



# Northumberland County Council

## 2020 Air Quality Annual Status Report (ASR) *Northumberland County Council*

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

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## Executive Summary: Air Quality in Our Area

This is the local air quality Annual Status Report for Northumberland County Council in 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 2019, including monitoring results for the calendar year.

The main findings for 2019 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 2019.
- 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.
- PM<sub>2.5</sub> meets the unofficial cap limit at both monitoring stations, 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 objectives have been met for annual means and daily exceedances for particulates (PM<sub>10</sub>).
- 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 2021 reporting the data collected in 2020.

## 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 and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas<sup>1,2</sup>.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion<sup>3</sup>.

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<sub>2</sub> and PM<sub>10</sub> 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.

The deployment of diffusion tubes (NO<sub>2</sub> 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.

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<sup>1</sup> Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

<sup>3</sup> Defra. Abatement cost guidance for valuing changes in air quality, May 2013

The Blyth Air Quality Management Area (AQMA) declared for particulates (PM<sub>10</sub>) 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 monitoring result, current and previous, 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 planned to start in 2021, this is to be carried out by Highways England and is likely to take place in two stages; the first being Morpeth to Felton then Alnwick to 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 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.

Preliminary works have begun 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 (coal and 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 (ie quarries, surface coal mines, 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**

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.

- **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<sub>2</sub> (diffusion tubes), PM<sub>10</sub> or the unofficial “cap” limit for PM<sub>2.5</sub> were identified in Northumberland during 2019. 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 2020.

Northumberland County Council will continue to monitor particulates at the two station 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 County Council during 2019. 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 can be found in Appendix E.

## 2 DEFRA's Appraisal Comments for the Northumberland 2019 Annual Status Report

Bureau Veritas on behalf of DEFRA made a number of comments on last year's report which are listed below with the appropriate responses:

The following comments are designed to help inform future reports:

1. The report continues to confirm the status of Northumberland County Council with no exceedances of the air quality objectives, with no AQMAs or the requirement for an Action Plan.

**No action or comment required.**

2. Table 2.2 'Progress on Measures to Improve Air Quality' needs to be updated every year to reflect the progress and achievements of the implemented measures. The table presented in this year's report is the same table from last year's report. It is recommended to present the changes that occurred within the reporting year.

**As was pointed out to Bureau Veritas and DEFRA this is very difficult to do and for almost every entry in this table, the Public Health Protection Unit are not the initiators, consultee or owners of these projects.**

**Without continuing communications with individual project officers, it is impossible to report on the timescales and progress of each of these projects.**

**The purpose of this was to show readers of the report the breadth of works being carried out where air quality is either a direct or indirect beneficiary and not to be a tracker or each project. Where possible, web links are provided so that readers of this report can find more details of these projects.**

3. Table A.3 shows sites HALT1 and B16 to have data capture of 67%, however, for the annualisation of these sites in Table G.4, sites BER2 and HEX1 have been presented. This issue will need to be looked into as it may affect the final results for 2018.

**Corrected in 2019 ASR**

4. It is recommended that the workings of distance correction be shown in the report for the reviewer to be able to check the calculations.

**Added to 2019 ASR.**

5. The trends observed over the previous 5 years have not been shown in graphical form. These graphs provide the reader with a visual representation of the pollutant levels and is suggested for inclusion in future reports.

**Added to 2019 ASR**

6. In terms of PM<sub>2.5</sub>, it is suggested that reference be made to the Public Health Outcomes Framework (PHOF). Even though, the PHOF indicator has not been shown in the report, it is very encouraging to see the Council's initiative to monitor PM<sub>2.5</sub> and the results show the PM<sub>2.5</sub> annual mean concentration to be below AQO.

**Added to 2019 ASR**

7. No detailed comments from last year's appraisal have been presented and responded to. Some of the issues from last year's appraisal are still present in this year's report (Example, use of the latest report template). It is advisable to take actions on these comments to improve the reporting.

**Most of the appraisal points were addressed in last year's report, as detailed here. We have included this section in the ASR so that readers of the report can see what issues were identified by DEFRA in the previous year's report and what has been done to address them.**

**It was agreed by Bureau Veritas that Northumberland had indeed used the most up to date template provided for the 2019 ASR. We have added a box to this report which includes the details of the template used in this year's report so that the template version can easily be verified.**

8. There are some minor inconsistencies within the report where the report refers to 2017 instead of 2018.

**Corrected in 2019 ASR.**

## **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 report continues to confirm the status of Northumberland County Council with no exceedances of the air quality objectives, with no AQMAs or the requirement for an Action Plan.
- On the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants. Following the amendment and resubmission of this report, Northumberland County Council should submit an Annual Status Report in 2020.

Northumberland County Council has taken forward a number of measures during 2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 3.1.

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 two phases of dualling of the A1 road north of Morpeth to dualled section of the Felton Bypass and from north of Alnwick to Ellingham. 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 Brownsie. 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.

It is expected that a formal planning application will be made under the national infrastructure planning process in 2020 with works commencing in 2021 and completed in 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 begun to work with the applicant to address the air quality impacts associated with this proposal. It is expected that works will begin in 2021 and be completed in 2022/23 (phase 1) and 2024 (phase 2).

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.

The outcome of this will be reported in the 2021 ASR.

### **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).

### **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 withdrawal. Consultants have come in with similar screening assessments which have been acceptable.

The trigger for requiring an air quality assessment is 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)”*

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.”***

### **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.

### **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 2019 which should all benefit air quality. These include:

- One new access restriction scheme.
- Nine new 20 mph speed restrictions (many locate at or near to schools).
- Seven new 30 mph speed restrictions.
- Two new 40 mph speed restrictions.
- Three new multiple speed 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 2020.

### **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	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion 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		N/A	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		N/A	Reduced vehicle emissions	N/A	On going	/
5	Home working some departments (such as IT)	Promoting Travel Alternatives	Promoting Travel Alternatives	2017/18	NCC		/	Reduced vehicle emissions	/	On going	/
7	Go Smarter, Cyclescheme offering VAT free cycles with up to 50% of prices with salary sacrifice scheme	Promoting Travel Alternatives	Promotion of cycling		NCC		/	Reduced vehicle emissions	/	On going	<a href="http://gosmarter.co.uk/">http://gosmarter.co.uk/</a>
8	Go Smarter promoting Modeshift STARS	Promoting Travel Alternatives	School Travel Plans		NCC		/	Reduced vehicle emissions	/	On going	<a href="http://modeshiftstars.org/">http://modeshiftstars.org/</a>
9	Travel planner and cycle routes	Public Information	Via the Internet		NCC		/	Reduced vehicle emissions	/	On going	<a href="http://www.northumberland.gov.uk/Highways/Cycling.aspx">http://www.northumberland.gov.uk/Highways/Cycling.aspx</a>
10	Informal anti-idling policy through taxi licensing	Traffic Management	Anti-idling enforcement		NCC		/	Reduced vehicle emissions	/	On going	/
11	20mph zones imposed in many residential areas especially surrounding schools	Traffic Management	Reduction of speed limits, 20mph zones		NCC		/	Reduced vehicle emissions	/	On going	<a href="http://www.northumberland.gov.uk/Highways/Roads/Traffic.aspx#4trafficregulationorderprepared">http://www.northumberland.gov.uk/Highways/Roads/Traffic.aspx#4trafficregulationorderprepared</a>
12	Parking enforcement on highways carried out by Council	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway		NCC		/	/	N/A	On going	<a href="http://www.northumberland.gov.uk/Highways/Parking.aspx#civildparkingenforcement">http://www.northumberland.gov.uk/Highways/Parking.aspx#civildparkingenforcement</a>
13	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		/	/	/	On going	<a href="http://www.northumberland.gov.uk/Highways/Cycling.aspx">http://www.northumberland.gov.uk/Highways/Cycling.aspx</a>
14	Over 110 fleet vehicles fitted with Ashwoods Lightfoot to encourage more efficient driving styles.	Vehicle Fleet Efficiency	Driver training and ECO driving aids		NCC		N/A	Reduced vehicle emissions	Estimated 7% saving in fuel costs from use of system	On going	<a href="https://www.lightfoot.co.uk/case-study/northumberland-county-council">https://www.lightfoot.co.uk/case-study/northumberland-county-council</a>
15	Over 800 fleet vehicles fitted with Masternaut vehicle tracking	Vehicle Fleet Efficiency	Driver training and ECO driving aids		NCC		N/A	Reduced vehicle emissions	/	On going	<a href="http://www.masternaut.com/">http://www.masternaut.com/</a>
16	Bid for Euro 6 buses	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport		NECA		/	/	/	On going	<a href="http://www.simplygo.com/news/greener-cleaner-buses-for-go-north-east/">http://www.simplygo.com/news/greener-cleaner-buses-for-go-north-east/</a>
17	Vehicle emission testing as part of fleet MOT testing, all taxis and service to public	Vehicle Fleet Efficiency	Testing Vehicle Emissions		NCC		N/A	/	/	On going	<a href="http://www.northumberland.gov.uk/Highways/Roads/Commercial.aspx#mottesting">http://www.northumberland.gov.uk/Highways/Roads/Commercial.aspx#mottesting</a>
18	Proactively engage with internal and external partners to raise awareness of Local Air Quality Management	Public Information	Via other mechanisms		NCC		Internal KPI / Stakeholder Engagement Day	/	/	Annual	/
19	Agile working for NCC staff	Promoting Travel Alternatives	Encourage / Facilitate home-working		NCC		N/A	Reduced vehicle emissions	/	On going	/
20	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		N/A	/	/	On going	<a href="http://www.northumberland.gov.uk/NorthumberlandCountyCouncil/media/JSNA/strategy%20documents/DPH-Annual-Report-Northumberland-2016-3.pdf">http://www.northumberland.gov.uk/NorthumberlandCountyCouncil/media/JSNA/strategy%20documents/DPH-Annual-Report-Northumberland-2016-3.pdf</a>
21	Northumberland Line	Promoting Travel Alternatives		2019	NCC			Reduced vehicle emissions	Preliminary	2022/23 (Phase 1) 2024 (Phase 2)	<a href="https://www.northumberland.gov.uk/Highways/Transport-policy/northumberland-line.aspx">https://www.northumberland.gov.uk/Highways/Transport-policy/northumberland-line.aspx</a>
22	A1 Dualling	Transport Planning and Infrastructure	Other	2014	Highways England				Preliminary	2024/25	<a href="https://highwaysengland.co.uk/projects/morpeth-to-ellingham-dualling/">https://highwaysengland.co.uk/projects/morpeth-to-ellingham-dualling/</a>

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

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

Within the county of Northumberland, the annual “cap” limit of 25 µg/m<sup>3</sup> 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<sub>2.5</sub> was to become a mandatory requirement of LAQM. However, as TG16 states:

*“...PM<sub>2.5</sub> is still not incorporated into LAQM Regulations, and therefore there is no statutory requirement to review and assess PM<sub>2.5</sub> for LAQM purposes (except now in Scotland). Whilst an increase in PM<sub>2.5</sub> 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<sub>2.5</sub>:

- Continuing to monitor PM<sub>2.5</sub> at specific locations in Northumberland
- Reporting the levels of PM<sub>2.5</sub> at these locations on an annual basis.
- Monitoring for any exceedance of the “cap” limit of 25 µg/m<sup>3</sup>.
- 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<sub>2.5</sub> monitoring data adjacent to Cowpen Road and Blyth Library has shown compliance with the “cap” limit of 25 µg/m<sup>3</sup> and also compliance with the stricter 10 µg/m<sup>3</sup> objective imposed in Scotland.

DEFRA background maps for PM<sub>2.5</sub> (2019) 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<sub>2.5</sub> levels and no modelled levels above 10 µg/m<sup>3</sup> in Northumberland.

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<sub>2.5</sub> within England and on a region and county/local authority scale. The fraction of mortality attributable to PM<sub>2.5</sub> pollution across England is 5.2 per cent (2018 data), the fraction within the North East region is 3.8 per cent and the fraction within Northumberland County is 3.3 per cent. The North East region has the lowest level within England and Northumberland has the lowest within the North East Region

This position may be revised if the reviewing and assessing of PM<sub>2.5</sub> become a statutory requirement.

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

### 4.1 Summary of Monitoring Undertaken

#### 4.1.1 Automatic Monitoring Sites

Northumberland County Council continues to operate two automatic (realtime) monitoring stations at two sites during 2019. 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) Digtel (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](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.

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<sub>2</sub> at 19 sites during 2019, these remain unchanged since 2018.

The highest bias-adjusted NO<sub>2</sub> annual mean was 31.0 µg/m<sup>3</sup> (27.1 µg/m<sup>3</sup> at the nearest receptor) of all the monitoring sites which falls well below the 60 µg/m<sup>3</sup> annual mean which would indicate an exceedance of the 1-hour mean objective for NO<sub>2</sub>.

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.



## 4.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias<sup>4</sup> and/or “annualisation” (where the data capture falls below 75%), and distance correction<sup>5</sup>. Further details on adjustments are provided in Appendix G.

### 4.2.1 Nitrogen Dioxide (NO<sub>2</sub>)

Northumberland County Council has decommissioned the one automatic nitrogen dioxide monitor at the Cowpen Road site. In previous air quality reports, it was indicated that no service contract was in place for this instrument and that it was intended to decommission this instrument should it malfunction. Since early 2019, the instrument has intermittently reported an “ozone flow error” which would impact the ability of the unit to oxidise nitrous oxide (NO) to nitrogen dioxide (NO<sub>2</sub>) and therefore the emitted radiation from the reaction and the resulting measured level of NO<sub>2</sub> would be unreliable.

Monitoring since 2007 has indicated a trend of decreasing nitrogen dioxide and particulate levels at our automatic monitoring stations (Figure A.1). Continuous nitrogen dioxide monitoring ceased at Blyth Library in 2013 and has now ceased for the Cowpen Road site (end of 2018).

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

For diffusion tubes, the full 2019 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.

### 4.2.2 Particulate Matter (PM<sub>10</sub>)

Northumberland County Council maintains two automatic particulate monitors at the Cowpen Road and Blyth Library sites, both instruments have comprehensive service

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<sup>4</sup> <https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html>

<sup>5</sup> Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

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 2019 was 85.8 and 69.2 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<sub>2.5</sub> 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 µg/m<sup>3</sup> (Sira MC090157/05).

Turnkey have carried out their own demonstration of equivalence of the Osiris monitors for PM<sub>10</sub> 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 2019 was 16.2 µg/m<sup>3</sup>. The annual mean for the Blyth Library Osiris in 2019 was 14.3 µg/m<sup>3</sup> (annualised to 13.3 µg/m<sup>3</sup>). The annual mean objective for this pollutant is 40 µg/m<sup>3</sup>.

The number of measured exceedances of the 24-hour mean objective (50 µg/m<sup>3</sup>) for the Cowpen Road Osiris in 2019 was six (the objective being 35 or less exceeds of the 50 µg/m<sup>3</sup> limit).

The number of measured exceedances of the 24-hour mean objective ( $50 \mu\text{g}/\text{m}^3$ ) for the Blyth Library Osiris in 2019 was three (the objective being 35 or less exceeds of the  $50 \mu\text{g}/\text{m}^3$  limit). Since data capture was below 85 per cent, the 90.4th percentile was calculated as 25.9, well below the  $50 \mu\text{g}/\text{m}^3$  limit.

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

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

Trends in  $\text{PM}_{10}$  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.

#### **4.2.3 Particulate Matter ( $\text{PM}_{2.5}$ )**

The annual mean for the Cowpen Road Osiris in 2019 was  $7.2 \mu\text{g}/\text{m}^3$ . The annual mean for the Blyth Library Osiris in 2019 was  $8.0 \mu\text{g}/\text{m}^3$  (annualised to  $7.6 \mu\text{g}/\text{m}^3$ ). The unofficial “cap” annual mean objective for  $\text{PM}_{2.5}$  is  $25 \mu\text{g}/\text{m}^3$ .

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

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

#### **4.2.4 Sulphur Dioxide ( $\text{SO}_2$ )**

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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
8N	Bondgate Without, Alnwick	Roadside	419025	613070	NO <sub>2</sub>	NO	2	2	NO	3
B1	Waterloo Road, Blyth	Urban Centre	431537	581537	NO <sub>2</sub>	NO	28	1	NO	3
B3	Cowpen Rd. West, Blyth	Roadside	428815	581813	NO <sub>2</sub>	NO	13.5	2	YES	3
BER1	32 Castlegate, Berwick	Roadside	399596	653213	NO <sub>2</sub>	NO	1	2	NO	1.5
B11	Blyth YCMA, Blyth	Urban Centre	431160	581415	NO <sub>2</sub>	NO	2	1	NO	3
CM8	Entrance to Cecil Court, Ponteland	Urban Centre	416820	572840	NO <sub>2</sub>	NO	21	1.5	NO	3
B15	South Newsham Road, Blyth	Roadside	430552	578950	NO <sub>2</sub>	NO	8	1.7	NO	3
C1	High Pit Road, Cramlington	Roadside	427593	576555	NO <sub>2</sub>	NO	4	1.7	NO	3
BER2	Prince Edward Road, Tweedmouth	Roadside	399345	625512	NO <sub>2</sub>	NO	11	1	NO	2.5
HEX1	4 Haugh Lane, Hexham	Roadside	393684	564214	NO <sub>2</sub>	NO	1	1.5	NO	2
C11	Storey Street (B1505), Cramlington	Roadside	427523	576136	NO <sub>2</sub>	NO	8	1.7	NO	3
CM2	Newgate St, Morpeth	Roadside	419525	586380	NO <sub>2</sub>	NO	1	1	NO	1.5
CM4	Bridge St, Morpeth	Roadside	419947	585937	NO <sub>2</sub>	NO	70	3	NO	3
CM5	Thorpe Ave, Morpeth	Roadside	420134	586329	NO <sub>2</sub>	NO	9	1.7	NO	2
HALT1	Westgate Road, Haltwhistle	Roadside	370647	564060	NO <sub>2</sub>	NO	17	1	NO	1.5
B16	24 Cowpen Road	Roadside	430666	581604	NO <sub>2</sub>	NO	7	2	NO	2
W17	Front Street East, Bedlington	Urban Centre	426014	581879	NO <sub>2</sub>	NO	20	1	NO	3
W21	Newbiggin Road, Ashington	Roadside	427939	586210	NO <sub>2</sub>	NO	5	1	NO	2.5
SD1	Salvation Army, Seaton Delaval	Roadside	430387	575433	NO <sub>2</sub>	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<sub>2</sub> 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 2019 (%) 2	NO <sub>2</sub> Annual Mean Concentration(µm/m <sup>3</sup> ) 3				
							2015	2016	2017	2018	2019
8N	419025	613070	Roadside	Diffusion Tube	N/A	91.7	30.0	30.0	31.0	31.3	24.7
B1	431537	581537	Urban Centre	Diffusion Tube	N/A	100.0	27.0	29.0	31.0	31.4	27.8
B3	428815	581813	Roadside	Diffusion Tube	N/A	100.0	32.0	32.0	23.0	22.3	31.0
BER1	399596	653213	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	N/A	N/A	16.6
B11	431160	581415	Urban Centre	Diffusion Tube	N/A	100.0	26.0	26.0	27.0	26.8	21.2
CM8	416820	572840	Urban Centre	Diffusion Tube	N/A	91.7	24.0	24.0	21.0	18.2	17.9
B15	430552	578950	Roadside	Diffusion Tube	N/A	100.0	20.0	19.0	24.0	22.0	17.2
C1	427593	576555	Roadside	Diffusion Tube	N/A	91.7	25.0	23.0	20.0	23.2	23.2
BER2	399345	625512	Roadside	Diffusion Tube	N/A	91.7	N/A	N/A	N/A	N/A	13.5
HEX1	393684	564214	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	N/A	N/A	28.0
C11	427523	576136	Roadside	Diffusion Tube	N/A	100.0	22.0	19.0	20.0	15.9	19.1
CM2	419525	586380	Roadside	Diffusion Tube	N/A	100.0	23.0	19.0	24.0	24.7	14.3
CM4	419947	585937	Roadside	Diffusion Tube	N/A	100.0	26.0	22.0	21.0	26.3	19.4
CM5	420134	586329	Roadside	Diffusion Tube	N/A	100.0	N/A	21.0	26.0	22.0	15.8
HALT1	370647	564060	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	N/A	N/A	12.6
B16	430666	581604	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	N/A	N/A	23.7
W17	426014	581879	Urban Centre	Diffusion Tube	N/A	100.0	28.0	20.0	23.0	24.0	22.3
W21	427939	586210	Roadside	Diffusion Tube	N/A	100.0	19.0	24.0	25.0	23.9	20.2
SD1	430387	575433	Roadside	Diffusion Tube	N/A	100.0	25.0	25.0	27.0	22.8	22.0

Diffusion tube data has been bias corrected.

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

**Notes:**

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

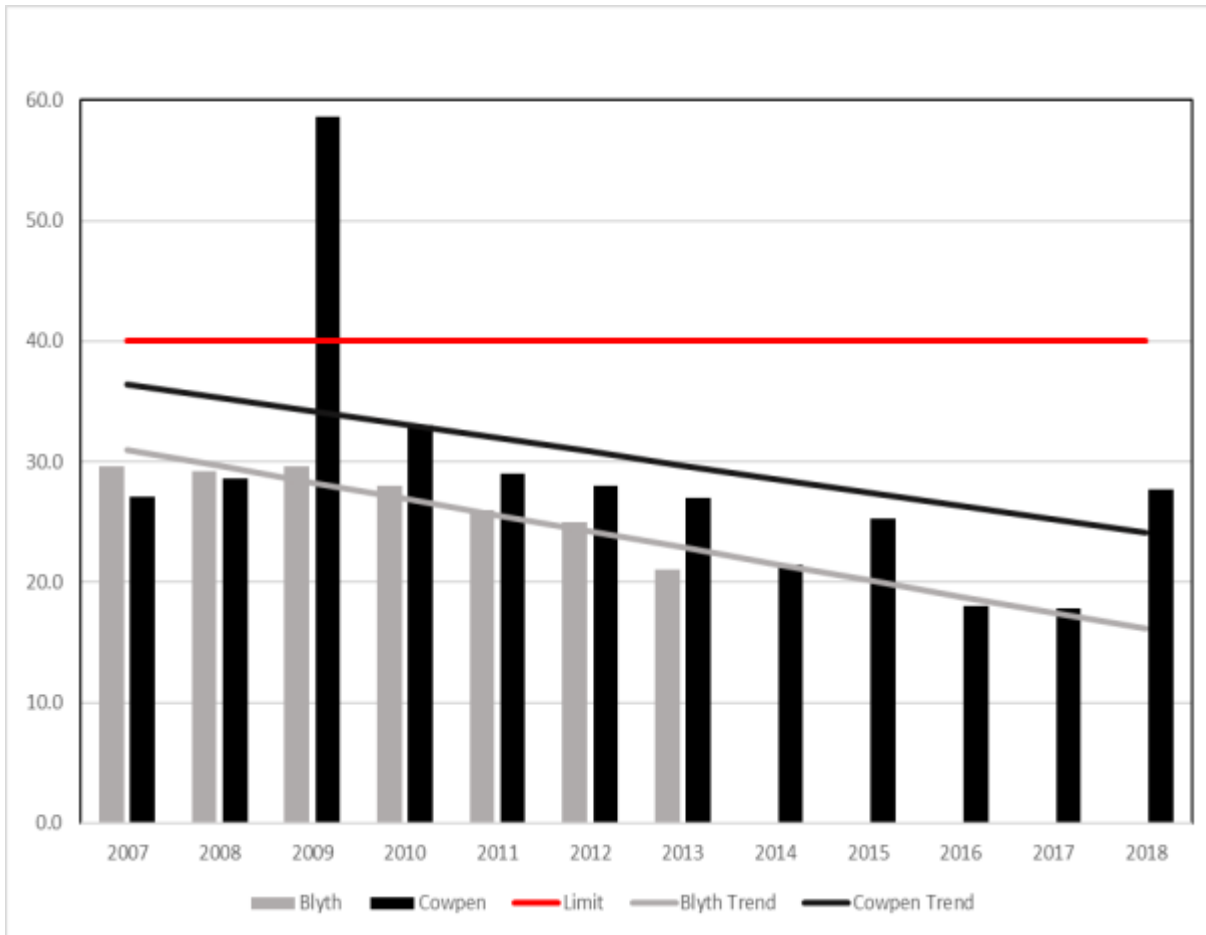
NO<sub>2</sub> annual means exceeding 60 µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

(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 for details.

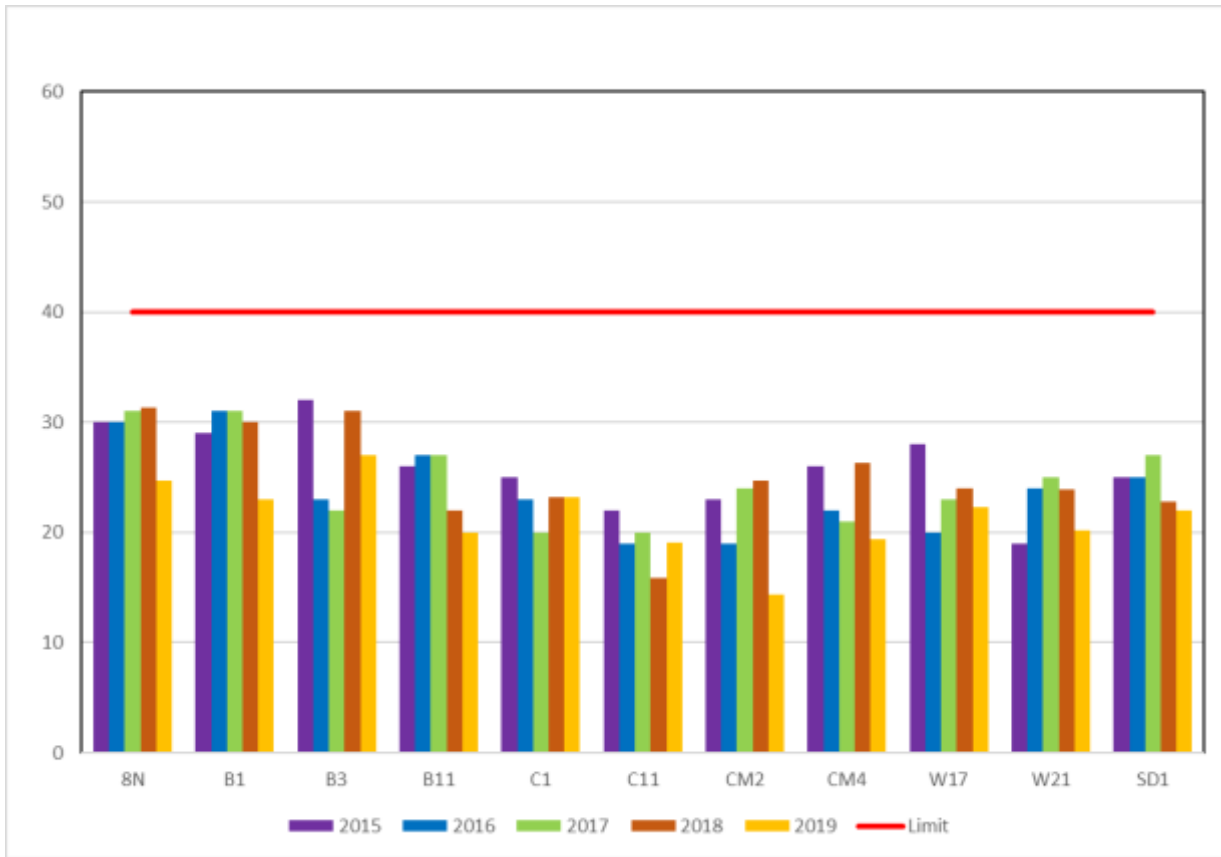
**Figure A.1 – Trends in Annual Mean NO<sub>2</sub> Concentrations from Automatic Monitors**



Measurements in micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ ).

[NOTE: No data has been added to these trends for 2019 and this is shown for reference only]

**Figure A.2 – Trends in Annual Mean NO<sub>2</sub> Concentrations from Diffusion Tubes**



Measurements in micrograms per cubic metre (µg/m<sup>3</sup>).

**Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results**

No Longer Carried out by Northumberland County Council



**Table A.5 – Annual Mean PM<sub>10</sub> 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( $\mu\text{m}/\text{m}^3$ ) 3 4				
						2015	2016	2017	2018	2019
BL	431536	581531	Urban Centre	N/A	69.2	13	17.9 (17.6)	13.4 (14.8)	15.5 (16.5)	14.3 (13.3)
CR	428817	581815	Roadside	N/A	85.8	14 (13)	15	13.5 (15.3)	15.6	16.2

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

**Notes:**

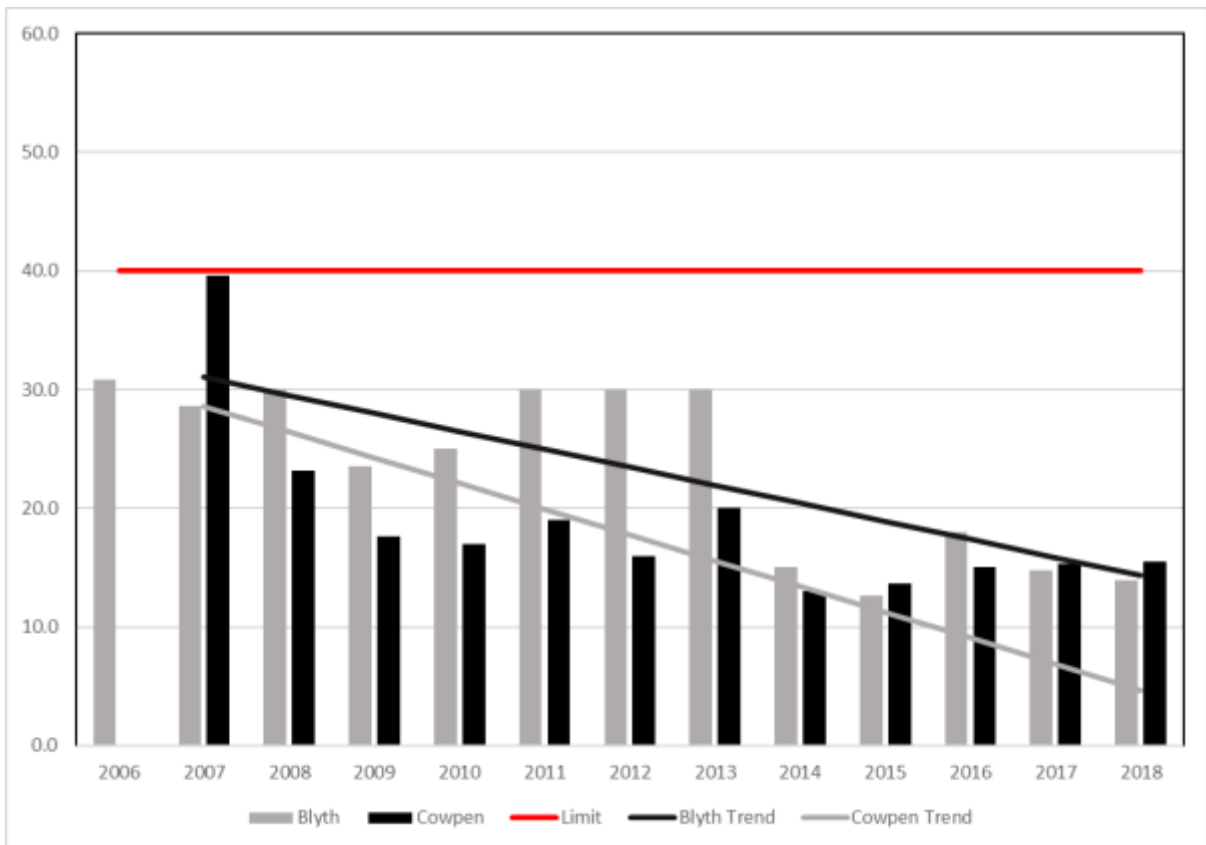
Exceedances of the PM<sub>10</sub> annual mean objective of 40  $\mu\text{g}/\text{m}^3$  are shown in **bold**.

(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 for details.

**Figure A.3 – Trends in Annual Mean PM<sub>10</sub> Concentrations**



Measurements in micrograms per cubic metre (µg/m³).

**Table A.6 – 24-Hour Mean PM<sub>10</sub> 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 <sub>10</sub> 24-Hour Means > 50µg/m <sup>3</sup> (3)				
						2015	2016	2017	2018	2019
BL	431536	581531	Urban Centre	N/A	69.2	2	8(32)	4 (30)	1 (28)	3 (26)
CR	428817	581815	Roadside	N/A	85.8	2(22)	0	0 (30)	1	6

**Notes:**

Exceedances of the PM<sub>10</sub> 24-hour mean objective (50 µg/m<sup>3</sup> 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 90.4<sup>th</sup> percentile of 24-hour means is provided in brackets.

**Table A.7 – PM<sub>2.5</sub> 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 <sub>2.5</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
						2015	2016	2017	2018	2019
BL	431536	581531	Urban Centre	N/A	69.2	6	7.1	6.2 (6.8)	7.3(6.7)	8.0 (7.6)
CR	428817	581815	Roadside	N/A	85.8	6.1	5.8	5.5 (6.0)	6.7	7.2

**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 C for details.

## Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results - 2019

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (factor) and Annualised <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>	
8N	39.0	48.3	33.7	35.6	29.7	22.9	26.2	33.4	36.9	40.6	/	46.1	35.7	27.1	27.1	
B1	49.4	45.4	36.5	36.8	36.3	27.7	32.7	34.4	40.7	37.7	42.4	47.1	38.9	29.6	24.1	
B3	43.0	53.4	44.1	42.2	28.5	31.9	39.2	34.1	34.7	45.4	44.9	45.5	40.6	30.8	27.4	
BER1	/	/	/	25.9	28.6	27.0	25.8	19.2	12.1	21.8	27.3	21.6	23.3	17.7	18.3	
B11	34.7	32.7	23.9	31.3	28.9	24.9	24.0	28.3	26.6	29.7	32.3	33.2	29.2	22.2	21.5	
CM8	/	/	24.1	26.7	24.6	23.9	24.0	21.9	18.1	28.6	32.8	36.0	26.1	19.8	17.0	
B15	23.4	36.6	26.1	22.3	17.3	14.5	19.0	19.7	18.1	24.4	32.1	31.6	23.8	18.1	16.8	
C1	30.3	33.1	31.5	/	37.7	30.8	32.7	21.0	19.0	31.1	47.5	37.3	32.0	24.3	23.3	
BER2	/	/	/	18.9	19.2	18.2	18.0	16.6	15.1	21.2	19.6	23.1	18.9	14.3	13.2	
HEX1	/	/	/	38.4	34.5	32.8	37.9	36.1	31.4	42.8	48.0	44.2	38.5	29.2	30.0	
C11	18.7	31.3	33.9	26.5	28.1	22.9	26.2	16.6	11.8	23.5	41.0	24.6	25.4	19.3	18.2	
CM2	24.2	25.6	20.9	20.4	17.0	13.9	16.8	14.0	13.5	19.7	30.3	28.8	20.4	15.5	15.5	
CM4	29.5	34.6	28.5	33.0	29.4	27.2	24.4	20.0	16.6	22.7	34.1	26.0	27.2	20.6	16.8	
CM5	2/5.7	27.5	22.2	19.0	19.7	16.6	20.4	16.2	13.8	23.1	32.6	31.0	22.3	17.0	15.5	
HALT1	/	/	/	/	13.2	14.0	15.5	13.8	13.7	19.0	22.0	23.3	16.8	12.8	10.9	
B16	/	/	/	/	31.7	26.1	26.9	26.8	24.9	33.8	42.0	39.8	31.5	23.9	22.3	
W17	39.0	24.3	26.7	28.4	24.6	/	27.0	24.6	23.5	31.0	43.1	33.7	29.6	22.5	18.8	
W21	31.9	31.8	27.0	24.9	19.1	16.8	22.7	22.0	22.3	27.0	38.3	38.4	26.9	20.4	18.8	
SD1	34.1	39.2	29.0	28.5	27.1	21.7	25.1	24.8	/	31.5	36.3	40.4	30.7	23.3	21.9	

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<sub>2</sub> annual mean objective of 40 µg/m<sup>3</sup> are shown in **bold**.

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

(1) See Appendix C 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**

### **Factor from Local Co-location Studies**

Northumberland County Council did not carry out any co-location studies in 2019.

### **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 Environmental Scientifics Group 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 ESG 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: 06/20. The bias factor was calculated to be 0.75 for SOCOTEC (Didcot) using 50% TEA in acetone.

The results of the laboratory performance scheme (AIR PT) are included below; the Environmental Scientifics Group received a performance score of 87.5 percent for the first quarter of 2019 and 100 percent performance for the rest of 2019.

Figure A.1 – National Diffusion Tube Bias Adjustment Spreadsheet for 06/20 showing results for SOCOTEC (Didcot) using 50% TEA in acetone.

National Diffusion Tube Bias Adjustment Factor Spreadsheet							Spreadsheet Version Number: 06/20				
<p>Follow the steps below in the correct order to show the results of relevant co-location studies.</p> <p>Data only apply to tubes exposed monthly and are not suitable for collecting individual short-term monitoring periods.</p> <p>Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet.</p> <p>This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.</p> <p>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.</p>							<p>This spreadsheet will be updated at the end of September 2020.</p> <p>Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.</p>				
Step 1:		Step 2:		Step 3:		Step 4:					
<p>Select the Laboratory that Analyzes Your Tubes from the Drop-Down List</p> <p>If a laboratory is not chosen, we have no data for this category.</p>		<p>Select a Preparation Method from the Drop-Down List</p> <p>If a preparation method is not chosen, we have no data for a method of this category.</p>		<p>Select a Year from the Drop-Down List</p> <p>If a year is not chosen, we have no data for this year.</p>		<p>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 shown in blue at the foot of the final column.</p> <p>If you have your own co-location study then see footnote 1. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQM@npnl.gov.uk or 0800 01227953</p>					
Analysed By	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m <sup>3</sup> )	Automatic Monitor Mean Conc. (Cm) (µg/m <sup>3</sup> )	Bias (B)	Tube Precision <sup>1</sup>	Bias Adjustment Factor (A) (Cm/Dm)	
Didcot: Didcot	50% TEA in acetone	2010	UB	Kingsley upon Hull City Council	12	30	23	32.2%	G	0.76	
Didcot: Didcot	50% TEA in acetone	2010	O	Kingsley upon Hull City Council	11	32	26	19.1%	G	0.84	
Didcot: Didcot	50% TEA in acetone	2010	R	Nale of Glasgow	11	40	24	68.0%	G	0.66	
Didcot: Didcot	50% TEA in acetone	2010	R	Warford Borough Council	12	35	30	15.9%	S	0.86	
Didcot: Didcot	50% TEA in acetone	2010	R	Dumfries & Galloway Council	13	35	31	12.3%	G	0.89	
Didcot: Didcot	50% TEA in acetone	2010	NS	Marylebone Road Intercomparison	12	60	65	48.5%	G	0.71	
Didcot: Didcot	50% TEA in acetone	2010	UB	City of York Council	12	22	16	29.6%	G	0.74	
Didcot: Didcot	50% TEA in acetone	2010	R	City of York Council	12	33	26	26.8%	G	0.78	
Didcot: Didcot	50% TEA in acetone	2010	R	City of York Council	9	32	23	27.2%	G	0.73	
Didcot: Didcot	50% TEA in acetone	2010	R	City of York Council	11	40	28	43.4%	G	0.76	
Didcot: Didcot	50% TEA in acetone	2010	R	Spaeth Borough Council	11	34	28	24.1%	G	0.75	
Didcot: Didcot	50% TEA in acetone	2010	R	Swaile BC	12	51	38	21.7%	G	0.76	
Didcot: Didcot	50% TEA in acetone	2010	R	Swaile BC	12	33	27	23.9%	G	0.81	
Didcot: Didcot	50% TEA in acetone	2010	R	Swaile BC	12	40	31	26.7%	G	0.78	
Didcot: Didcot	50% TEA in acetone	2010	R	Wrexham County Borough Council	09	20	16	22.2%	G	0.82	
Didcot: Didcot	50% TEA in acetone	2010	R	City of Wolverhampton Council	12	39	27	48.4%	G	0.67	
Didcot: Didcot	50% TEA in acetone	2010	R	North Herts DC	12	59	46	28.5%	G	0.78	
Didcot: Didcot	50% TEA in acetone	2010	R	Harsham District Council	12	30	24	24.5%	G	0.80	
Didcot: Didcot	50% TEA in acetone	2010	R	Harsham District Council	11	21	22	44.8%	G	0.68	
Didcot: Didcot	50% TEA in acetone	2010	R	Harsham District Council	11	32	24	24.4%	G	0.74	
Didcot: Didcot	50% TEA in acetone	2010	R	Merway Council	09	21	13	58.5%	F	0.63	
Didcot: Didcot	50% TEA in acetone	2010	R	Merway Council	12	32	24	25.1%	G	0.74	
Didcot: Didcot	50% TEA in acetone	2010	R	Waverley Borough Council	09	28	30	27.5%	G	0.78	
Didcot: Didcot	50% TEA in acetone	2010	R	Waverley Borough Council	12	35	24	44.7%	G	0.68	
Didcot: Didcot	50% TEA in acetone	2010	NS	Camphilly CDC	12	60	63	42.4%	G	0.70	
Didcot: Didcot	50% TEA in acetone	2010	R	Camphilly CDC	11	42	27	54.1%	G	0.65	
Didcot: Didcot	50% TEA in acetone	2010	NS	Camphilly CDC	11	34	24	41.5%	G	0.71	
Didcot: Didcot	50% TEA in acetone	2010	R	Cambridge City Council	11	42	28	47.1%	G	0.68	
Didcot: Didcot	50% TEA in acetone	2010	UB	Canterbury City Council	12	16	12	27.6%	G	0.78	
Didcot: Didcot	50% TEA in acetone	2010	R	Canterbury City Council	12	34	25	25.5%	G	0.74	
Didcot: Didcot	50% TEA in acetone	2010	R	Doncaster Borough Council	11	21	24	39.2%	G	0.77	
Didcot: Didcot	50% TEA in acetone	2010	R	Derry City and Strabane District Council	12	39	32	20.1%	G	0.82	
Didcot: Didcot	50% TEA in acetone	2010	UB	Derry City and Strabane District Council	12	15	11	40.4%	G	0.71	
Didcot: Didcot	50% TEA in acetone	2010	R	Gravesham Borough Council	12	36	28	24.5%	G	0.80	
Didcot: Didcot	50% TEA in acetone	2010	R	Gravesend Borough Council	12	27	25	18.9%	G	0.90	
Didcot: Didcot	50% TEA in acetone	2010	R	Slough Borough Council	11	39	32	22.5%	G	0.82	
Didcot: Didcot	50% TEA in acetone	2010	S.U	Slough Borough Council	11	32	22	46.7%	G	0.68	
Didcot: Didcot	50% TEA in acetone	2010	UB	Slough Borough Council	09	38	21	25.4%	G	0.80	
SOCOTEC: Didcot	50% TEA in acetone	2010		Overall Factor (SR studies)					Use	0.75	

For Casella Stanger/Bureau Veritas (NOT Bureau Veritas Lab) use Graviton 50% TEA in Acetone.  
 For Casella Seair/SMS/Casella CR8/Bureau Veritas Lab/Carlyle/USE Environmental Scientific Group.  
 From 2011 for Environmental Scientific Group use ESG Glasgow.  
 From 2011 for Horwell Scientific Services use ESG Didcot.  
 For 2017 for SOCOTEC use ESG Didcot as same changed mid year.  
 For 2018 SOCOTEC entered as Didcot and Glasgow. Glasgow analysis lab moved to Didcot mid 2018.  
 For Staffordshire CC SSA Staffordshire County Analyst use Staffordshire Scientific Services.  
 For Staffordshire Health Sciences and Cytex Analytical Laboratories use Enviro.  
 For Rotherham MBC use South Yorkshire Labs.  
 For Doncaster CC use Tayside SS.  
 For Leicester Scientific Services use Staffordshire Scientific Services.  
 For South Yorkshire Air Quality Samples use South Yorkshire Labs. As of January 2010 sampler body changed. As of April 2010 sampler cap changed.  
 Lancashire County Analyst withdrew from the Field Intercomparison at the end of 2010. No submissions were supplied in 2011.  
 Walsall MBC closed in March 2011.  
 Bristol Scientific Services closed at the end of 2011.  
 Somerset County Council did not start the Marylebone road Intercomparison until June 2012.  
 Essex stopped providing diffusion tubes at the end of 2013.  
 Kent Scientific Services stopped providing diffusion tubes at the end of 2013.  
 Milton Keynes Council stopped providing diffusion tubes in the middle of 2016.  
 Northampton BC stopped providing diffusion tubes in 2017.

## LAQM Helpdesk – November 2019 - Summary of Laboratory Performance in AIR NO<sub>2</sub> Proficiency Testing Scheme (January 2018 – November 2019).

### LAQM Helpdesk – November 2019

#### Summary of Laboratory Performance in AIR NO<sub>2</sub> Proficiency Testing Scheme (January 2018 – November 2019).

*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 Laboratory (HSL). AIR PT is a new scheme, started in April 2014, which combined two long running PT schemes: LGC Standards STACKS PT scheme and HSL 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<sub>2</sub> test sample type that is distributed to participants in a quarterly basis.

AIR NO<sub>2</sub> PT forms an integral part of the UK NO<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> ambient monitoring in the UK.



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**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  $\pm 3$  % 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<sub>2</sub> scheme.

The  $Z_{score}$ , may be defined as:

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

Where:

- $x_{lab}$  = participant result from a laboratory
- $\bar{x}_{assigned}$  = assigned value
- $\sigma_{SDPA}$  = standard deviation for performance assessment (currently set at 7.5 % of  $\bar{x}_{assigned}$ )

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### 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.

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**Contacts**

Further **specific** information on the LGC AIR NO<sub>2</sub> PT scheme is available from LGC proficiency testing on 0161 7622500 or by email at [customerservices@lqcgroup.com](mailto:customerservices@lqcgroup.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](mailto:nick.martin@npl.co.uk).

Table 1: Laboratory summary performance for AIR NO<sub>2</sub> PT rounds AR0024, 25, 27, 28, 30, 31, 33 and 34

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO<sub>2</sub> 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 AR024 January – February 2018	AIR PT AR025 April – May 2018	AIR PT AR027 July – August 2018	AIR PT AR028 September – October 2018	AIR PT AR030 January – February 2019	AIR PT AR031 April – May 2019	AIR PT AR033 July – August 2019	AIR PT AR034 September – November 2019
Aberdeen Scientific Services	100 %	100 %	100 %	100 %	75 %	100 %	100 %	100 %
Cardiff Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Edinburgh Scientific Services	100 %	100 %	100 %	100 %	100 %	NR [2]	100 %	25 %
SOCOTEC	100 % [1]	100 % [1]	100 % [1]	100 % [1]	87.5 % [1]	100 % [1]	100 % [1]	100 % [1]
Exova (formerly Clyde Analytical)	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	100 %	100 %	50 %	100 %	100 %	100 %	100 %	50 %
Gradko International [1]	100 % [1]	100 %	100 %	100 %	75 %	100 %	100 %	100 %
Kent Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Kirklees MBC	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Lambeth Scientific Services	NR [2]	NR [2]	NR [2]	25 %	50 %	100 %	50 %	100 %
Milton Keynes Council	100 %	75 %	100 %	100 %	100 %	100 %	50 %	100 %
Northampton Borough Council	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	100 %	100 %	100 %	100 %	75 %
Staffordshire County Council	50 %	100 %	100 %	100 %	100 %	75 %	75 %	75 %
Tayside Scientific Services (formerly Dundee CC)	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]
West Yorkshire Analytical Services	50 %	75 %	100 %	100 %	100 %	100 %	100 %	50 %

[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] Northampton Borough Council, Kent Scientific Services, Cardiff Scientific Services, Kirklees MBC and Exova (formerly Clyde Analytical) no longer carry out NO<sub>2</sub> diffusion tube monitoring and therefore did not submit results.

## Diffusion Tube - NO<sub>2</sub> 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<sub>2</sub> Concentrations and Distance from Roads, Air Quality Consultants (ref 504/1/F1 Issue No. 3 dated 18<sup>th</sup> July 2008).

This uses the equation:

$$C_z = ((C_y - C_b) / (-0.5476 \times \ln(D_y) + 2.7171)) \times (-0.5476 \times \ln(D_z) + 2.7171) + C_b$$

Where:

C<sub>y</sub> is the total measured concentration (µg/m<sup>3</sup>) at distance D<sub>y</sub>;

D<sub>y</sub> is the distance from the kerb at which concentrations were measured;

C<sub>z</sub> is the total predicted concentration (µg/m<sup>3</sup>) at distance D<sub>z</sub>

D<sub>z</sub> is the distance from the kerb (m) at which concentrations are to be predicted;

C<sub>b</sub> is the background concentration (µg/m<sup>3</sup>)\*

Ln(D) is the natural log of the number D

\* 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 2019 are as follows:

Site ID	Bias adjusted annual mean concentration 2019 (µg/m <sup>3</sup> )	Nearest Receptor	2019 Background Concentration	Kerb-Tube Distance	Logn Kerb-Tube	Kerb-Receptor Distance	Logn Kerb-Receptor	Distance Corrected (µg/m <sup>3</sup> )
8N	24.7	2	4.2	2	0.30103	4	0.60206	23.4
B1	27.8	28	10.2	1	0.00000	29	1.46240	22.6
B3	31.0	13.5	10.4	2	0.30103	15.5	1.19033	27.1
BER1	16.6	1	6.2	2	0.30103	3	0.47712	16.2
B11	21.2	2	10.2	1	0.00000	3	0.47712	20.1
CM8	17.9	21	6.8	1.5	0.17609	22.5	1.35218	15.2
B15	17.2	8	7.7	1.7	0.23045	9.7	0.98677	15.7
C1	23.2	4	9.9	1.7	0.23045	5.7	0.75587	21.7
BER2	13.5	11	7.0	1	0.00000	12	1.07918	12.1
HEX1	28.0	12	6.2	1.5	0.17609	13.5	1.13033	23.6
C11	19.1	8	9.9	1.7	0.23045	9.7	0.98677	17.6
CM2	14.3	1	6.1	1	0.00000	2	0.30103	13.8
CM4	19.4	70	6.4	3	0.47712	73	1.86332	15.4
CM5	15.8	9	6.0	1.7	0.23045	10.7	1.02938	14.2
HALT1	12.6	17	4.2	1	0.00000	18	1.25527	10.5
B16	23.7	7	9.4	2	0.30103	9	0.95424	21.7
W17	22.3	20	6.8	1	0.00000	21	1.32222	18.2
W21	20.2	5	7.8	1	0.00000	6	0.77815	18.2
SD1	22.0	6	10.3	1.7	0.23045	7.7	0.88649	20.4

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

Figure D.1 – Blyth Automatic and NO<sub>2</sub> Diffusion Tube Monitoring Locations

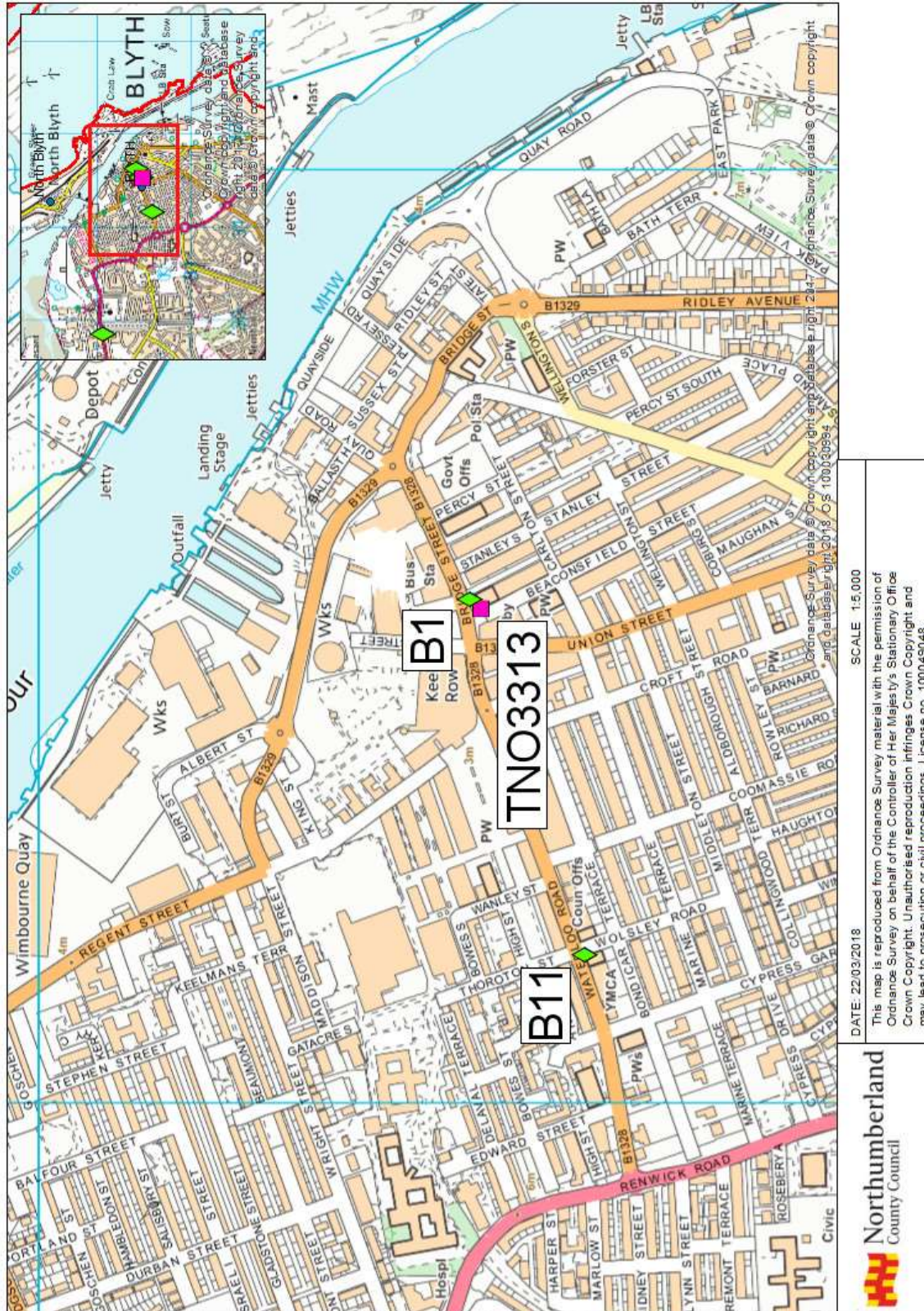


Figure D.2 – Cowpen Automatic and NO<sub>2</sub> Diffusion Tube Monitoring Locations

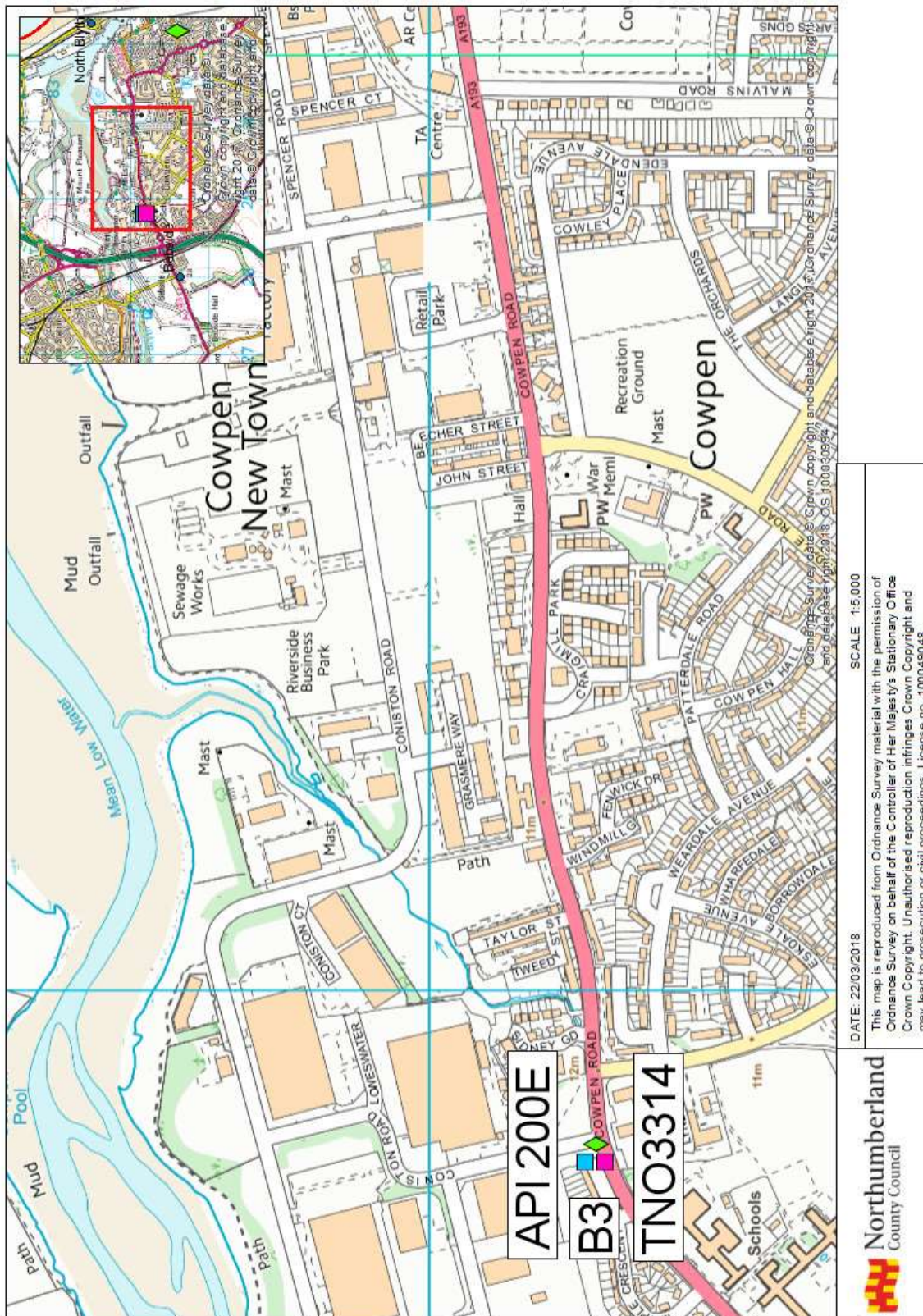


Figure D.3 – Alnwick NO<sub>2</sub> Diffusion Tube Monitoring Locations

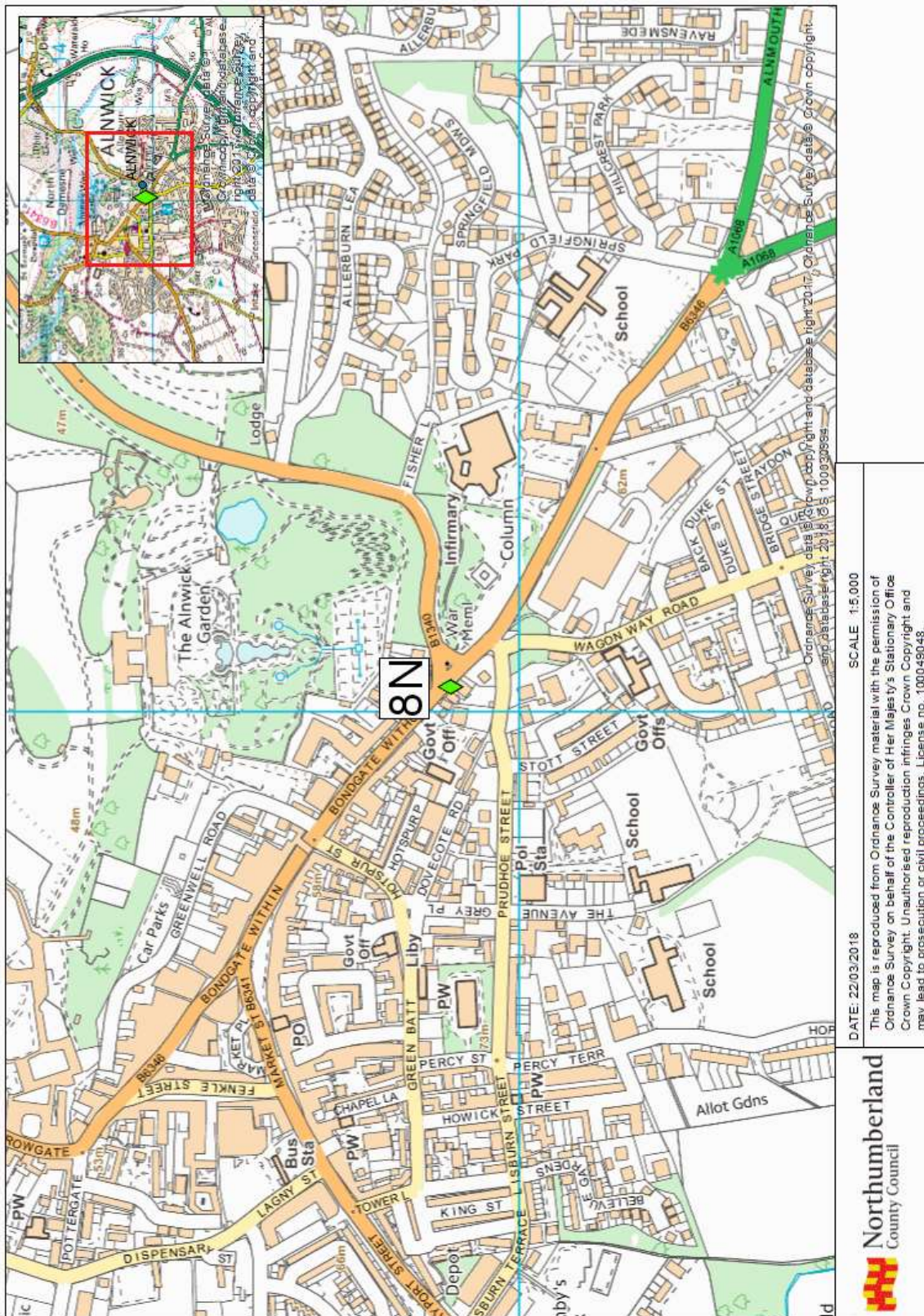




Figure D.4 – Morpeth NO<sub>2</sub> Diffusion Tube Monitoring Locations

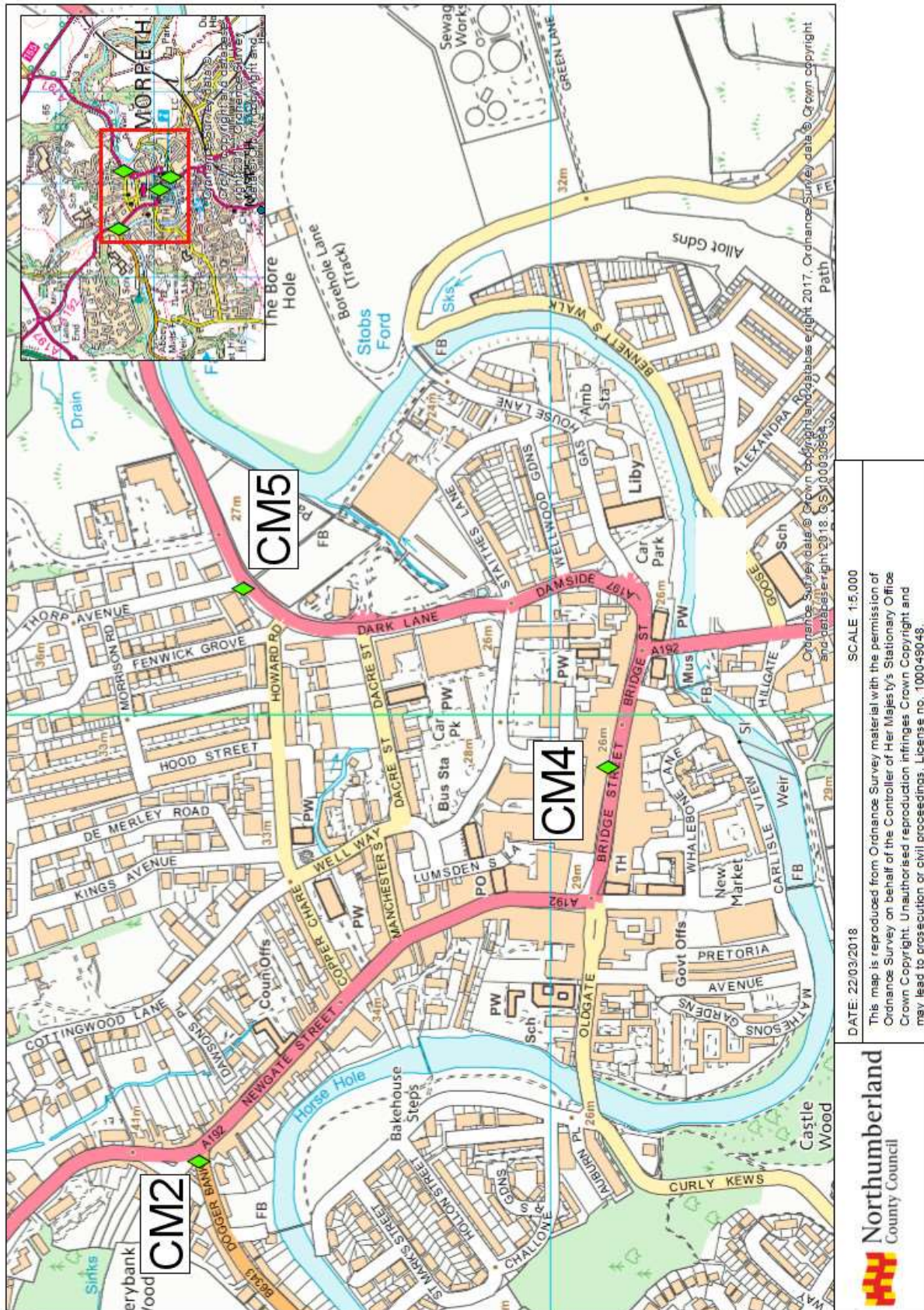


Figure D.5 – Ponteland NO<sub>2</sub> Diffusion Tube Monitoring Location

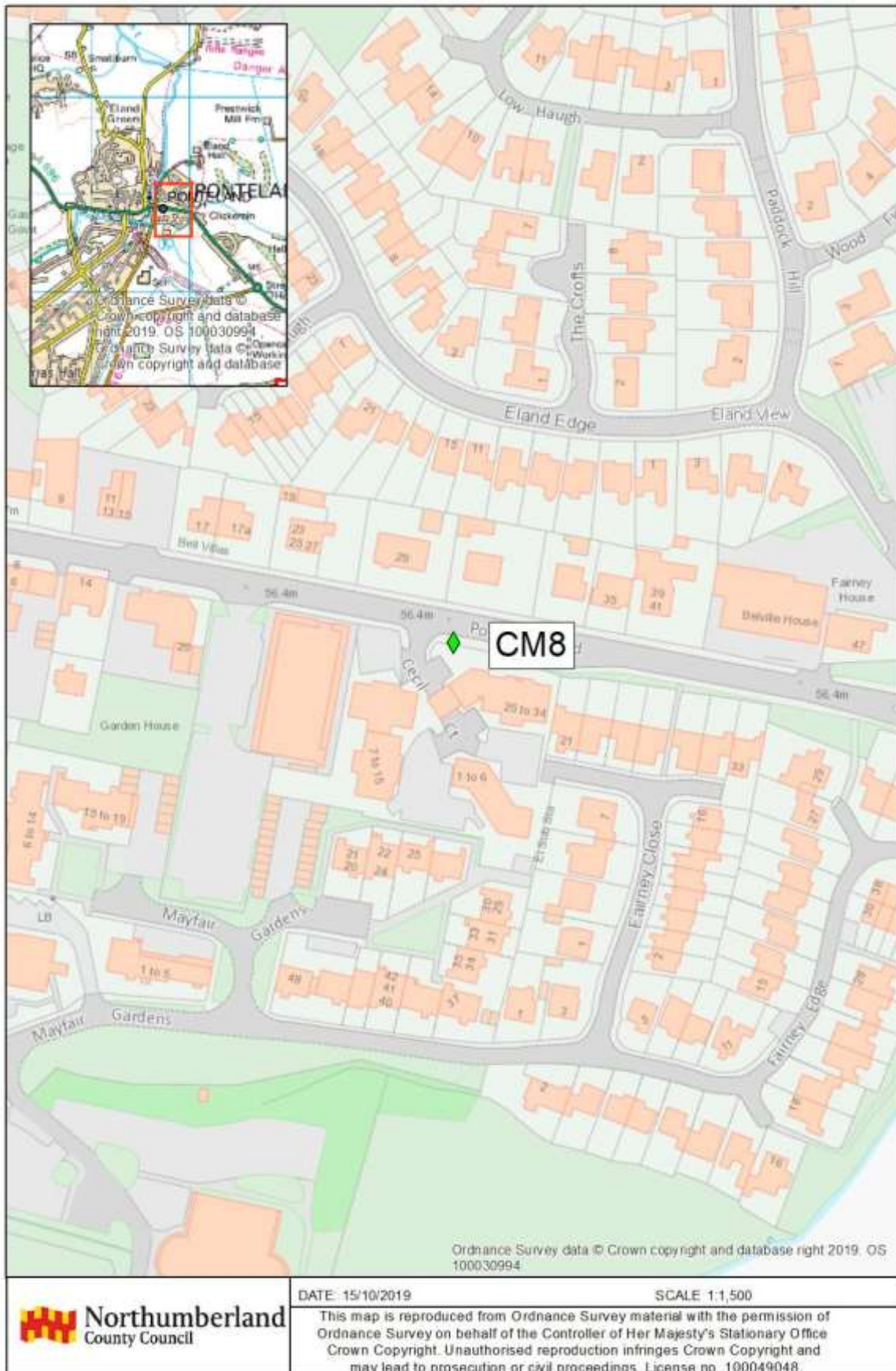


Figure D.6 – East Cramlington NO<sub>2</sub> Diffusion Tube Monitoring Locations

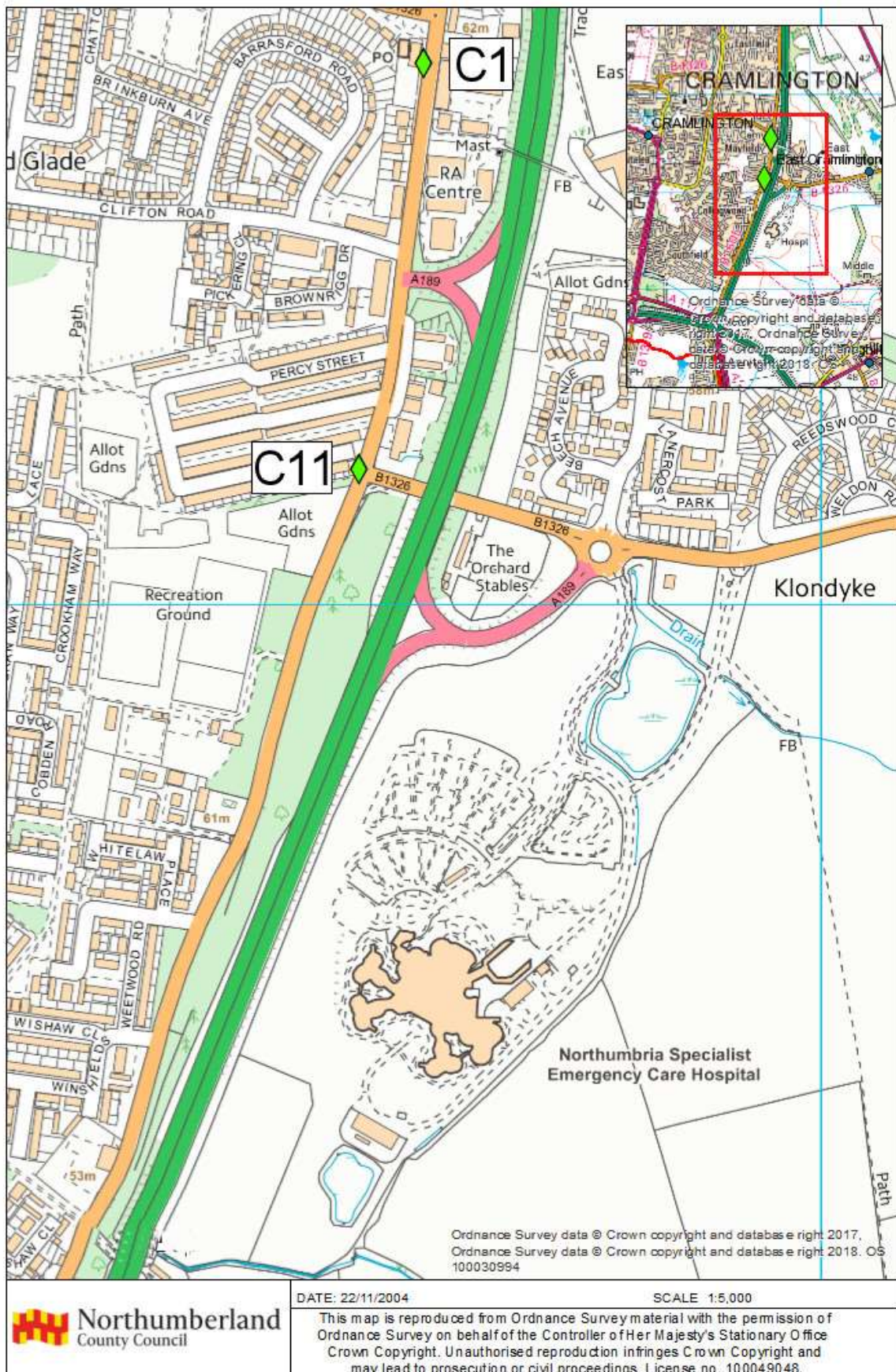


Figure D.7 – Berwick and Tweedmouth NO<sub>2</sub> Diffusion Tube Monitoring Locations

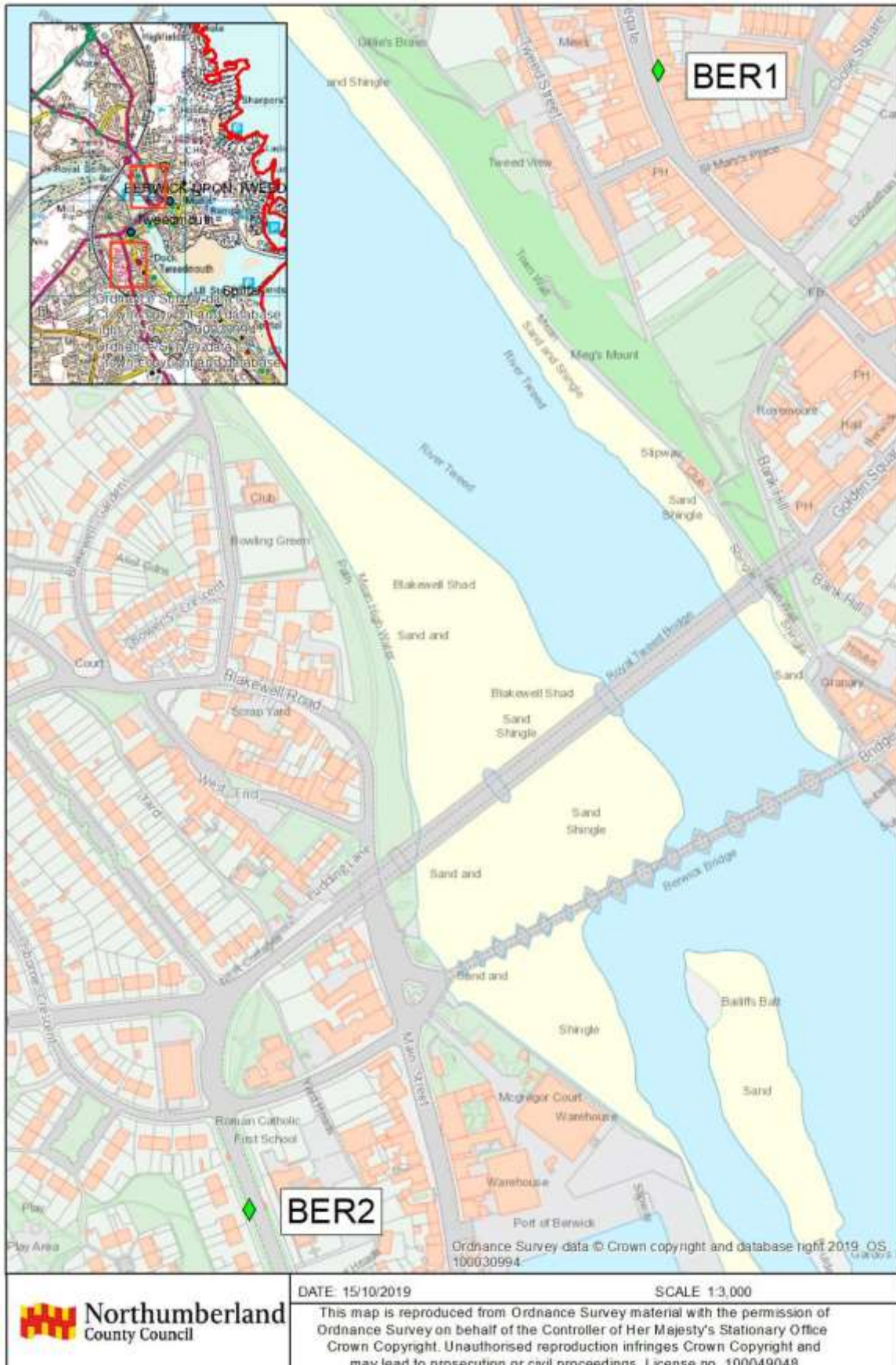
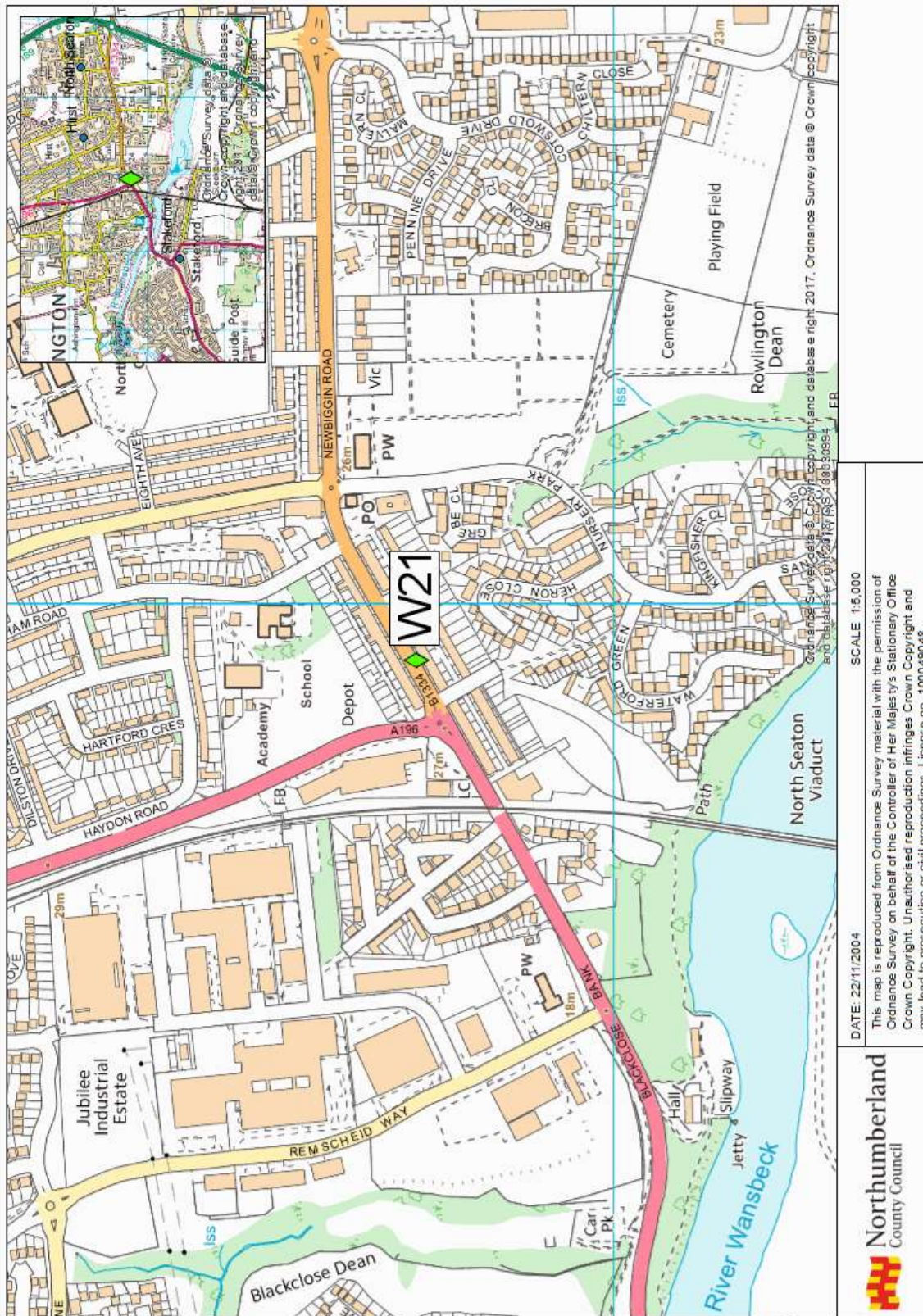


Figure D.8 – Ashington NO<sub>2</sub> Diffusion Tube Monitoring Locations



DATE: 22/11/2004  
 SCALE: 1:5,000  
 This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office. Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. License no. 100049048.



Figure D.9 – Bedlington NO<sub>2</sub> Diffusion Tube Monitoring Locations

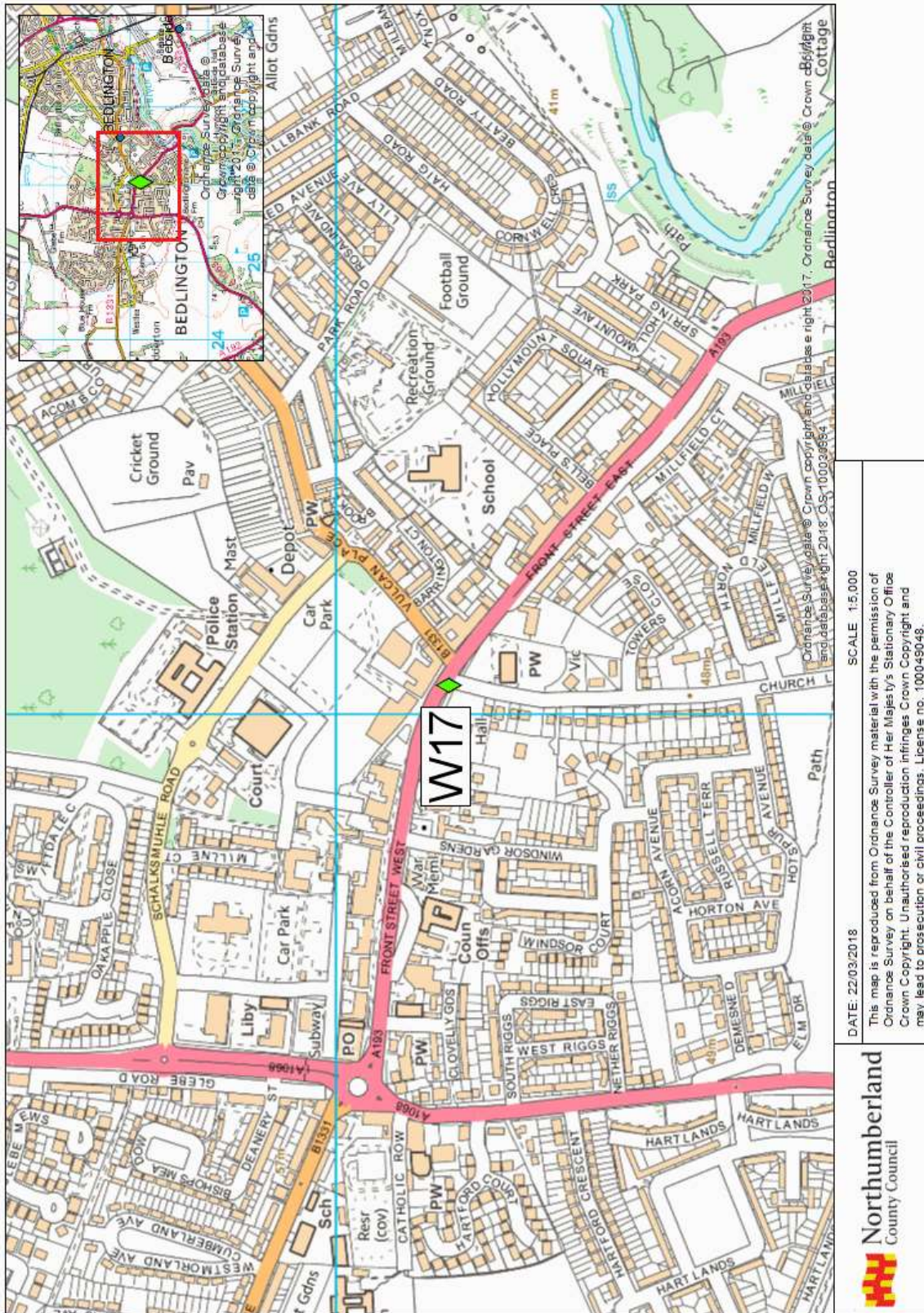


Figure D.10 – Hexham NO<sub>2</sub> Diffusion Tube Monitoring Location



Figure D.11 – Haltwhistle NO<sub>2</sub> 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 <sup>6</sup>	
	Concentration	Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

<sup>6</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

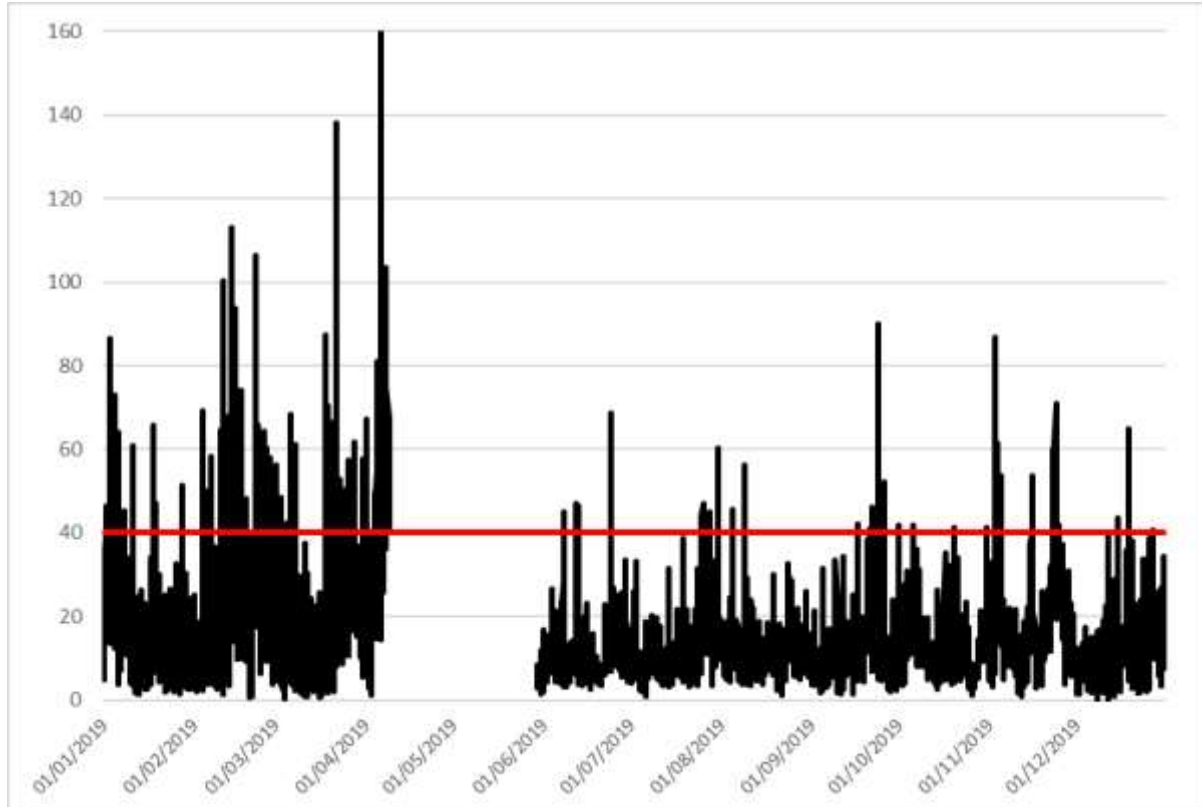
## Appendix F: Data Summaries and Time Series Plots

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

	PM2.5	PM10
Number Very High	0	0
Number High	0	5
Number Moderate	0	12
Number Low	315	297
Maximum 15-minute Mean	73.5 $\mu\text{g m}^3$	234.7 $\mu\text{g m}^3$
Maximum Hourly Mean	67.8 $\mu\text{g m}^3$	162.5 $\mu\text{g m}^3$
Maximum running 8-hour Mean	102.5 $\mu\text{g m}^3$	195.7 $\mu\text{g m}^3$
Maximum running 24-hour Mean	64.6 $\mu\text{g m}^3$	124.7 $\mu\text{g m}^3$
Maximum Daily Mean	24.4 $\mu\text{g m}^3$	64.6 $\mu\text{g m}^3$
90.4th Percentile (PM <sub>10</sub> ) - Daily	-	-
99.8th Percentile (NO <sub>2</sub> ) - Hourly	-	-
Average	7.2 $\mu\text{g m}^3$	16.2 $\mu\text{g m}^3$
Data Capture	85.8 %	85.8 %

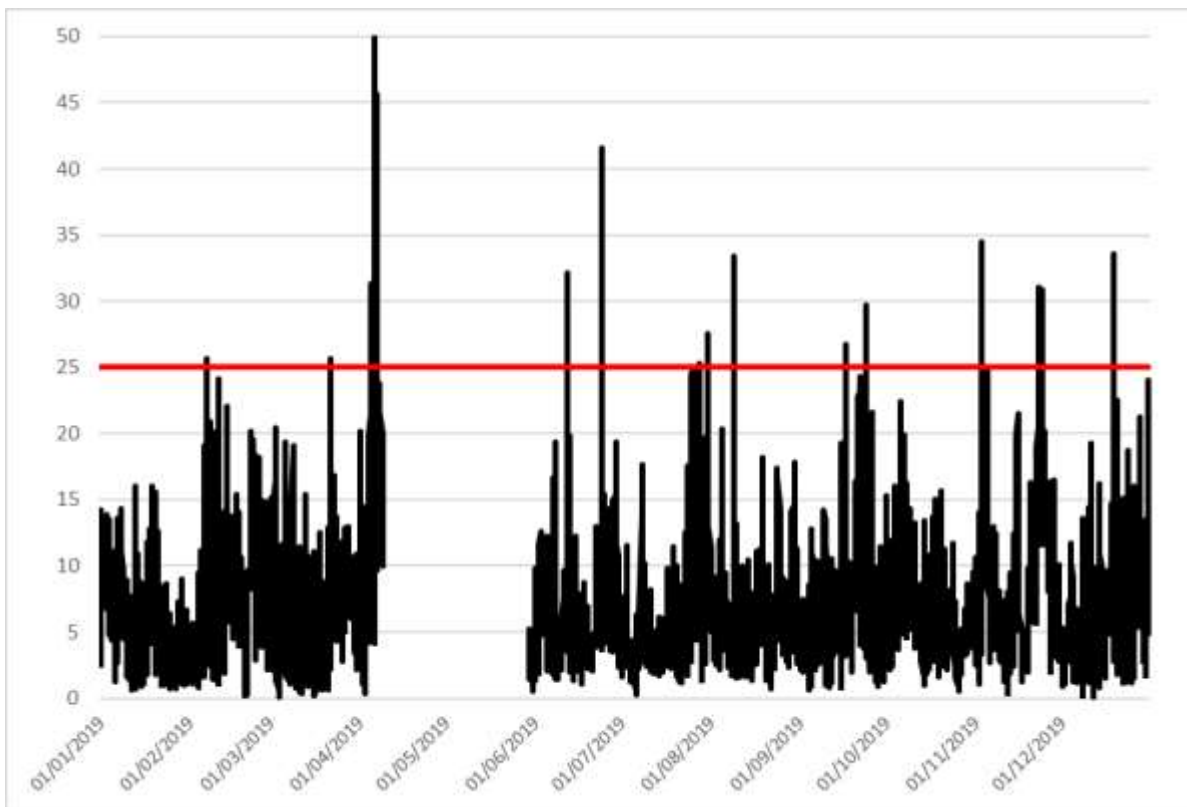
### Hourly Time Series Plots

Figure F.1 – Cowpen Road Particulates (PM<sub>10</sub>) Time Series Plot



Measurements in micrograms per cubic metre ( $\mu\text{g/m}^3$ ).

Figure F.3 – Cowpen Road Particulates (PM<sub>2.5</sub>) Time Series Plot



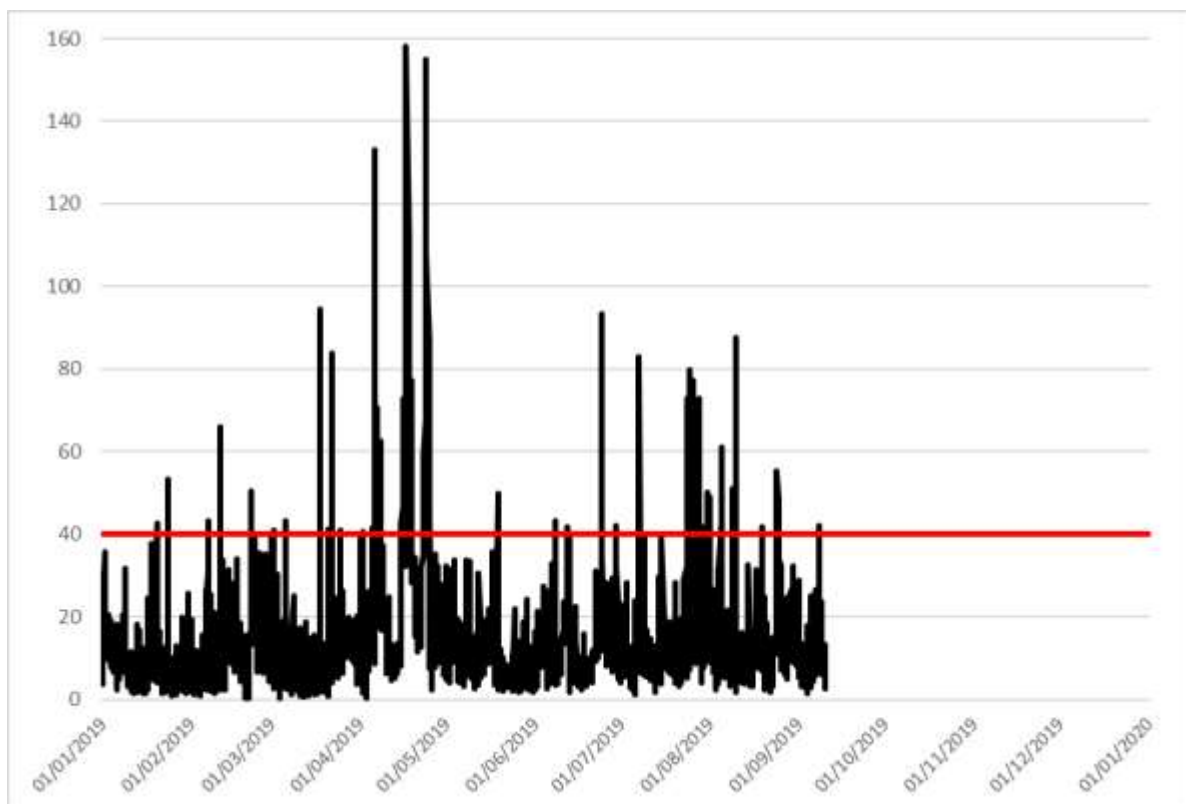
Measurements in micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ ).

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

	PM2.5	PM10
Number Very High	1	0
Number High	1	0
Number Moderate	10	2
Number Low	240	251
Maximum 15-minute Mean	108.7 $\mu\text{g m}^3$	281.1 $\mu\text{g m}^3$
Maximum Hourly Mean	96.4 $\mu\text{g m}^3$	158.2 $\mu\text{g m}^3$
Maximum running 8-hour Mean	55.0 $\mu\text{g m}^3$	128.8 $\mu\text{g m}^3$
Maximum running 24-hour Mean	47.6 $\mu\text{g m}^3$	98.6 $\mu\text{g m}^3$
Maximum Daily Mean	47.6 $\mu\text{g m}^3$	98.6 $\mu\text{g m}^3$
90.4th Percentile (PM <sub>10</sub> ) - Daily	-	25.9 $\mu\text{g m}^3$
99.8th Percentile (NO <sub>2</sub> ) - Hourly	-	-
Average	8.0 $\mu\text{g m}^3$	14.3 $\mu\text{g m}^3$
Data Capture	69.2 %	69.2 %

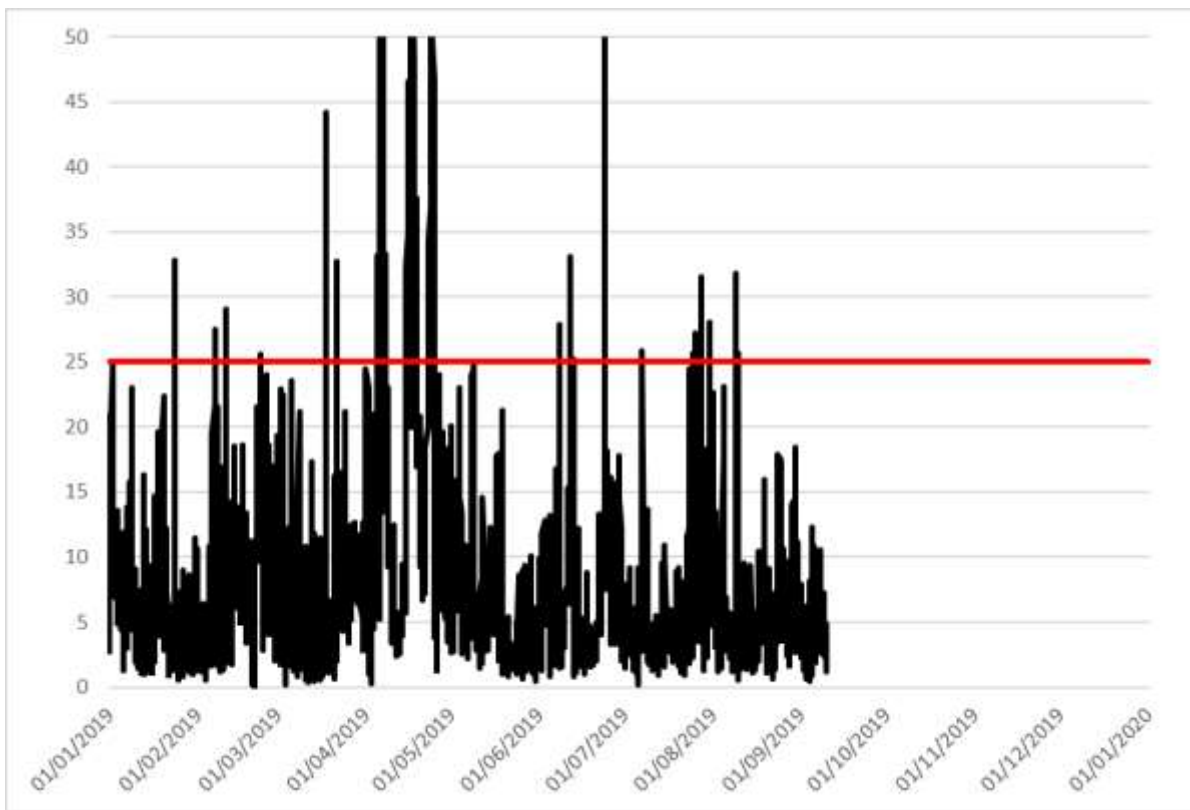
## Hourly Time Series Plots

**Figure F.4 – Blyth Library Particulates (PM<sub>10</sub>) Time Series Plot**



Measurements in micrograms per cubic metre ( $\mu\text{g/m}^3$ ).

Figure F.5 – Blyth Library Particulates (PM<sub>2.5</sub>) Time Series Plot



Measurements in micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ ).

## Appendix G: Annualising Data

### Particulates (PM<sub>10</sub> and PM<sub>2.5</sub>) - TNO3313 - Blyth Library

The data capture for the Blyth Library Osiris particulate monitor was 69.2 per cent in 2019, 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 one main block from 10 September to 31 December, because of an issue with a circuit breaker on an old wiring board in the library building which supplies the electric to the monitor.

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) Middlesbrough (40.2 miles), Sunderland Silksworth (18.2) and Middlesbrough (40.2 miles). The four stations collected 95.4, 77.3, 97.2 and 85.1 per cent data in 2019, respectively.

**Table G.2 – Blyth Library PM<sub>10</sub> Annualising Calculation**

	<i>Data Capture (%)</i>	<i>Annual Mean 2014 (AM)</i>	<i>Period Mean 2014 (PM)</i>	<i>Annualised Value</i>
<b>Blyth Library Osiris (PM10)</b>	69.2	14.3	14.3	<b>13.3</b>
<b>Long Term Site</b>		<b>Annual Mean 2014 (AM)</b>	<b>Period Mean 2014 (PM)</b>	<b>Ratio (AM/PM)</b>
<b>Newcastle City Centre (PM10)</b>	95.4	15.2	16.7	0.91
<b>Newcastle Cradlewell</b>	77.3	16.2	17.2	0.94
<b>Middlesbrough</b>	97.2	17.7	19.2	0.92
<b>Cowpen Road Osiris (PM10)</b>	85.8	16.2	17.0	0.95
			Average (Ra)	0.93

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. Additionally, although not an AURN monitor, our Cowpen Road Osiris unit was used to provide a truly local ratio. The ratio from this monitor does not vary greatly from ratios produced from the AURN monitors, so they have been included to supplement the ones chosen.

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<sub>10</sub>, the ratio of the annual mean and period mean was 0.93, the ratio varies little between 0.91 to 0.95 at the four sites.

The result is that the annualised value for the Blyth Library Osiris PM<sub>10</sub> annual mean is decreased from 14.3  $\mu\text{g}/\text{m}^3$  to 13.3  $\mu\text{g}/\text{m}^3$ .

**Table G.3 – Blyth Library PM<sub>2.5</sub> Annualising Calculation**

	<i>Data Capture (%)</i>	<i>Annual Mean 2014 (AM)</i>	<i>Period Mean 2014 (PM)</i>	<i>Annualised Value</i>
<b>Blyth Library Osiris (PM2.5)</b>	69.2	8.0	8.0	<b>7.6</b>
<b>Long Term Site</b>		<b>Annual Mean 2014 (AM)</b>	<b>Period Mean 2014 (PM)</b>	<b>Ratio (AM/PM)</b>
<b>Newcastle City Centre (PM2.5)</b>	94.0	8.8	9.8	0.90
<b>Sunderland Silksworth</b>	85.1	9.4	10.6	0.89
<b>Middlebrough</b>	95.9	10.3	10.8	0.95
<b>Cowpen Road Osiris (PM10)</b>	85.8	7.2	6.9	1.04
			Average (Ra)	0.95

For PM<sub>2.5</sub>, the ratio of the annual mean and period mean was 0.95, the ratio varies little between 0.89 to 1.04 at the four sites.

The result is that the annualised value for the Blyth Library Osiris PM<sub>2.5</sub> annual mean is decreased from 8.0  $\mu\text{g}/\text{m}^3$  to 7.6  $\mu\text{g}/\text{m}^3$ .

## Appendix H: Glossary of Terms

Abbreviation	Description
<b>AM</b>	Annual Mean
<b>AQAP</b>	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'
<b>AQMA</b>	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
<b>AQO</b>	Air Quality Objectives, sometimes referred to as the Air Quality Standards (AQS)
<b>ASR</b>	Annual Status Report (for air quality)
<b>AURN</b>	Automatic Urban Rural Network
<b>BAM</b>	Beta Attenuation Monitor
<b>BTEX</b>	Benzene, Toluene, Ethylbenzene and Xylene
<b>DEFRA</b>	Department for Environment, Food and Rural Affairs
<b>DMRB</b>	Design Manual for Roads and Bridges – includes an air quality screening tool produced by Highways England
<b>EU</b>	European Union
<b>FDMS</b>	Filter Dynamics Measurement System
<b>IAQM</b>	Institute of Air Quality Management
<b>LAQM</b>	Local Air Quality Management
<b>LGR</b>	Local Government Reorganisation
<b>LSO</b>	Local Site Operatives
<b>LTP</b>	Local Transport Plan
<b>NO</b>	Nitrous Oxide
<b>NO<sub>2</sub></b>	Nitrogen Dioxide
<b>NO<sub>x</sub></b>	Nitrogen Oxides
<b>PAH</b>	Poly-Aromatic Hydrocarbons
<b>PM</b>	Period Mean
<b>PM<sub>10</sub></b>	Airborne particulate matter with an aerodynamic diameter of 10 $\mu\text{m}$ (micrometres or microns) or less
<b>PM<sub>2.5</sub></b>	Airborne particulate matter with an aerodynamic diameter of 2.5 $\mu\text{m}$ or less
<b>QA/QC</b>	Quality Assurance / Quality Control
<b>SO<sub>2</sub></b>	Sulphur Dioxide
...	...



## Appendix I: References

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- Summary of Laboratory Performance in AIR NO<sub>2</sub> Proficiency Testing Scheme (January 2018 – November 2019). Available at <https://laqm.defra.gov.uk/assets/laqmno2performancedatauptonovember2019v1.pdf> (accessed 06/07/2020)