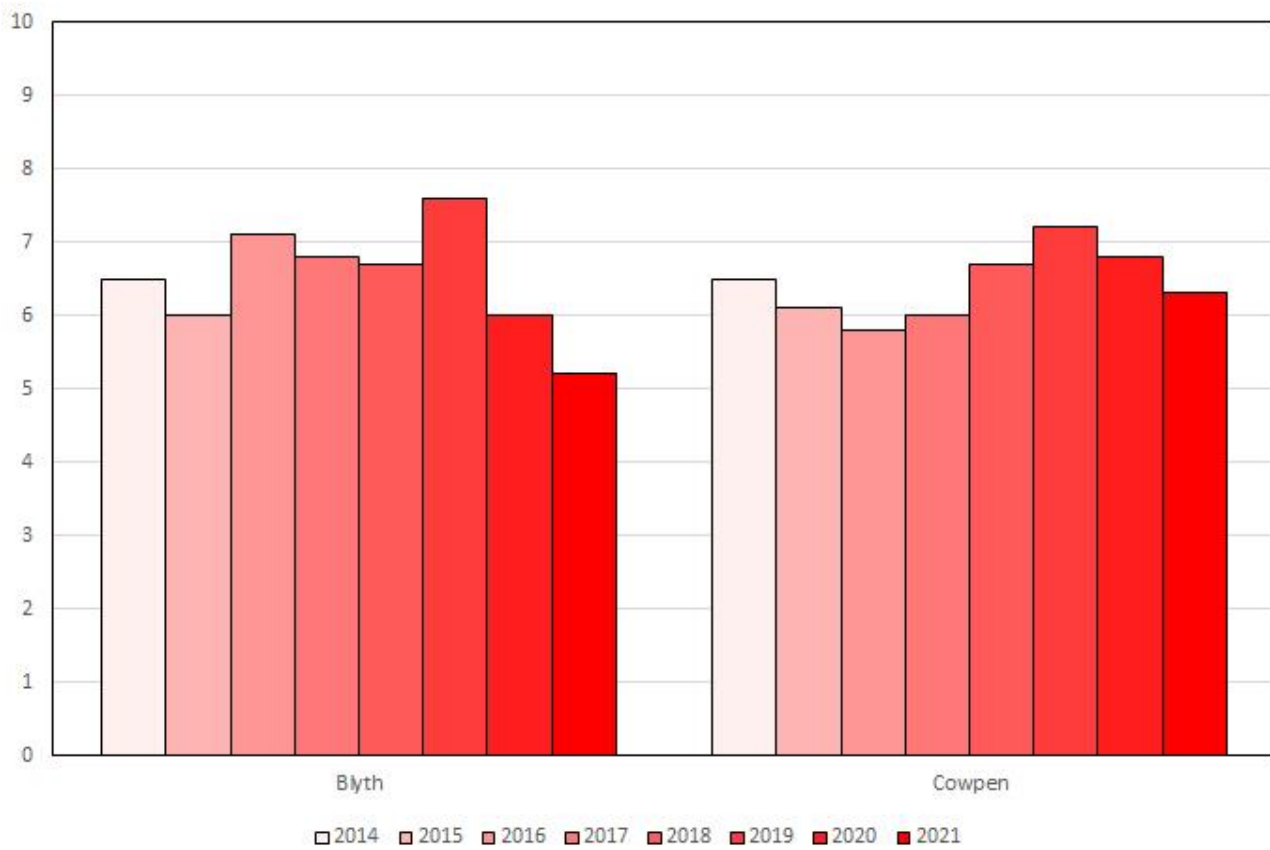**Figure A.8 – Cowpen Road Fine Particulates (PM2.5) - Time Series Plot (μg/m³)**

Figure A.9 – Trends in Annual Mean PM₂.₅ Concentrations (μg/m³)

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO₂ 2021 Diffusion Tube Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (x.x)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
8N - Alnwick	419025	613070		29.0	22.5	21.8	27.5	22.2	23.3	25.6	31.8	29.0	33.1	31.7	27.0	21.1	20.0	
B1	431537	581537	45.9	25.6	29.6	26.3	21.9	22.1	23.8	25.9	34.3	38.1	51.4	45.0	32.5	25.3	20.7	
B3	428815	581813	44.9	42.2	32.2	25.1	35.5	31.3	32.3	34.8	44.2	41.8	40.1	46.3	37.6	29.3	25.8	
BER1 - Berwick	399596	653213	18.1	15.4	12.1	24.3	27.4	17.0	20.7	20.5	21.3	15.2	12.5	13.4	18.2	14.2	13.9	
B11	431160	581415	31.1	26.6	26.0	27.5	21.3	21.2	20.7	24.4	28.5	19.7	22.3	31.8	25.1	19.6	18.6	
CM8 - Ponteland	416820	572840	22.0	21.8	13.6	19.6	21.4	15.5	18.5	16.3	22.6	20.2	20.7	23.8	19.7	15.3	13.4	
B15	430552	578950	22.8	21.2	12.8	18.3	17.8	14.0	14.3	11.4	21.6	19.9	18.3	25.6	18.2	14.2	13.1	
C1	427593	576555	37.0	34.4	19.7	31.1	31.0	21.7	23.4	19.4	31.5	29.6	22.0	26.8	27.3	21.3	20.0	
BER2 - Tweedmouth	399345	625512	16.0	15.1	11.4	14.3	14.8	11.5	13.2	11.4	16.6	13.7	12.7	15.1	13.8	10.8	9.9	
HEX1 - Hexham	393684	564214	36.5	30.1	23.2	28.6	29.9	26.1	28.5	28.3	34.8	35.3	29.9	34.8	30.5	23.8	20.4	
C11	427523	576136	27.5	27.7	13.7	25.3	30.4	19.2	23.1	20.6	24.9	21.3	13.3	23.6	22.6	17.6	16.4	
CM2	419525	586380	19.7	17.4	9.5	16.5	16.2	14.3	13.1	11.1	16.7	15.5	11.5	19.3	15.1	11.8	11.4	
CM4	419947	585937	25.0	24.7	16.3	27.3	28.3	19.5	25.4	22.1	24.5	20.2	20.2	24.6	23.2	18.1	14.6	
CM5	420134	586329	21.2	19.3	12.5	17.1	17.3	12.6	16.1	15.2	19.8	18.5	18.5	23.9	17.7	13.8	12.5	
Halt1 - Haltwhistle	370647	564060	20.9	14.0	11.7	11.2	12.7	9.2	11.2	9.9	13.5	13.3	17.2	18.1	13.6	10.6	9.0	
B17	430666	581604	27.8	33.3	24.7	29.1	31	15.7		22.2	31.7	33	30.4	35.6	28.6	22.3	20.5	
W17	426014	581879	30.8	25.2	20.3	16.9	25.3	20.5		21.7	27.8	23.9	22.3	32.3	24.3	18.9	15.7	
W21	427939	586210	26.5	31.6	20.7	21.1	18.1	16.3	16.0	18.4	24.1	28.8	23.7	32.1	23.1	18.0	16.4	
SD1	430387	575433	30.8	26.1	26.5	25.0	25.6	21.4	19.2	20.6	29.3	28.4	27.7	38.0	26.6	20.7	19.2	

☐ **All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1**.
☐ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**
☐ **Local bias adjustment factor used.**
☒ **National bias adjustment factor used.**
☒ **Where applicable, data has been distance corrected for relevant exposure in the final column.**
☒ **Northumberland County Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System**.
Notes:
Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.
NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.
See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Northumberland County Council During 2021

Northumberland County Council has not identified any new sources relating to air quality within the reporting year of 2021.

Additional Air Quality Works Undertaken by Northumberland County Council During 2021

Northumberland County Council has not completed any additional works within the reporting year of 2021.

QA/QC of Diffusion Tube Monitoring

The supplier of Northumberland County Council's diffusion tubes for the whole of 2021 was SOCOTEC Didcot and the tubes were prepared using the 50 per cent TEA in water method.

The diffusion tubes in Northumberland County Council were collected/deployed within one day of the dates contained within the 2021 Diffusion Tube Monitoring Calendar.

SOCOTEC Didcot take part in the AIR NO_2 Proficiency Testing Scheme (AIR-PT) and for the five quarters of 2021-22 when the diffusion tubes from Northumberland County Council were analysed they achieved:

January – February 2021 (AIR PT AR042) – 100 per cent

May – June 2021 (AIR PT AR043) – 100 per cent

July – August 2021 (AIR PT AR045) – 87.5 per cent

September – October 2021 (AIR PT AR046) - 100 per cent

January – February 2022 (AIR PT AR049) – 100 per cent

From: https://laqm.defra.gov.uk/wp-content/uploads/2022/07/LAQM-NO2-Performance-data_Up-to-June-2022_V2.1.pdf

Diffusion Tube Annualisation

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

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Northumberland County Council have applied a national bias adjustment factor of 0.78 to the 2021 monitoring data (bias adjustment spreadsheet version 06/22), available at:

https://laqm.defra.gov.uk/air-quality/air-quality-assessment/national-bias/

A summary of bias adjustment factors used by Northumberland County Council over the past five years is presented in Table C.1.

Northumberland County Council no longer operate any continuous NO_2 analysers or employ any multiple diffusion tubes at any sites and therefore cannot derive any local bias adjustments.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2017	National	03/18	0.77
2018	National	09/19	0.76
2019	National	06/20	0.75
2020	National	06/21	0.76
2021	**National**	**06/22**	**0.78**

NO_2 Fall-off with Distance from the Road

No diffusion tube NO_2 monitoring locations within Northumberland County Council required distance correction during 2021 as there were no raw data or bias adjusted results above

$36\mu g/m^3$, however distance corrected results to the nearest receptors have been presented in the DTDES, Table B.1 and C.4 for completeness.

QA/QC of Automatic Monitoring

Local Site Operator (LSO) and Data Management

Both of these are carried out by officers within the Public Health Protection Unit.

Diffusion Tubes posted to an officer who deploys and collects them and returns them by post and the results are emailed by SOCOTEC to the Environmental Protection Team.

Data from both the Osiris particulate monitors are automatically uploaded to data servers via 3G modems and data can be viewed of downloaded from a dedicated website ([www.airqweb.co.uk)](www.airqweb.co.uk).) Anyone can access this website and view historic data from our two Osiris monitors.

Data from the Osiris monitors requires no additional processing to ratify the data, with the exception of annulisation where necessary. The data presented in the ASR is "ratified" in that it requires no further processing.

Data processing is carried out by officers in the Environmental Protection Team who have a number of years of experience collecting and processing air quality data and preparing the annual air quality reports to DEFRA.

Turnkey Instruments Osiris Particulate Monitors

Both the Osiris monitors have comprehensive service agreements with Turnkey Instruments and the units are returned to them annually for service and calibration. Any issues in-between these annual services and calibrations are dealt with by Turnkeys technical support team who can either access the monitors remotely, advise the LSO on any stapes to take or return to Turnkey for a resolution. The only other LSO responsibility is to change the pre-filter on the monitors every few months or when the unit indicates the mass on the filters has exceeded a trigger level for attention.

The Osiris particulate monitors are not "accredited" by DEFRA and were not considered as candidate instruments in the DEFRA UK equivalence program, however the DEFRA equivalence scheme is now almost 16 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*".

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

The Osiris particulate monitors (PM_{10} and $PM_{2.5}$) deployed within the Northumberland County Council area do not require the application of any correction factors or any adjustments to the downloaded data.

Automatic Monitoring Annualisation

The Cowpen Road Osiris particulate monitor (PM_{10} and $PM_{2.5}$) had data capture of 26.9 per cent and therefore required annualising against four of the nearest particulate monitors on the AURN network. Those air quality monitoring stations were; Newcastle City Centre, Sunderland Silksworth, Stockton-on-Tees (Eaglescliffe) and Middlebrough.

NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within Northumberland County Council required distance correction during 2021, although these were calculated and presented in the DTDES Table B.1 and C.4 for completeness.

Table C.2 – Annualisation Summary for Cowpen Road Particulate Data

(concentrations presented in µg/m³)

Site ID	Annualisation Factor Newcastle City Centre	Annualisation Factor Sunderland Silksworth	Annualisation Factor Stockton-on-Tees, Eaglescliffe	Annualisation Factor Middlesbrough	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
CR – PM10	1.06	1.00	1.03	1.11	1.05	8.3	8.7	
CR – PM2.5	1.10	1.00	1.00	1.04	1.03	6.1	6.3	

Table C.3 – Local Bias Adjustment Calculation

A national bias adjustment factor has been used to bias adjust the 2021 diffusion tube results.

Table C.4 – NO₂ Fall off With Distance Calculations (concentrations presented in μg/m³)

Site ID	Distance (m) - Monitoring Site to Kerb	Logn - Monitoring Site to Kerb	Distance (m) - Receptor to Kerb	Logn Kerb - Receptor to Kerb	Nearest Receptor (m)	Monitored Concentration (Annualised and Bias Adjusted) - μg m-3	Background Concentration (2021) - μg m-3	Concentration Predicted at Receptor - μg m-3	Comments
8N - Alnwick	2.0	0.3010	4.0	0.6021	2.0	21.1	4.7	20.0	
B1	1.0	0.0000	29.0	1.4624	28.0	25.3	9.5	20.7	
B3	2.0	0.3010	15.5	1.1903	13.5	29.3	10.8	25.8	
BER1 - Berwick	2.0	0.3010	3.0	0.4771	1.0	14.2	6.3	13.9	
B11	1.0	0.0000	3.0	0.4771	2.0	19.6	9.5	18.6	
CM8 - Ponteland	1.5	0.1761	22.5	1.3522	21.0	15.3	7.3	13.4	
B15	1.7	0.2304	9.7	0.9868	8.0	14.2	7.4	13.1	
C1	1.7	0.2304	5.7	0.7559	4.0	21.3	10.0	20.0	
BER2 - Tweedmouth	1.0	0.0000	12.0	1.0792	11.0	10.8	7.0	9.9	
HEX1 - Hexham	1.5	0.1761	13.5	1.1303	12.0	23.8	6.6	20.4	
C11	1.7	0.2304	9.7	0.9868	8.0	17.6	10.0	16.4	
CM2	1.0	0.0000	2.0	0.3010	1.0	11.8	6.4	11.4	
CM4	3.0	0.4771	73.0	1.8633	70.0	18.1	6.7	14.6	
CM5	1.7	0.2304	10.7	1.0294	9.0	13.8	6.1	12.5	
Halt1 - Haltwhistle	1.0	0.0000	18.0	1.2553	17.0	10.6	4.3	9.0	
B17	2.0	0.3010	9.0	0.9542	7.0	22.3	9.4	20.5	
W17	1.0	0.0000	21.0	1.3222	20.0	18.9	7.0	15.7	
W21	1.0	0.0000	6.0	0.7782	5.0	18.0	7.5	16.4	
SD1	1.7	0.2304	7.7	0.8865	6.0	20.7	9.6	19.2	

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

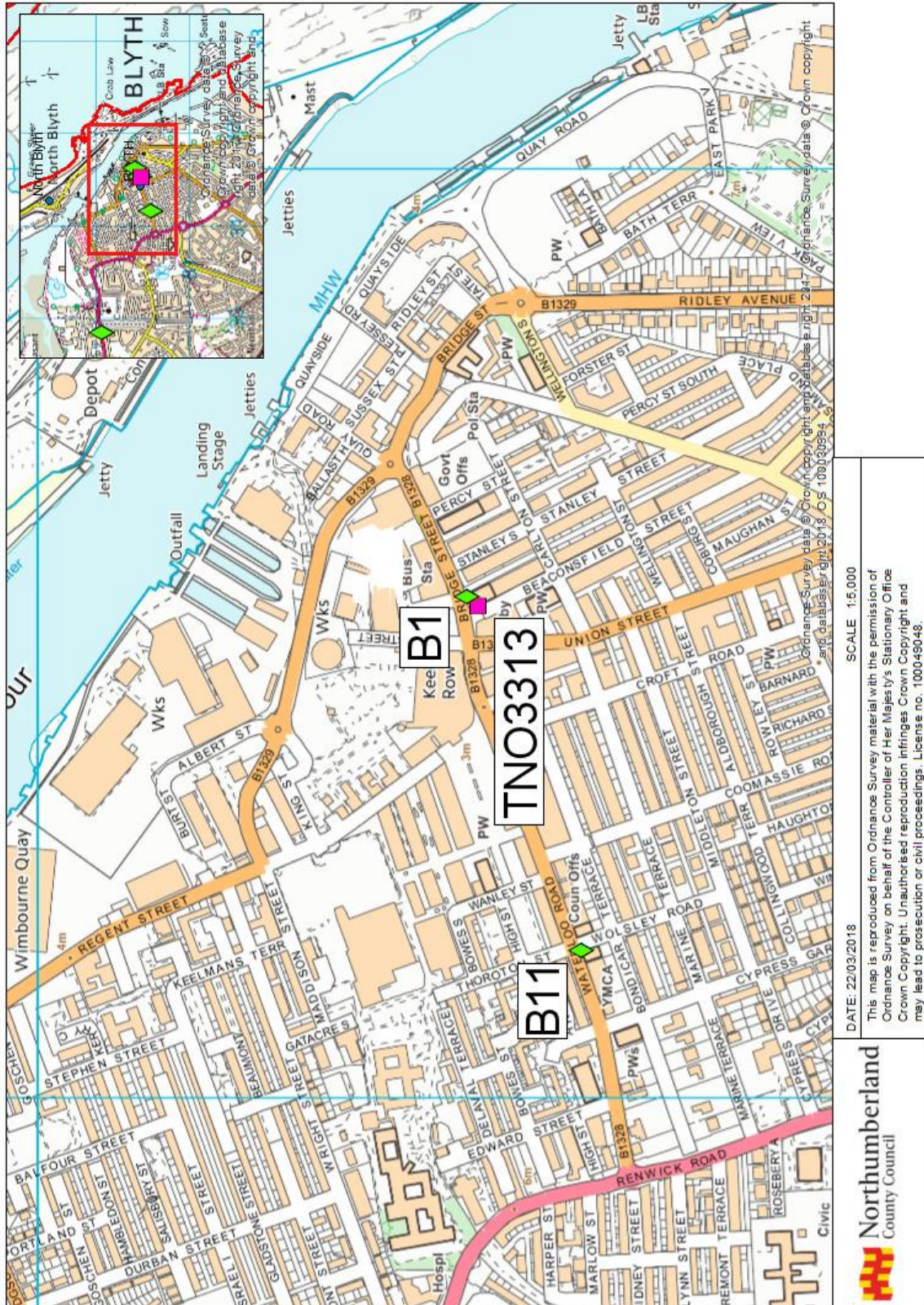**Figure D.1 – Blyth Automatic and NO$_2$ Diffusion Tube Monitoring Locations**

Figure D.2 – Cowpen Automatic and NO₂ Diffusion Tube Monitoring Locations
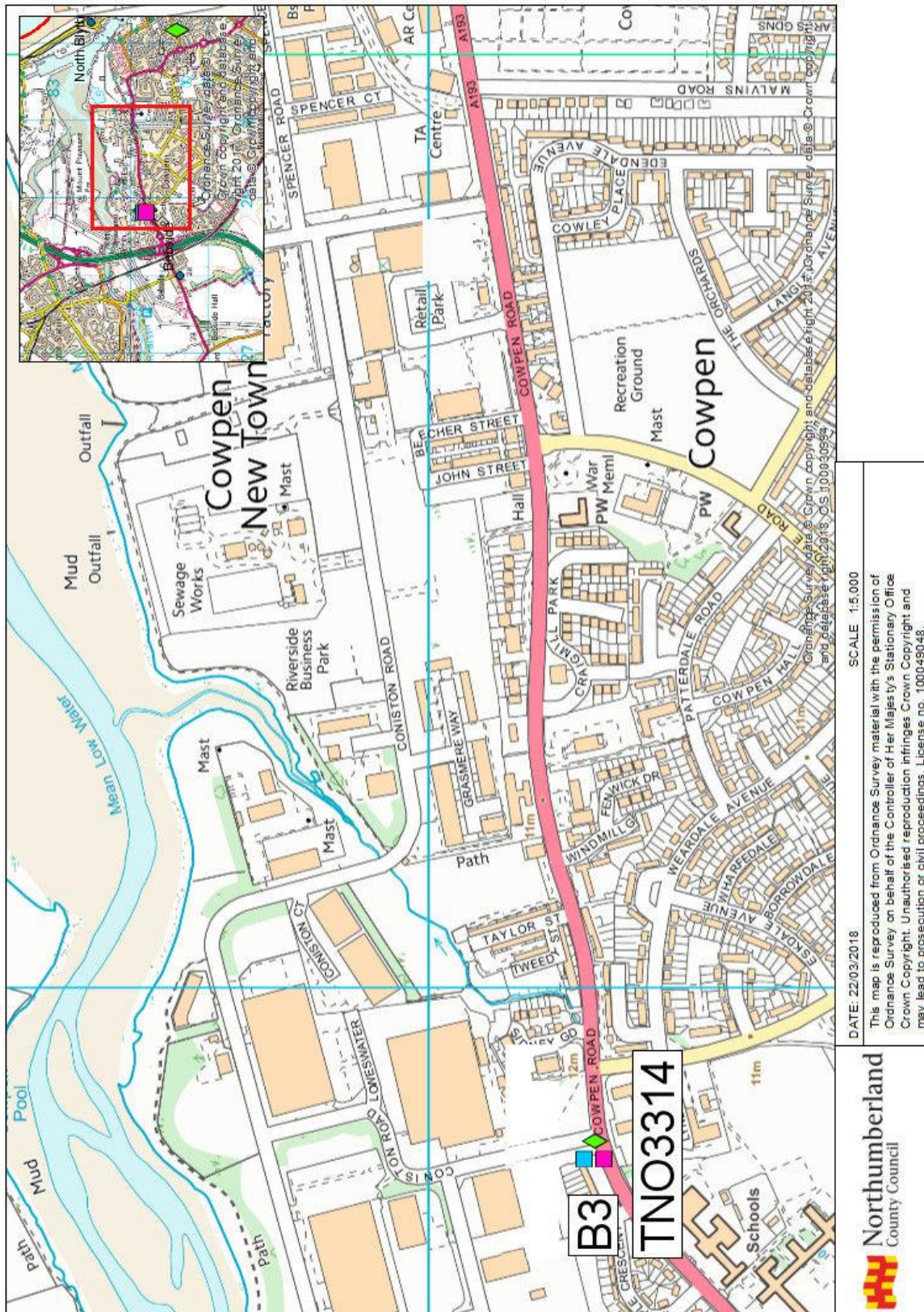
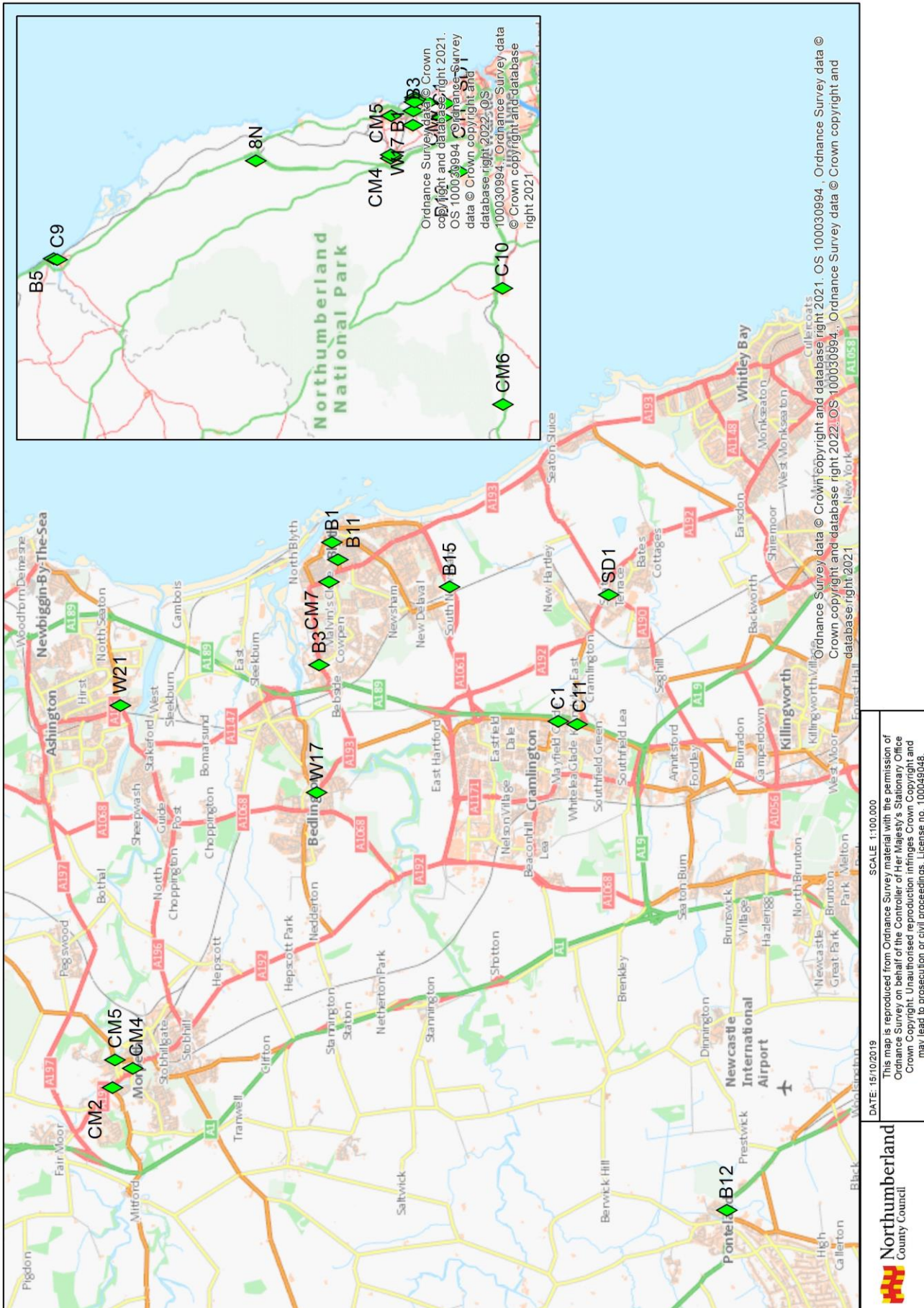**Figure D.3 – NO₂ Diffusion Tube Monitoring Locations Across Northumberland**

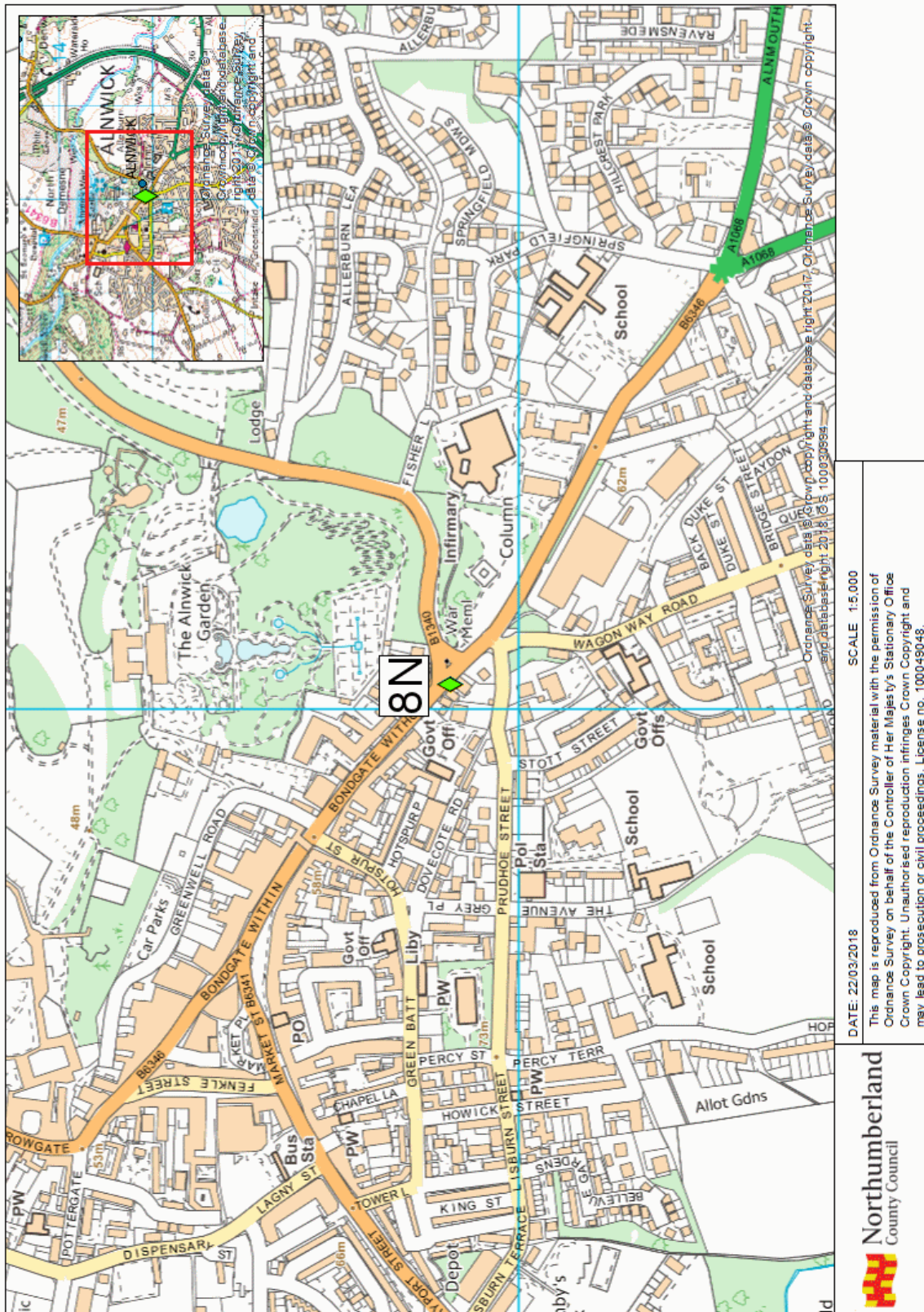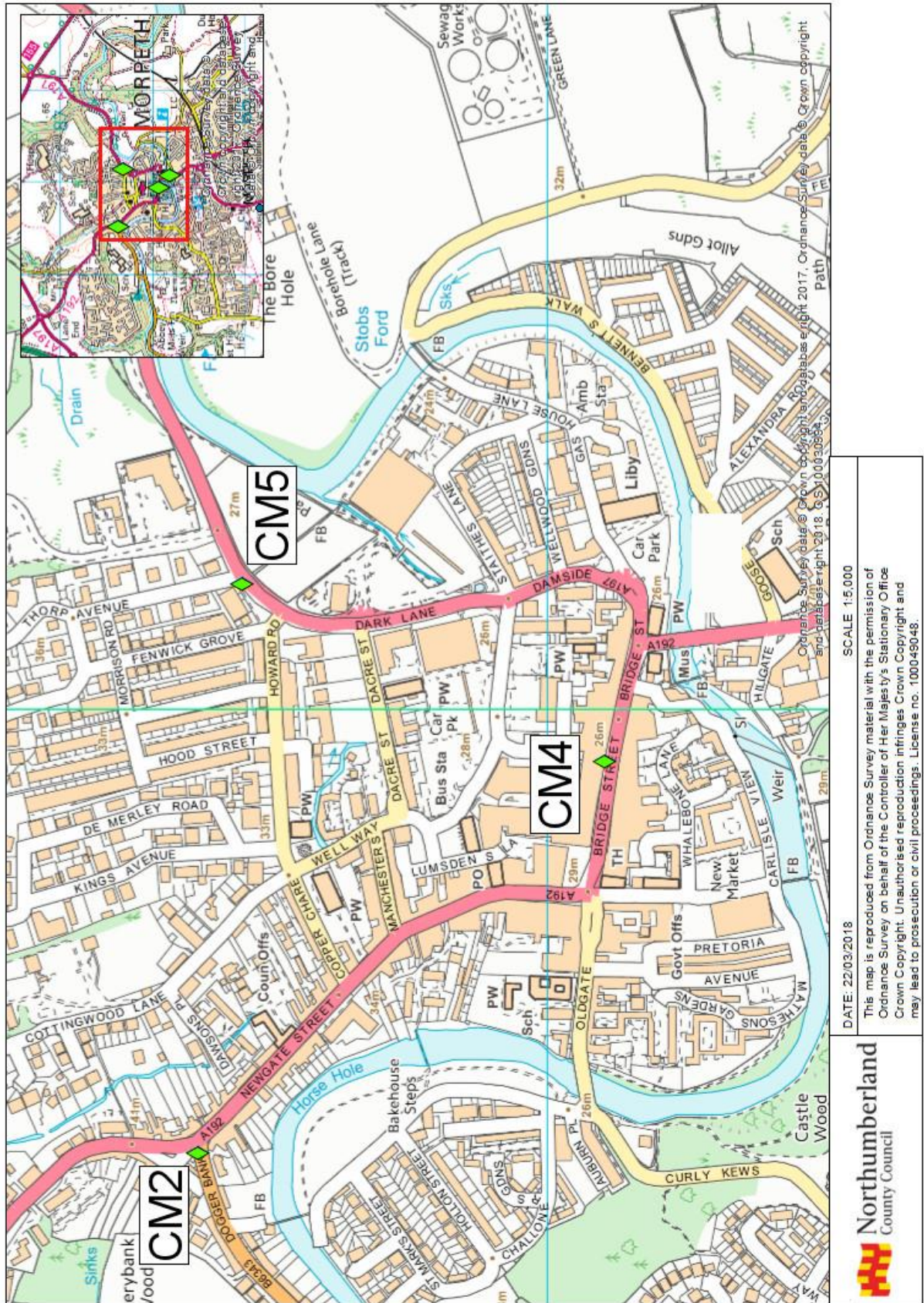**Figure D.4 – Alnwick NO₂ Diffusion Tube Monitoring Locations**

Figure D.5 – Morpeth NO₂ Diffusion Tube Monitoring Locations

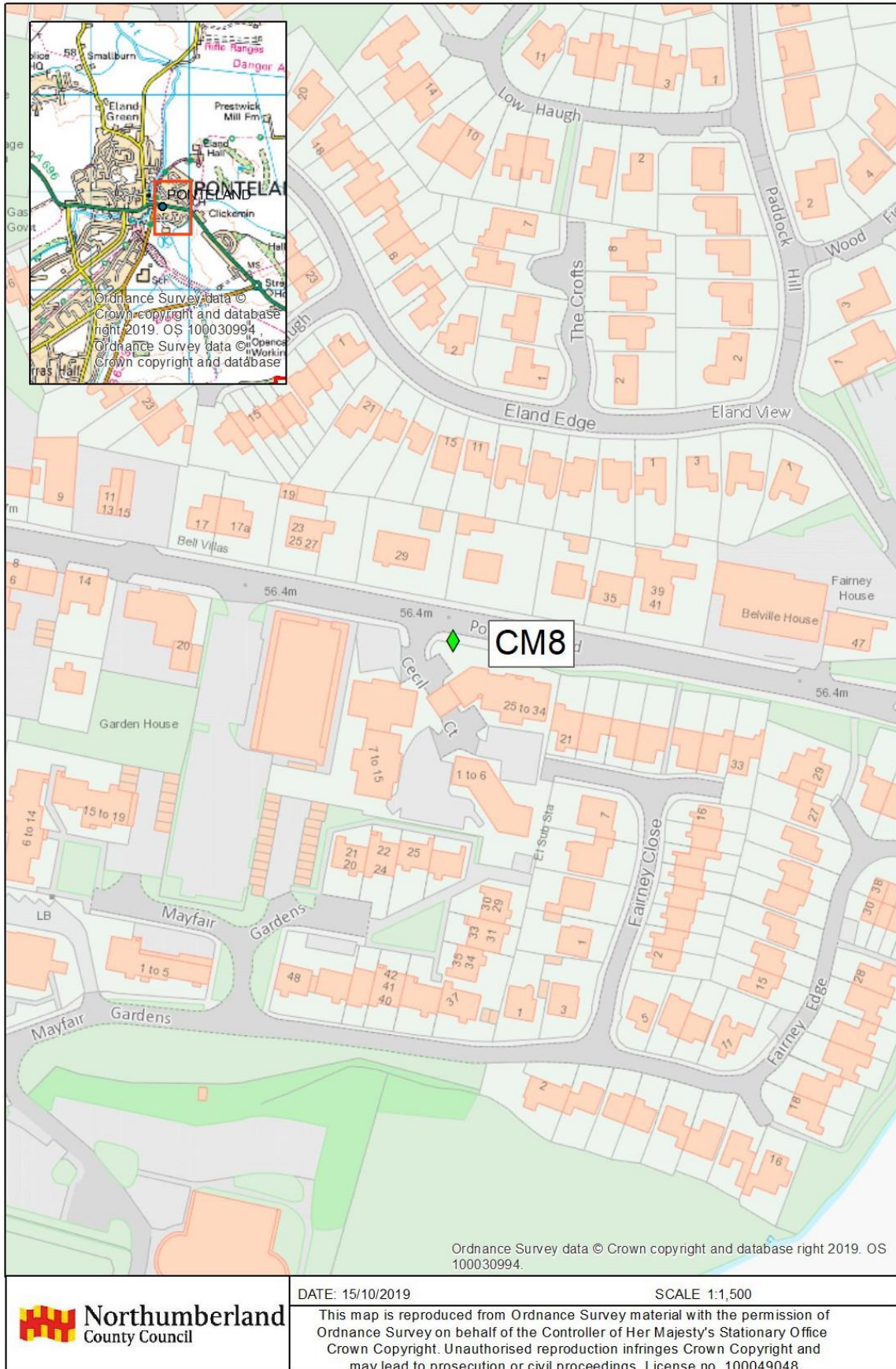**Figure D.6 – Ponteland NO₂ Diffusion Tube Monitoring Location**

Figure D.7 – East Cramlington NO₂ Diffusion Tube Monitoring Locations
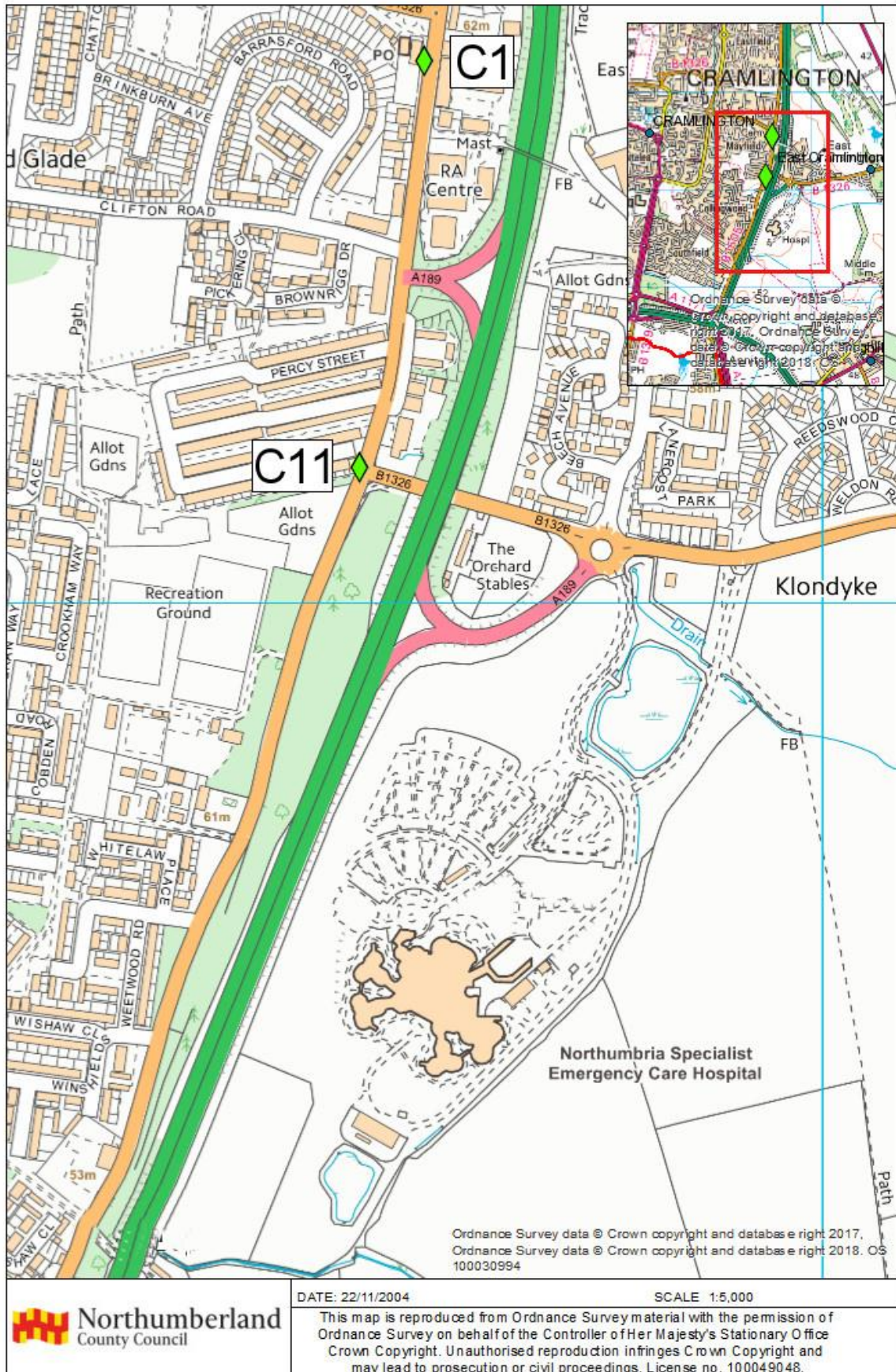
Figure D.8 – Berwick and Tweedmouth NO₂ Diffusion Tube Monitoring Locations

Figure D.9 – Ashington NO₂ Diffusion Tube Monitoring Locations

Figure D.10 – Bedlington NO₂ Diffusion Tube Monitoring Locations
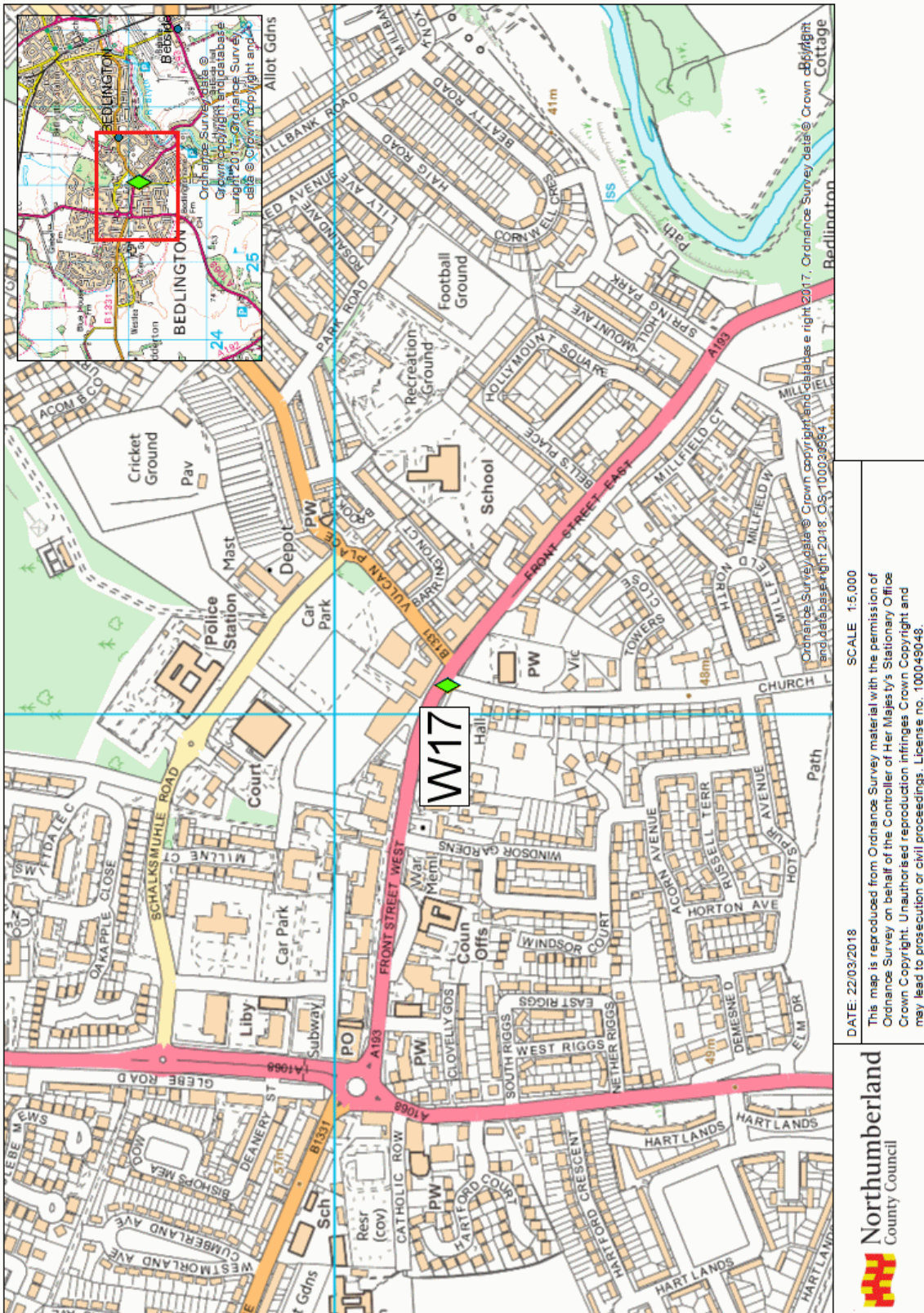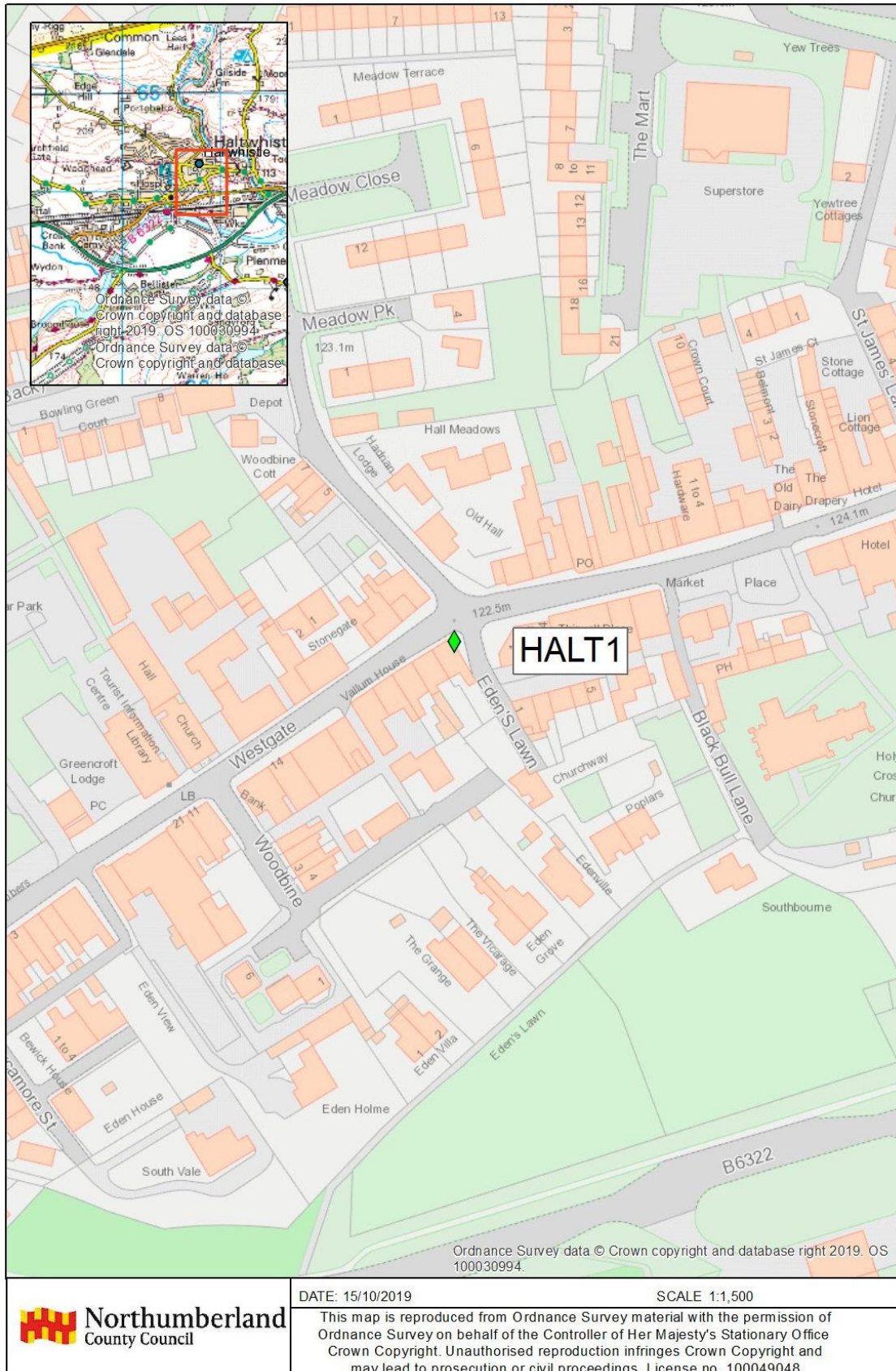
Figure D.11 – Hexham NO₂ Diffusion Tube Monitoring Location

Figure D.12 – Haltwhistle NO₂ Diffusion Tube Monitoring Location

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO₂)	200µg/m³ not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO₂)	40µg/m³	Annual mean
Particulate Matter (PM₁₀)	50µg/m³, not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM₁₀)	40µg/m³	Annual mean
Sulphur Dioxide (SO₂)	350µg/m³, not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO₂)	125µg/m³, not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO₂)	266µg/m³, not to be exceeded more than 35 times a year	15-minute mean

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[7] The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

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
LOGN	Normal logarithmic value – log-normal
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
…	…

References

AEA Energy & Environment Document "Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users." Ref: ED48673043, Issue 1a, February 2008. Available at http://laqm.defra.gov.uk/documents/0802141004_NO2_WG_PracticalGuidance_Issue1a.pdf

Automatic Urban and Rural Network (AURN) Data Archive Data Selector, DEFRA. Available at http://uk-air.defra.gov.uk/data/data_selector (accessed 01/07/2022)

Demonstration of Equivalence of Osiris at PM10, available at: https://turnkey-instruments.com/wp-content/uploads/2018/06/Osiris-PM10-Equivalence.pdf (accessed 14/08/2020)

Demonstration of the Equivalence of PM2.5 and PM10 Measurement Methods in Kupio 2014-2015, Jari Walden, Tuomas Walden, Sisko Laurila, Hannele Hakola, Finnish Meteorological Institute, 2017:1, available at http://expo.fmi.fi/aqes/public/PM_Equivalence_report_Kuopio_2017.pdf (accessed 14/08/2020)

Local Air Quality Management Technical Guidance (LAQM.TG16), DEFRA, April 2021. Available at https://laqm.defra.gov.uk/supporting-guidance.html

Local Air Quality Management Policy Guidance (LAQM.PG16), DEFRA, April 2016. Available at: https://laqm.defra.gov.uk/supporting-guidance.html

MCERTS Certified Products: Indicative Ambient Particulate Monitors, Issue 24 Updated 08/01/2020, available at https://www.csagroupuk.org/services/mcerts/mcerts-product-certification/mcerts-certified-products/mcerts-certified-products-indicative-ambient-particulate-monitors/ (accessed 14/08/2020)

Public Health Outcomes Framework - Particulate Air Pollution – County & UA (4/19-3/20) https://fingertips.phe.org.uk/search/particulate%20air%20pollution#page/0/gid/1/pat/6/par/E12000001/ati/102/are/E06000057/iid/30101/age/230/sex/4/cid/4/page-options/ovw-do-0 (last accessed 03/08/2022)

Public Health England - Indicator: Fraction of mortality attributable to particulate air pollution, Data for Upper tier local authorities (pre 4/19) in North East region. Available at: https://fingertips.phe.org.uk/search/particulates#page/9/gid/1000002/ (last accessed 04/08/2022)

The National Diffusion Tube Bias Adjustment Factors Spreadsheet (v.06/22). Available at https://laqm.defra.gov.uk/air-quality/air-quality-assessment/national-bias/ (accessed 17/07/2022)

Summary of Laboratory Performance in AIR NO2 Proficiency Testing Scheme (May 2020 – June 2022). Available at: https://laqm.defra.gov.uk/wp-content/uploads/2022/07/LAQM-NO2-Performance-data_Up-to-June-2022_V2.1.pdf (last accessed 01/08/2022)