Northumberland
County Council

2018 Air Quality Annual Status Report (ASR)

Northumberland County Council

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

Date June 2018

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Executive Summary: Air Quality in Our Area

This is the local air quality Annual Status Report for Northumberland County Council for 2018. 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 2017, including monitoring results for the calendar year.

The main findings for 2017 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 three real-time, automatic analysers. The results of which have met the national air quality objectives for 2017.
- 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.
- $PM_{2.5}$ meets the unofficial cap limit (and also meets the stricter objective set in Scotland) at both monitoring stations. One of the monitoring stations is sited next to one of the busiest urban roads in Northumberland, with relevant receptors present.
- Defra feedback on last year's ASR indicated that where diffusion tube locations did not suggest an issue with nitrogen dioxide, then they should be moved to other locations. This will be done when the diffusion tubes for the Year 1 assessment for the Morpeth Northern Bypass are relocated in May 2018. It is planned to relocate six tubes at that time to locations nor previously assessed. The new locations and results for those locations will be reported in the 2019 ASR.
- The national air quality objectives have been met for annual means and daily exceedances for particulates (PM10) and annual mean and hourly exceedances for nitrogen dioxide (NO2).

- No further detailed assessment is required for any of the monitored pollutants within Northumberland.
- Northumberland County Council will progress to an LAQM Annual Status Report in 2019.

Air Quality in Northumberland County

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[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

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 nitrogen dioxide at the Cowpen Road site and the Blyth Library site. A continuously-monitoring, realtime NO_2 monitor was removed from the Blyth Library site in 2013.

Monitoring from 2017 has indicated a trend of decreasing nitrogen dioxide and particulate levels at our monitoring stations. Nitrogen dioxide monitoring ceased at Blyth Library in 2013.

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

All monitoring carried out by Northumberland County Council has shown compliance with the national air quality objectives since 2009.

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

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 Morpeth Northern Bypass was completed and opened in April 2017. Baseline diffusion tube assessments prior to the bypass opening and a subsequent assessments in Year 1 (2017) have been completed and a further assessment in Year 5 (2021) will be carried out to confirm the prediction model and demonstrate a positive impact for residents within Morpeth. The results of these assessments will be reported in subsequent air quality reports.

Our large programme of diffusion tubes (NO_2 and BTEX) has been successively reduced since LGR due to long-term compliance.

The Blyth Air Quality Management Area (AQMA) declared for particulates (PM_{10}) was revoked in 2012, as detailed in our 2012 Updating and Screening Assessment. Northumberland currently has no declared Air Quality Management Areas (AQMAs) and there is no positive indication based upon monitoring results, that another one may be required.

Northumberland County Council's Environmental Protection Team participated in a Local Air Quality Partnership with Rio Tinto (and formerly Alcan) who were 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 biomass. Fuel deliveries to the plant have commenced in March 2018. The Environment agency are Requlators for the site but it is hoped that a new air quality partnership will be revived.

A 27 MWe biomass CHP plant at Cramlington became operational in 2017. This was mentioned in previous air quality reports and was erected under planning permission 12/02699/RENE. This installation is regulated by the Environment Agency and it is presumed that emission limits to air have been set for this power station along with requirements to abate and monitor emissions.

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.

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 2.1.

- **Go Smarter Northumberland (GSN) Scheme** - DfT funded scheme to improve sustainable transport, extend job horizons, support local businesses and local economic development and contribute to an increasingly low-carbon travel culture
- **Clean Vehicle Technology Fund** (lead by neighbouring Newcastle City Council) - project to improve bus fleet to lower emissions.
- **Taxi Fleets** - all new taxis in Northumberland to be emission standard Euro 5 (passenger cars) and Euro 4 (light commercial) from 2017 onwards.
- **Biomass Appliances** - identify commercial biomass appliances through the planning process and we require additional information on them.
- **Planning Process** - require air quality assessment for larger applications, address
- **Council Fleet Vehicles** - driver management systems installed to improve overall fuel consumption and emissions. 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.
- **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.

- **Ongoing Traffic Projects** - a number of other traffic related actions which will improve air quality.

Conclusions, Local Priorities and Challenges

No exceedances for any objective for NO_2, PM_{10} or the unofficial "cap" limit for $PM_{2.5}$ were identified in Northumberland during 2017.

One of the automatic particulate monitors (Blyth Library site) recorded four exceeds of the 24-hour mean objective but this was well within the limit of 35 in the year.

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 rôle 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 particulates from Lynemouth Power Station once it become operational as a biomass-fuelled electricity generator.
- 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 webpages content will be reviewed and updated again in 2018.

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1. Local Air Quality Management

This report provides an overview of air quality in Northumberland 2017. 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 yearly requirement to document and report the strategies employed by Northumberland County Council to improve air quality and any progress that has been made in the year.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2. Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

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

Northumberland County Council has taken forward a number of measures during 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1.

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 2017/18, 2 of our key priorities were related directly to air improving air quality :

1. To proactively inspect identified industrial polluting sites which require a Local Authority permit'. 124 Inspections of such sites were carried out within the year. Of these 107, were concerned with processes having principally emissions to air.
2. To proactively engage with internal and external partners to raise awareness of Local Air Quality Management. 6 actions were undertaken to meet this priority, including taking part in a stakeholder engagement day (2/6/17); Publication of our 2016 ASR on our webpage; representation at the North east Combined Authority Air Quality strategy Meeting and direct liaison with our newly appointed(1/8/18) Director of Public Health Liz Morgan concerning health related air quality impacts and complaints.

Below is a summary of some of the main actions and projects which improve air quality in Northumberland.

Go Smarter Northumberland (GSN) Scheme

Since its successful bid in 2012, Northumberland County Council has received further funding (2015/16) through the Department of Transport's local sustainable transport fund (LSTF). The project delivered through local sustainable transport funding (LSTF) aims to:

- Improve sustainable travel to work
- Extend job search horizons
- Support local businesses and local economic development
- Contribute to an increasingly low-carbon travel culture

The project centres around south-east Northumberland, where there are higher proportions of key economic, social and environmental challenges and areas where transport to work barriers can be positively encouraged by greater use of sustainable travel modes.

The project also extends to key employment and development areas within the rest of Northumberland, offering support to young adults in acquiring new employability skills and addressing travel to work barriers in rural areas.

The key objectives of the Northumberland LSTF bid were to:

- Enable people to access a wider range of job opportunities, improving connectivity and creating sustainable transport links to jobs and training
- Encourage sustainable commuting for people already in work by making it more attractive to use the bus, walk or cycle. This will reduce traffic congestion and improve safety, health and air quality.
- Create a low-carbon travel culture by giving people a better understanding of available travel options

The Go Smarter Northumberland website can be viewed at;

http://gosmarter.co.uk/blog/go-smarter-in-northumberland

Clean Vehicle Technology Fund lead by Newcastle City Council

North East Cleaner Bus KERS (kinetic energy recovery system) Project lead by Newcastle City Council made a successful bid for £472,500 to the Clean Vehicle Technology Fund projects at the end of 2014. The bid was supported by over £700,000 from Go North East bus company. This has improved thirty fleet buses which cover routes to Blyth in Northumberland.

More details are available online at :

https://www.gov.uk/government/collections/clean-vehicle-technology-fund

and :

http://www.simplygo.com/news/greener-cleaner-buses-for-go-north-east/

Taxis

Northumberland County Council's Licensing Team, require 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.

One of the larger taxi companies in Blyth (Phoenix) have voluntarily moved to a mostly LPG fleet with some electric vehicles.

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). Although in 2017, only four applications were highlighted which contained any reference to the installation of biomass plant (see Appendix C).

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 assessed using the Design Manual for Roads and Bridges (DMRB) methodology. 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 2 internal driver management systems (Ashwood's Lightfoot and Masternaut), which are intend to reduce air emissions by attempting to improve driving styles in their fleet vehicles. The former gives 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. The latter, tracks vehicles movements and for any exceedances of a speed limit and engine idling, reports to management are made.

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 yet, there is no measurable performance indicator for this.

The Environmental Protection team are fully agile in accordance with the Policy.

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 2017 which should all benefit air quality. These include:

- Four one-way traffic schemes
- Five access restriction schemes
- Fifteen new 20 mph speed restrictions (many in relation to school locations).
- Seven new 30 mph speed restrictions
- Three new 40 mph speed restrictions &
- Six 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.
- 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 etc.).

- Offering MOT Vehicles emission testing for 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 2018.

Funding Sources

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

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	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	NCC	Various	Various	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	NCC	Various	Various	N/A	Reduced vehicle emissions	N/A	On going	/
3	Bids for funding to improve bus fleet vehicles	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	NECA	/	/	/	Reduced vehicle emissions	/	Completed	Bid by Newcastle and Sunderland city councils – however bus fleet enters Northumberland
4	All taxis to be EURO 5	Promoting Low Emission Transport	Taxi emission incentives	NCC	N/A	Up to 2017	Complete conversion of taxi fleets to Euro 5	Reduced vehicle emissions	/	01-Apr-17	http://www.northumberland.gov.uk/Business/Licences/Taxi.aspx
5	Home working some departments (such as IT)	Promoting Travel Alternatives	Promoting Travel Alternatives	NCC	/	/	/	Reduced vehicle emissions	/	On going	/
6	Go Smarter	Promoting Travel Alternatives	Personalised Travel Planning	NCC	/	2012	/	Reduced vehicle emissions	/	2015/16	From LSTF funding. http://gosmarter.co.uk/
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	http://gosmarter.co.uk/
8	Go Smarter promoting Modeshift STARS	Promoting Travel Alternatives	School Travel Plans	NCC	/	/	/	Reduced vehicle emissions	/	On going	http://modeshiftstars.org/
9	Travel planner and cycle routes	Public Information	Via the Internet	NCC	/	/	/	Reduced vehicle emissions	/	On going	http://www.northumberland.gov.uk/Highways/Cycling.aspx
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	http://www.northumberland.gov.uk/Highways/Roads/Traffic.aspx#4trafficregulationorderprepared

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
12	Parking enforcement on highways carried out by Council	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	NCC	/	/	/	/	N/A	On going	http://www.northumberland.gov.uk/Highways/Parking.aspx#civilparkingenforcement
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	http://www.northumberland.gov.uk/Highways/Cycling.aspx
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	/	N/A	Reduced vehicle emissions	Estimated 7% saving in fuel costs from use of system	On going	https://www.lightfoot.co.uk/case-study/northumberland-county-council
15	Over 800 fleet vehicles fitted with Masternaut vehicle tracking	Vehicle Fleet Efficiency	Driver training and ECO driving aids	NCC	N/A	/	N/A	Reduced vehicle emissions	/	On going	http://www.masternaut.com/
16	Bid for Euro 6 buses	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	NECA	/	/	/	/	/	On going	http://www.simplygo.com/news/greener-cleaner-buses-for-go-north-east/
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	N/A	N/A	/	/	On going	http://www.northumberland.gov.uk/Highways/Roads/Commercial.aspx#mottesting
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 Directory for Public Health for Northumberland on issues and measures to improve AQ	Other Policy	Policy Guidance and Development Control	NCC	N/A	N/A	N/A	/	/	On going	http://www.northumberland.gov.uk/NorthumberlandCountyCouncil/media/JSNA/strategy%20documents/DPH-Annual-Report-Northumberland-2016-3.pdf

2.3 PM2.5 – Local Authority Approach to Reducing Emissions and or Concentrations

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

Within the Northumberland County Council area the annual "cap" limit of 25 μg/m³ at the roadside of one of the county's busiest urban roads (A193 - Cowpen Road, Blyth) is comfortably met.

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

"*…PM2.5 is still not incorporated into LAQM Regulations, and therefore there is no statutory requirement to review and assess PM2.5 for LAQM purposes.*"

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

- Continuing to monitor $PM_{2.5}$ at specific locations in Northumberland
- Reporting the levels of $PM_{2.5}$ at these location on an annual basis.
- Monitoring for any exceedance of the "cap" limit of 25 μg/m³.
- 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.

Four years of $PM_{2.5}$ monitoring data adjacent to Cowpen Road has shown compliance with the the "cap" limit of 25 μg/m³ and also compliance with the stricter 10 μg/m³ objective imposed in Scotland.

DEFRA background maps for $PM_{2.5}$ (2017) would appear to slightly over-estimate the measured level at Cowpen Road although the corresponding $PM_{2.5}$ at the Blyth

Library site is very close to the measured level. The background maps do provide a useful tool for looking at the rest of the County as a whole, which correlates with our view that there is no significant $PM_{2.5}$ levels and no modelled levels above 10 μg/m³.

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

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Northumberland County Council continued automatic (realtime) monitoring at two sites during 2017. Table A.1 in Appendix A shows the details of the sites.

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

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

Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

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

3.1.2 Non-Automatic Monitoring Sites

Northumberland County Council undertook passive diffusion tube monitoring for NO_2 at 19 sites during 2017.

The highest bias-adjusted NO_2 annual mean was 31.4 $\mu g/m^3$ at these sites which falls well below the 60 $\mu g/m^3$ annual mean which would indicate an exceedance of the 1-hour mean objective for NO_2.

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

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

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

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, "annualised" and/or adjusted for bias. Further details on these adjustments are provided in Appendix G.

3.2.1 Nitrogen Dioxide (NO_2)

Northumberland County Council maintains one automatic nitrogen dioxide monitor at the Cowpen Road site. No service contract is in place for this instrument as the intention is to decommission it should it malfunction at any point. Data capture for this instrument in 2017 was 68 per cent and it was therefore necessary to annualise the data and present the relevant percentile in place of actual measured data.

The measured annual mean for this instrument in 2017 was 17.8 $\mu g/m^3$ (annualised to 17.1 $\mu g/m^3$), the annual mean objective for this pollutant is 40 $\mu g/m^3$.

The number of measured exceedances of the 1-hour mean objective (200 $\mu g/m^3$) limit in 2017 was zero. Since data capture was below 85 per cent, the 99.8th percentile was calculated as 87.1, well below the 200 limit.

Table A.3 in Appendix A compares the continuously monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40 $\mu g/m^3$.

Table A.4 in Appendix A compares the continuously monitored NO_2 hourly mean concentrations for the past five years with the hourly mean objective of 200 $\mu g/m^3$, not to be exceeded more than 18 times per year.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B.

3.2.2 Particulate Matter (PM_{10})

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

annually. Data capture for the Cowpen Road and Blyth Library sites in 2017 was 83.6 and 80.1 percent, respectively.

These are indicative monitors and were, in part, purchased to replace older equipment specifically when it was indicated that monitoring of $PM_{2.5}$ was to become a requirement in England. Additionally, changes at one monitoring site specifically required a post-mounted solution which none of the alternatives could 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 available now. Osiris monitors from unit TNO2296 onwards are MCerts certified in the measurement range of 0 to 100 $\mu g/m^3$ (Sira MC090157/05).

Turnkey have carried out their own demonstration of equivalence of the Osiris monitors for PM10 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 2017 was 13.5 $\mu g/m^3$ (annualised to 15.3 $\mu g/m^3$). The annual mean for the Blyth Library Osiris in 2017 was 13.4 $\mu g/m^3$ (annualised to 14.8 $\mu g/m^3$). The annual mean objective for this pollutant is 50 $\mu g/m^3$.

The number of measured exceedances of the 24-hour mean objective (50 $\mu g/m^3$) for the Cowpen Road Osiris in 2017 was zero (the objective being 35 or less exceeds of the 50 $\mu g/m^3$ limit). Since data capture was below 85 per cent, the 90.4th percentile was calculated as 25.2, well below the 50 limit.

The number of measured exceedances of the 24-hour mean objective (50 $\mu g/m^3$) for the Blyth Library Osiris in 2017 was four (the objective being 35 or less exceeds of

the 50 μg/m^3 limit). Since data capture was below 85 per cent, the 90.4th percentile was calculated as 27.4, well below the 50 limit.

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

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

3.2.3 Particulate Matter ($PM_{2.5}$)

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

The annual mean for the Cowpen Road Osiris in 2017 was 6.2 μg/m^3 (annualised to 6.8 μg/m^3). The annual mean for the Blyth Library Osiris in 2017 was 5.5 μg/m^3 (annualised to 6.0 μg/m^3). The unofficial “cap” annual mean objective for $PM_{2.5}$ is 25 μg/m^3.

These results are very similar to previous years i.e. substantially below the “cap” limit of 25 μ g/m³ and below the limit set in Scotland for $PM_{2.5}$.

3.2.4 Sulphur Dioxide (SO_2)

Northumberland County Council no longer monitors for sulphur dioxide.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
BL	Blyth Library	Urban Centre	431536	581531	PM10; PM2.5	NO	Nephelometer	3	3	3
CR	Cowpen Road	Roadside	428817	581815	PM10; PM2.5; NO2	NO	Nephelometer; Chemiluminescent	3	3	3

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
8N	Bondgate Without, Alnwick	Roadside	419025	613070	NO2	NO	20	1	NO	3
B1	Waterloo Road, Blyth	Urban Centre	431537	581537	NO2	NO	5	1	NO	3
B3	Cowpen Rd. West, Blyth	Roadside	428815	581813	NO2	NO	6	1	YES	3
B5	Cowpen Rd. East, Blyth	Roadside	429850	581947	NO2	NO	25	1	NO	3
B11	Blyth YCMA, Blyth	Urban Centre	431160	581415	NO2	NO	2	1	NO	3
B12	Bridge St, Blyth	Urban Centre	431612	581586	NO2	NO	1	1	NO	3
B15	South Newsham Road	Roadside	430552	578950	NO2	NO	6	2	NO	3
C1	High Pit Road, Cramlington	Roadside	427593	576555	NO2	NO	1	1	NO	3
C9	Trebor, Cramlington	Roadside	424456	577173	NO2	NO	30	3	NO	3
C10	Bay Horse (B1505)	Roadside	427243	575362	NO2	NO	13	1	NO	3
C11	Storey Street (B1505)	Roadside	427523	576136	NO2	NO	10	1	NO	3
CM2	Newgate St, Morpeth	Roadside	419525	586380	NO2	NO	2	2	NO	1.5
CM4	Bridge St, Morpeth	Roadside	419947	585937	NO2	NO	2	2	NO	3
CM5	Thorpe Ave, Morpeth	Roadside	420134	586329	NO2	NO	1	1.5	NO	2
CM6	Telford Bridge, Morpeth	Roadside	420077	585814	NO2	NO	1	1	NO	2.5
CM7	Greystoke Cottage, Clifton	Roadside	420371	582725	NO2	NO	3	2	NO	1.5
W17	Front Street East, Bedlington	Urban Centre	426014	581879	NO2	NO	25	1	NO	3
W21	Newbiggin Road, Ashington	Roadside	427939	586210	NO2	NO	4.5	1	NO	2.5
SD1	Salvation Army, Seaton Delaval	Roadside	430387	575433	NO2	NO	1	1	NO	3

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO2 Annual Mean Concentration (µg/m3) (3)				
					2013	2014	2015	2016	2017
CR	Roadside	Automatic	N/A	60	28	22	25	18	17 (18)
8N	Roadside	Diffusion Tube	N/A	100.0	28	30	30	31	31
B1	Urban Centre	Diffusion Tube	N/A	100.0	29	27	29	31	31
B3	Roadside	Diffusion Tube	N/A	100.0	33	32	32	23	22
B5	Roadside	Diffusion Tube	N/A	100.0	24	24	23	25	23
B11	Urban Centre	Diffusion Tube	N/A	100.0	25	26	26	27	27
B12	Urban Centre	Diffusion Tube	N/A	100.0	25	24	24	21	18
B15	Roadside	Diffusion Tube	N/A	100.0	21	20	19	24	22
C1	Roadside	Diffusion Tube	N/A	100.0	24	25	23	20	23
C9	Roadside	Diffusion Tube	N/A	100.0	21	22	20	26	23
C10	Roadside	Diffusion Tube	N/A	100.0	28	27	23	20	17
C11	Roadside	Diffusion Tube	N/A	100.0	19	22	19	20	16
CM2	Roadside	Diffusion Tube	N/A	100.0	22	23	19	24	25
CM4	Roadside	Diffusion Tube	N/A	91.7	28	26	22	21	26
CM5	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	21	26	22
CM6	Roadside	Diffusion Tube	N/A	91.7	N/A	N/A	25	26	19
CM7	Roadside	Diffusion Tube	N/A	100.0	N/A	N/A	26	27	20
W17	Urban Centre	Diffusion Tube	N/A	100.0	27	28	20	23	24
W21	Roadside	Diffusion Tube	N/A	100.0	N/A	19	24	25	24
SD1	Roadside	Diffusion Tube	N/A	100.0	26	25	25	27	23

A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO2 1-Hour Means > 200µg/m3 (3)				
					2013	2014	2015	2016	2017
CR	Roadside	Automatic	N/A	60.0	0 (113)	0 (107)	0	0	0 (87)

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

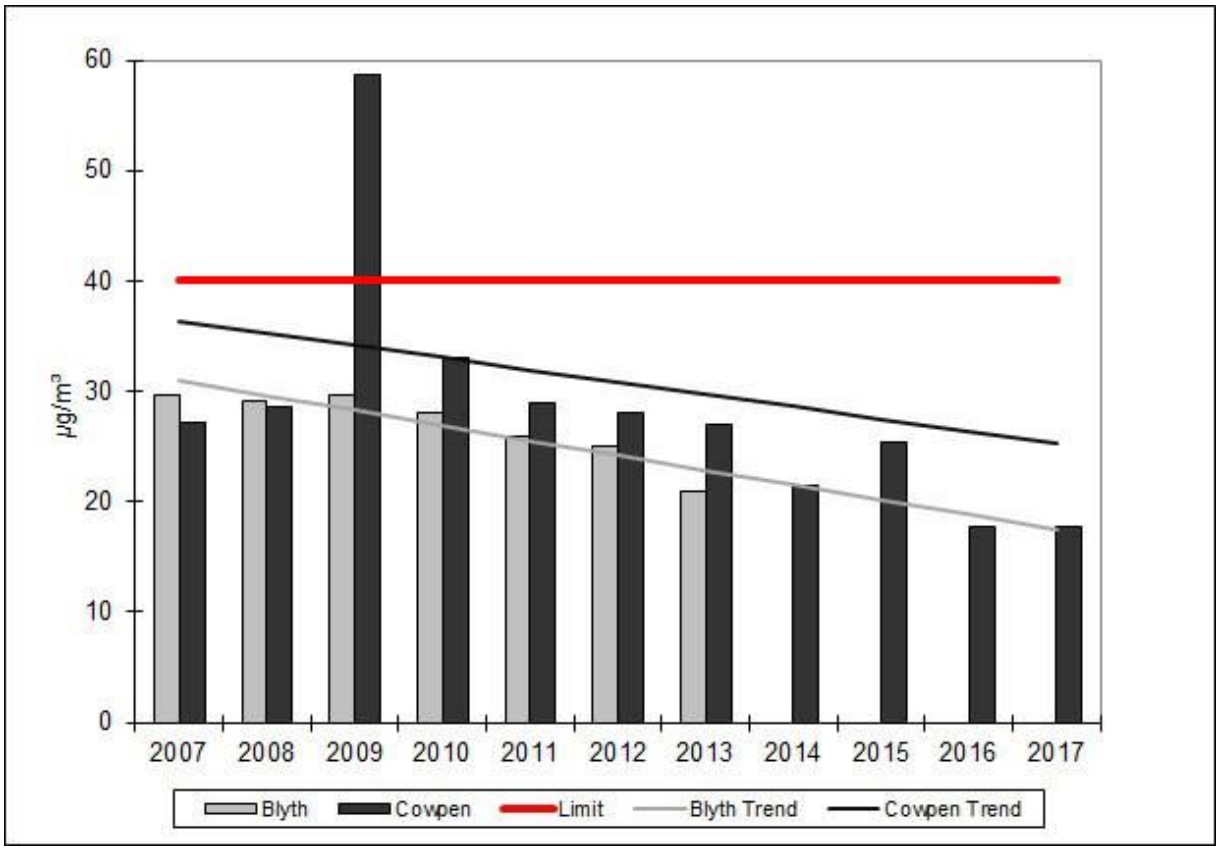


Table A.5 – Annual Mean Objective PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM10 Annual Mean Concentration (µg/m3) (3)				
				2013	2014	2015	2016	2017
BL	Urban Centre	N/A	80.1	36(35)	15	13	17.9(17.6)	13.4 (14.8)
CR	Roadside	N/A	83.6	25(24)	14(14)	14(13)	15	13.5 (15.3)

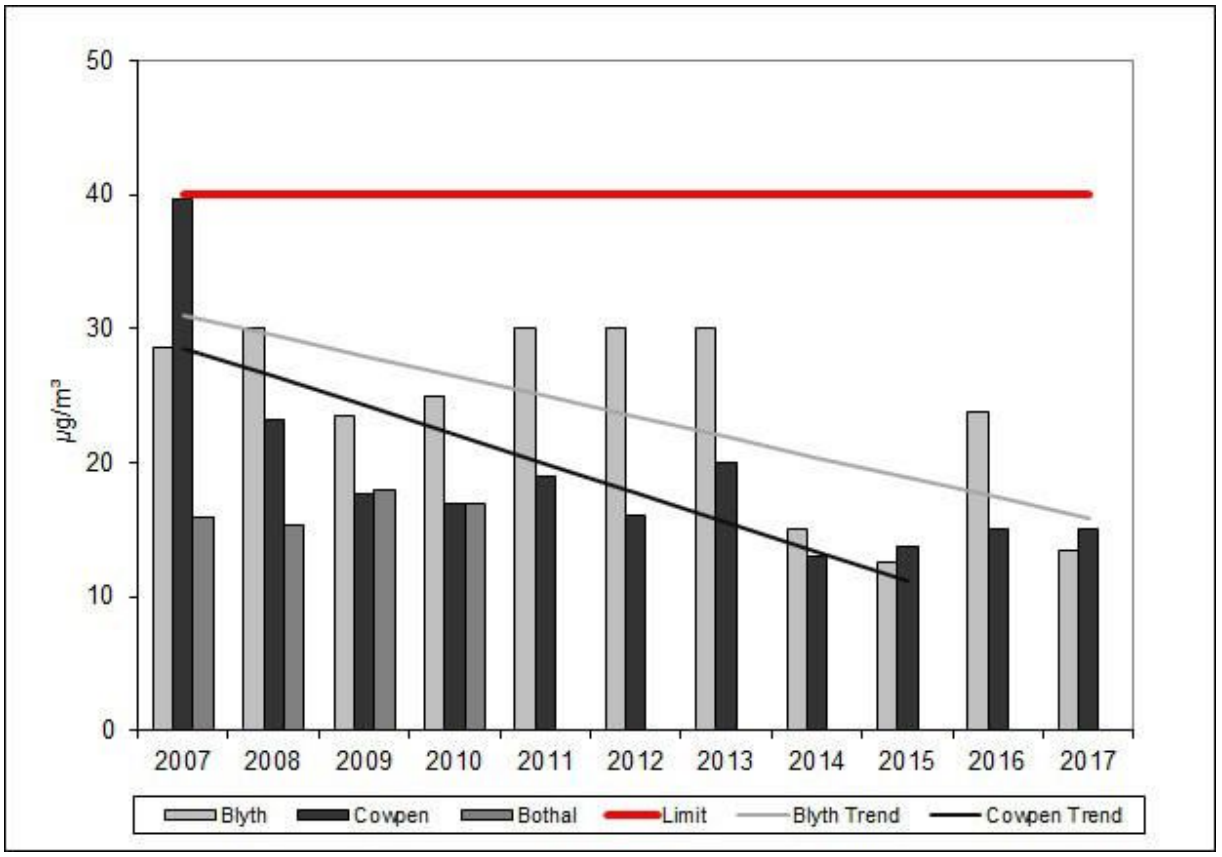
Table A.6 – 24-Hour Mean Objective PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM10 24-Hour Means > 50µg/m3 (3)				
				2013	2014	2015	2016	2017
BL	Urban Centre	N/A	80.1	11(42)	6	2	8(32)	4 (30)
CR	Roadside	N/A	83.6	9(36)	2(22)	2(22)	0	0 (30)

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	PM2.5 Annual Mean Concentration (µg/m3) (3)				
				2013	2014	2015	2016	2017
BL	Urban Centre	N/A	80.1	N/A	6.5	6	7.1	6.2 (6.8)
CR	Roadside	N/A	83.6	N/A	6.5	6.1	5.8	5.5 (6.0)

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2017

Site ID	NO2 Mean Concentrations (µg/m3)														
													Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
8N	45.5	35.4	41.8	38.2	29.7	32.2	29.4	36.9	34.8	35.4	12.9	37.6	34.2	26.3	21.0
B1	58.1	45.8	48.6	41.2	30.7	30.1	30.5	31.8	37.8	43.8	43.3	46.3	40.7	31.3	28.6
B3	52.3	49.8	49.1	31.4	30.1	32.0	34.5	34.2	46.8	42.6	46.4	39.6	40.7	31.4	28.5
B5	43.0	37.1	35.8	31.3	22.2	19.7	20.2	21.2	23.1	27.7	32.2	34.6	29.0	22.3	19.1
B11	41.3	34.8	38.3	30.2	26.8	21.2	24.8	28.0	28.7	27.2	30.7	31.0	30.3	23.3	22.6
B12	51.5	39.6	44.1	31.7	28.9	24.5	22.4	26.6	35.6	31.7	40.0	41.2	34.8	26.8	26.8
B15	28.5	30.8	31.0	18.9	21.5	17.2	17.8	20.4	23.2	22.0	25.0	28.0	23.7	18.2	17.3
C1	37.6	38.9	34.4	25.6	31.1	21.0	25.2	22.6	28.6	23.8	25.8	28.0	28.6	22.0	22.0
C9	40.7	33.5	34.3	24.0	21.2	22.3	22.9	25.7	31.0	32.7	40.7	32.4	30.1	23.2	21.1
C10	42.0	47.3	38.0	24.5	28.8	22.5	22.9	22.6	29.3	25.3	25.9	24.2	29.4	22.7	20.4
C11	26.6	39.4	24.8	20.2	29.2	15.0	19.1	15.5	23.2	19.8	13.6	18.7	22.1	17.0	16.0
CM2	28.9	33.7	32.2	18.3	18.4	14.2	14.4	12.2	20.4	17.7	17.7	19.5	20.6	15.9	15.9
CM4	31.9	36.1	36.3	26.0	31.0	17.3	23.2	22.1	22.4		23.5	21.7	26.5	20.4	20.4
CM5	39.7	41.2	28.9	22.6	22.2	15.3	15.8	15.1	22.4	20.7	21.6	24.4	24.2	18.6	18.9
CM6	40.4	38.6	37.1		28.3	22.2	23.5	23.1	30.7	27.4	35.3	35.5	31.1	23.9	23.9
CM7	40.9	41.7	38.7	31.0	25.3	23.9	21.1	25.3	25.9	26.0	29.4	25.6	29.6	22.8	22.2
W17	42.0	49.1	40.2	29.7	30.9	23.8	21.2	26.5	30.0	27.3	31.8	33.2	32.1	24.7	20.3
W21	41.1	35.9	36.9	23.6	23.3	21.7	20.1	23.3	24.4	29.0	30.9	32.2	28.5	22.0	20.4
SD1	45.1	39.3	36.8	30.7	25.8	20.6	23.2	25.1	29.1	28.3	35.2	34.8	31.2	24.0	24.0

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

Biomass Burning Appliances in Northumberland

Seventy three applications for biomass appliances have been identified via our engagement with the planning process since 2007. The vast majority of these were widely spread across the more rural parts of the county. Only eight were within the more densely populated south-east area, which is almost entirely subject to smoke control area provisions.

Of the eight biomass appliances within the south-east area, only one formed part of a permitted process (I-PPC) and the remaining were all DEFRA exempt appliances. The average distance between each of these appliances is approximately 6 kilometres. The closest being 1.2 kilometres apart. The cumulative impacts on air quality are therefore assumed to be negligible

In 2017, four applications were identified indicating that a biomass boiler was to be installed. All four were in very rural locations. These meet the screening criteria for particulates and NOx using the AEA Biomass Screening Tool (22 Dec 2008).

Factor from Local Co-location Studies

Northumberland County Council did not carry out any co-location studies in 2017.

Processing of Automatic Monitor Data

Data from the Teledyne API 200E is uniformly scaled, with the lowest recorded measurement up to zero. The long-term data is then adjusted with a linear regression from the last service/calibration (when the response of the analyser was reset) to current responses to span and calibration values.

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: 03/18. The bias factor was calculated to be 0.77 for ESG (Didcot).

The results of the laboratory performance scheme (AIR PT) are included below; the Environmental Scientifics Group received a 100 percent performance for the whole of 2017.

Figure A.1 – National Diffusion Tube Bias Adjustment Spreadsheet for 03/18 showing results for ESG (Didcot) using 50% TEA in acetone.

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/18

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods

Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet

This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2018

LAQM Helpdesk Website

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

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

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List. If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List. If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List. If a year is not shown, we have no data[2]

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

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

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) ($\mu g/m^3$)	Automatic Monitor Mean Conc. (Cm) ($\mu g/m^3$)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
ESG Didcot	50% TEA in acetone	2017	R	Suffolk Coastal DC	12	45	37	21.7%	G	0.82
ESG Didcot	50% TEA in acetone	2017	R	Dumfries and Galloway Council	12	36	29	23.3%	G	0.81
ESG Didcot	50% TEA in acetone	2017	KS	Marylebone Road Intercomparison	12	106	79	34.3%	G	0.74
ESG Didcot	50% TEA in acetone	2017	R	Vale of White Horse District Council	11	31	25	26.0%	G	0.79
ESG Didcot	50% TEA in acetone	2017	UB	Cardiff City Council	10	29	21	35.1%	G	0.74
ESG Didcot	50% TEA in acetone	2017	R	Cambridge City Council	12	45	33	37.7%	G	0.73
ESG Didcot	50% TEA in acetone	2017	R	Wrexham County Borough Council	12	20	17	14.5%	G	0.87
ESG Didcot	50% TEA in acetone	2017	UI	North Lincolnshire Council	12	22	16	40.7%	G	0.71
ESG Didcot	50% TEA in acetone	2017	KS	Caerphilly CBC	12	37	32	15.8%	G	0.86
ESG Didcot	50% TEA in acetone	2017	R	Caerphilly CBC	11	44	29	51.2%	G	0.66
ESG Didcot	50% TEA in acetone	2017	UB	City of York Council	12	23	15	53.4%	G	0.65
ESG Didcot	50% TEA in acetone	2017	R	City of York Council	10	37	28	30.8%	G	0.76
ESG Didcot	50% TEA in acetone	2017	R	City of York Council	11	32	23	41.0%	G	0.71
ESG Didcot	50% TEA in acetone	2017	R	City of York Council	12	40	25	58.6%	G	0.63
ESG Didcot	50% TEA in acetone	2017	R	Hambleton District Council	10	21	20	4.0%	G	0.96
ESG Didcot	50% TEA in acetone	2017	R	Horsham District Council	11	35	29	18.1%	G	0.85
ESG Didcot	50% TEA in acetone	2017	R	Horsham District Council	12	31	26	21.3%	G	0.82
ESG Didcot	50% TEA in acetone	2017	R	Horsham District Council	11	33	23	41.1%	G	0.71
ESG Didcot	50% TEA in acetone	2017	UC	Leeds City Council 1	12	41	32	28.5%	G	0.78
ESG Didcot	50% TEA in acetone	2017	R	Leeds City Council 10	11	48	38	25.1%	S	0.80
ESG Didcot	50% TEA in acetone	2017	R	Leeds City Council 2	12	47	35	34.4%	S	0.74
ESG Didcot	50% TEA in acetone	2017	R	Leeds City Council 4	11	56	43	29.1%	S	0.77
ESG Didcot	50% TEA in acetone	2017	R	Leeds City Council 7	11	38	27	39.8%	S	0.72
ESG Didcot	50% TEA in acetone	2017	R	Slough Borough Council	12	45	35	26.4%	G	0.79
ESG Didcot	50% TEA in acetone	2017	UB	Slough Borough Council	12	32	25	28.6%	G	0.78
ESG Didcot	50% TEA in acetone	2017	UB	Slough Borough Council	11	39	33	19.2%	G	0.84
ESG Didcot	50% TEA in acetone	2017	R	Tunbridge Wells	12	56	40	38.2%	G	0.72
ESG Didcot	50% TEA in acetone	2017		**Overall Factor[3] (27 studies)**					**Use**	**0.77**

LAQM Helpdesk – March 2018 - Summary of Laboratory Performance in AIR NO_2 Proficiency Testing Scheme (April 2016 – February 2018).

LAQM Helpdesk – March 2018

Summary of Laboratory Performance in AIR NO_2 Proficiency Testing Scheme (April 2016 – February 2018).

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_2 test sample type that is distributed to participants in a quarterly basis.

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

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

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

AIR NO_2 PT Scheme overview

Purpose of scheme

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

NO_2 PT Summary – AIR PT Rounds AR013, 15, 16, 18, 19, 21, 22 and 24

LAQM Helpdesk – March 2018

Preparation of test samples

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

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

Scheme operation

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

Performance scoring

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

The Z_{score}, may be defined as:

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

Where:

x_{lab} = participant result from a laboratory

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

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

NO_2 PT Summary – AIR PT Rounds AR013, 15, 16, 18, 19, 21, 22 and 24

LAQM Helpdesk – March 2018

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.

NO_2 PT Summary – AIR PT Rounds AR013, 15, 16, 18, 19, 21, 22 and 24

LAQM Helpdesk – March 2018

Contacts

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

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

NO_2 PT Summary – AIR PT Rounds AR013, 15, 16, 18, 19, 21, 22 and 24

Table 1: Laboratory summary performance for AIR NO_2 PT rounds AR013, 15, 16, 18, 19, 21, 22 and 24

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

AIR PT Round	AIR PT AR013	AIR PT AR015	AIR PT AR016	AIR PT AR018	AIR PT AR019	AIR PT AR021	AIR PT AR022	AIR PT AR024
Round conducted in the period	April – May 2016	July – August 2016	September – October 2016	January – February 2017	April – May 2017	July – August 2017	September – October 2017	January – February 2018
Aberdeen Scientific Services	100 %	100 %	100 %	100 %	100 %	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 %	100 %	100 %	100 %
Environmental Services Group, Didcot [1]	75 %	75 %	100 %	100 %	100 %	100 %	100 %	100 %
Exova (formerly Clyde Analytical)	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	100 %	0 %	100 %	100 %	50 %	0 %	100 %	100 %
Gradko International [1]	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Kent Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Kirklees MBC	100 %	100 %	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Lambeth Scientific Services	100 %	100 %	75 %	100 %	NR [2]	NR [2]	100 %	NR [2]
Milton Keynes Council	100 %	100 %	75 %	100 %	75 %	0 %	75 %	100 %
Northampton Borough Council	100 %	NR [2]	75 %	0 %	NR [3]	NR [3]	NR [3]	NR [3]
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	75 %	100 %
South Yorkshire Air Quality Samplers	100 %	75 %	100 %	100 %	100 %	100 %	100 %	100 %
Staffordshire County Council	75 %	100 %	NR [2]	100 %	100 %	100 %	100 %	50 %
Tayside Scientific Services (formerly Dundee CC)	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %
West Yorkshire Analytical Services	100 %	NR [2]	50 %	100 %	100 %	100 %	100 %	50 %

[1] Participant subscribed to two sets of test samples (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_2 diffusion tube monitoring and therefore did not submit results.

Appendix D: Map(s) of Monitoring Locations

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

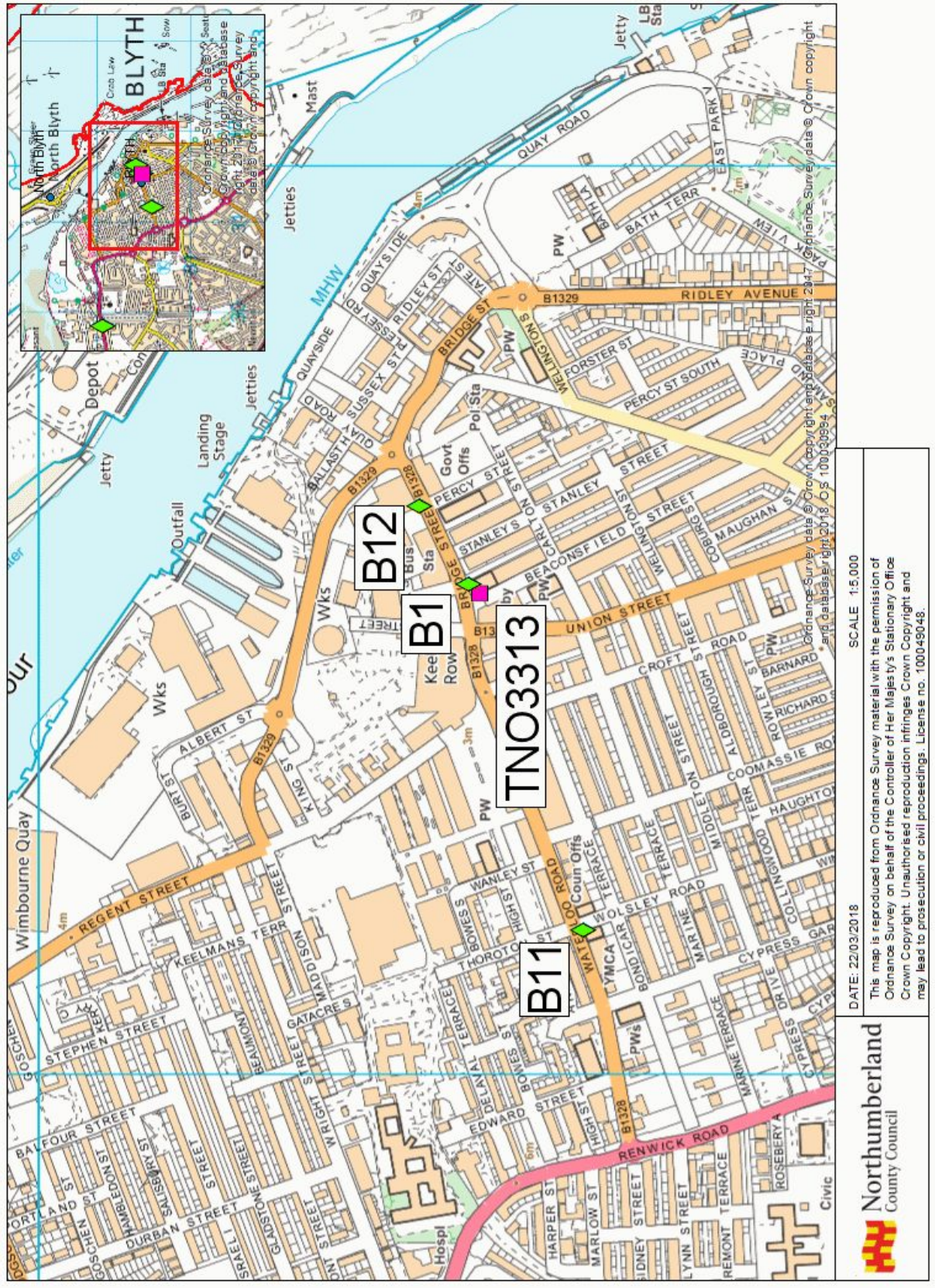


Figure D.2 – Cowpen Automatic and NO_2 Diffusion Tube Monitoring Locations

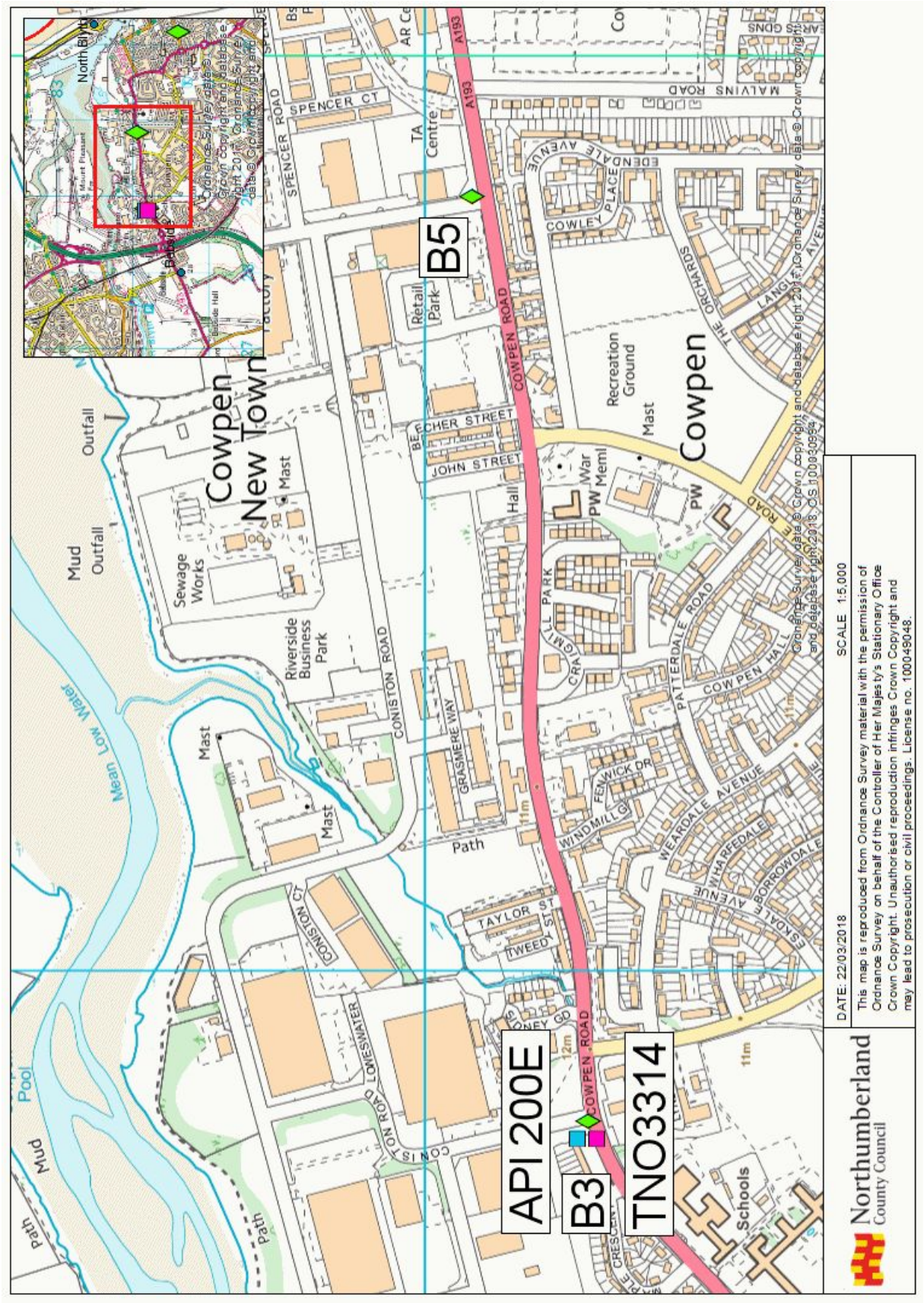


Figure D.3 – Alnwick NO_2 Diffusion Tube Monitoring Locations

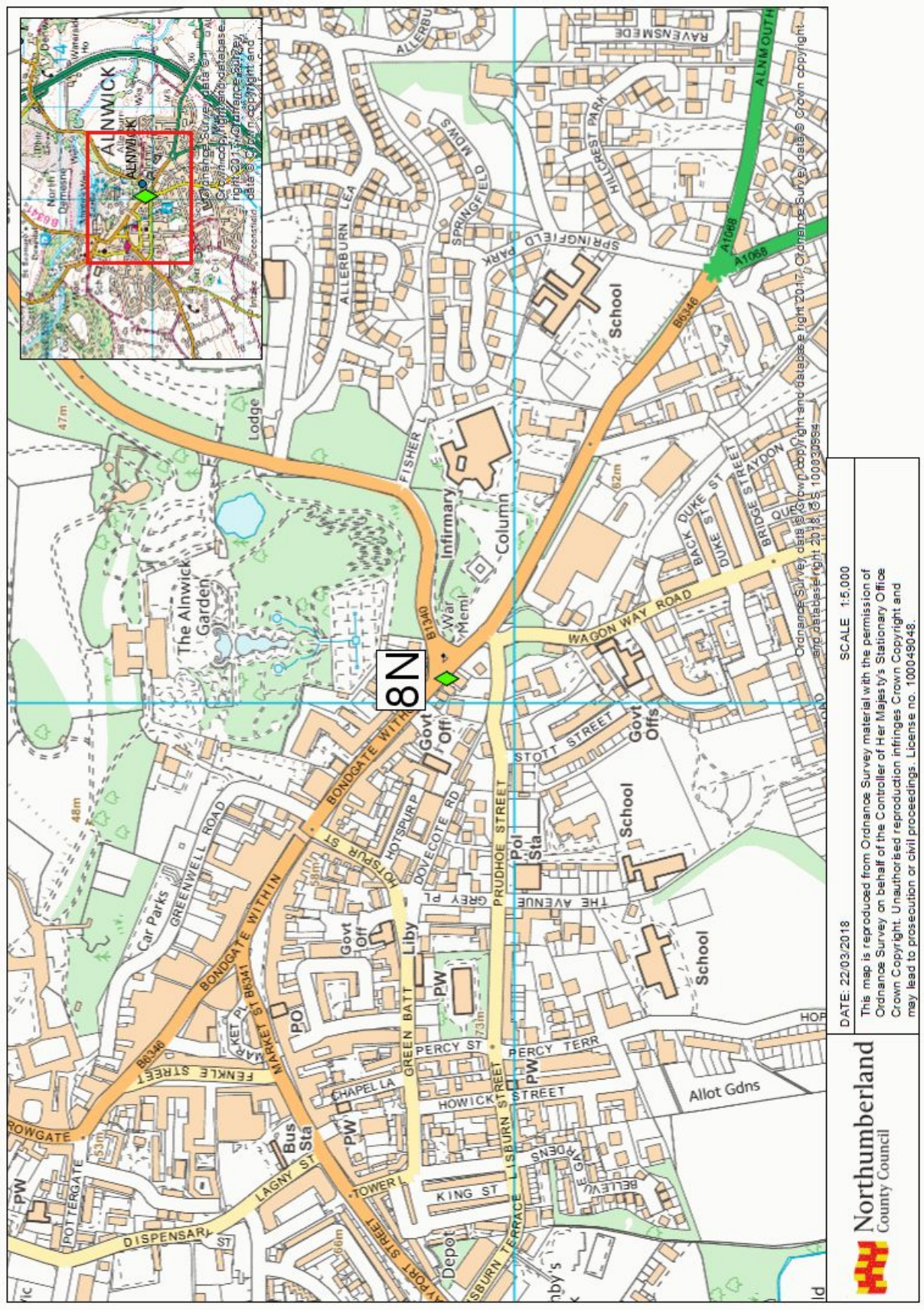


Figure D.4 – Morpeth NO_2 Diffusion Tube Monitoring Locations

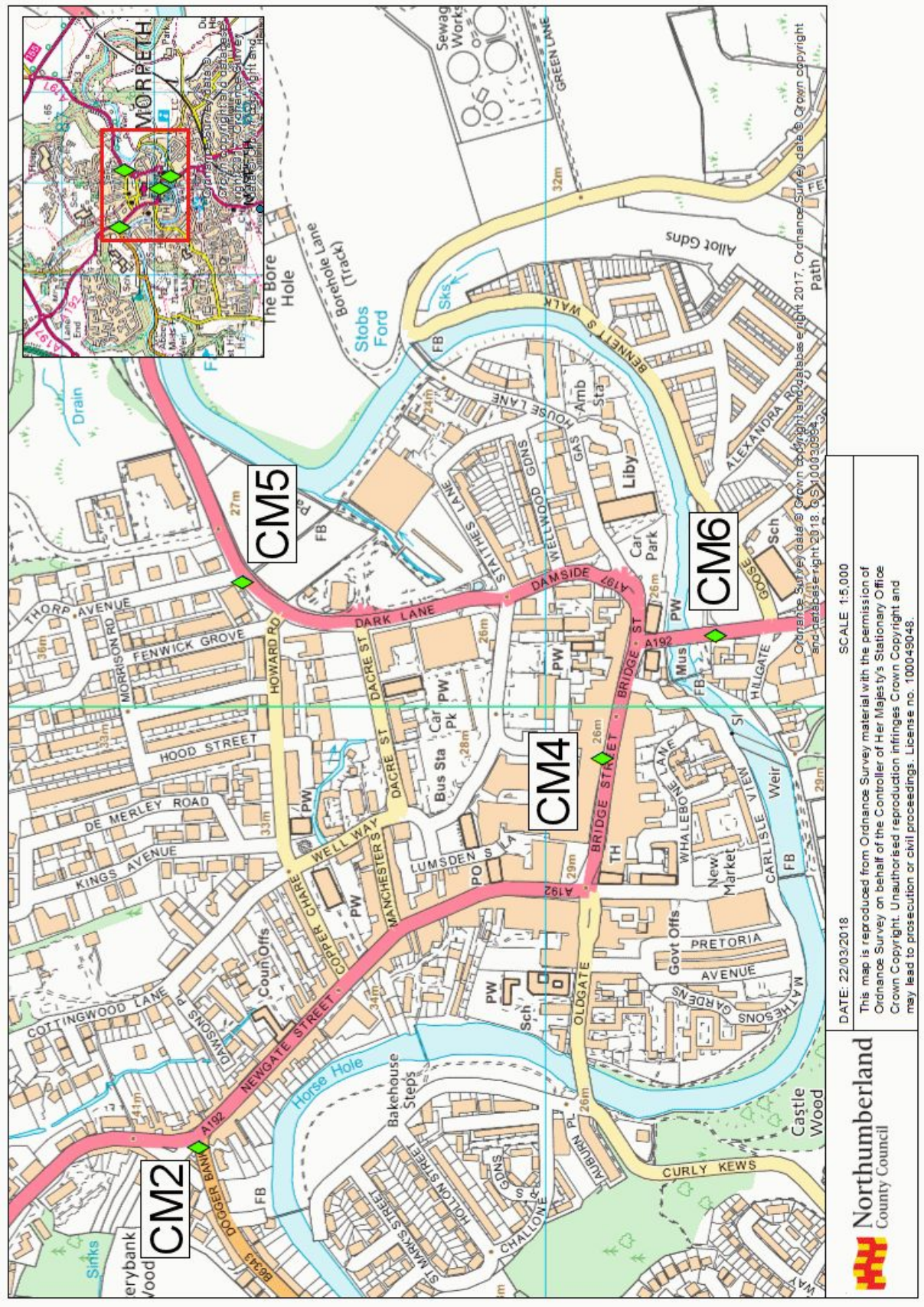


Figure D.5 – Clifton NO_2 Diffusion Tube Monitoring Location

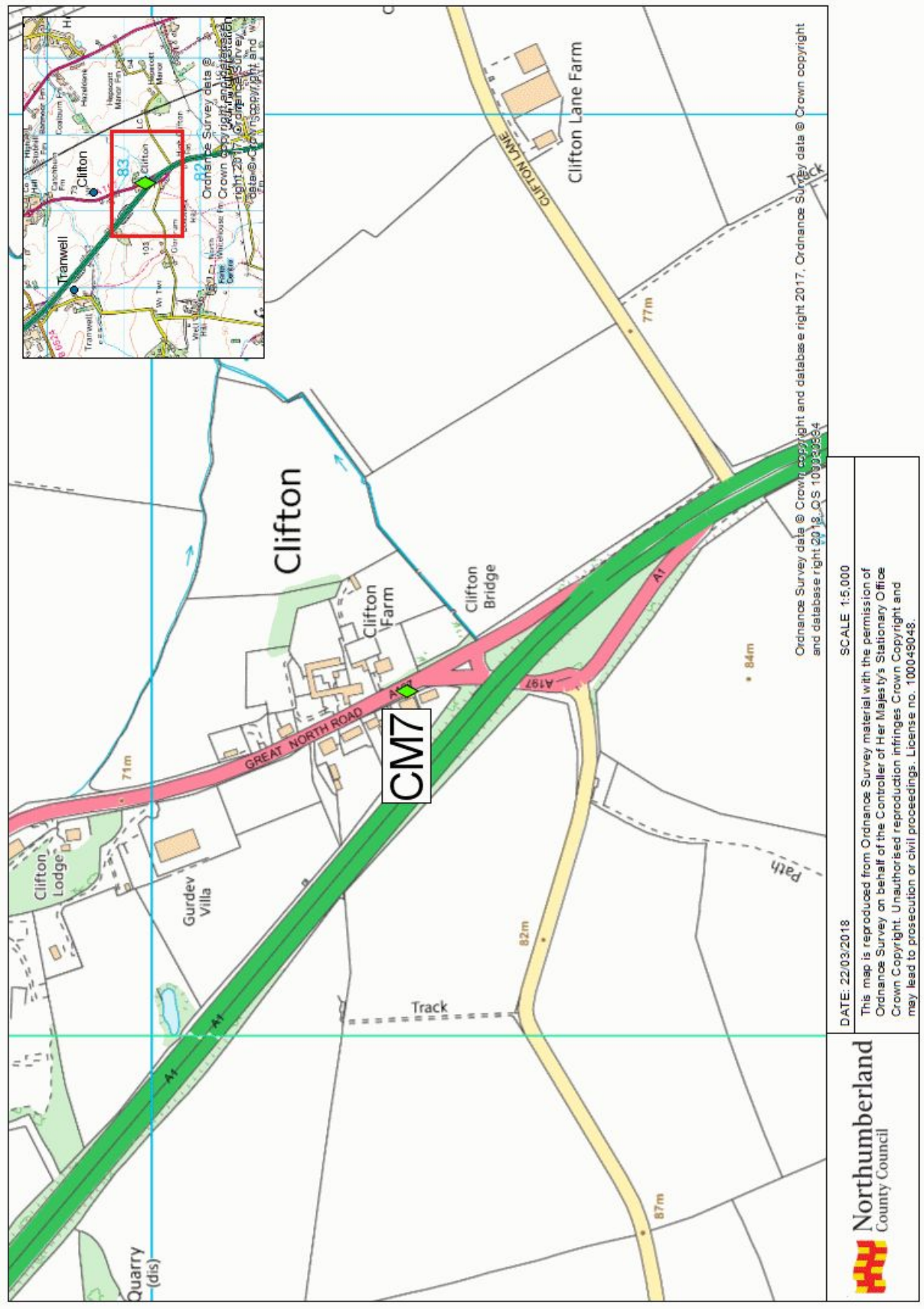


Figure D.6 – East Cramlington NO_2 Diffusion Tube Monitoring Locations

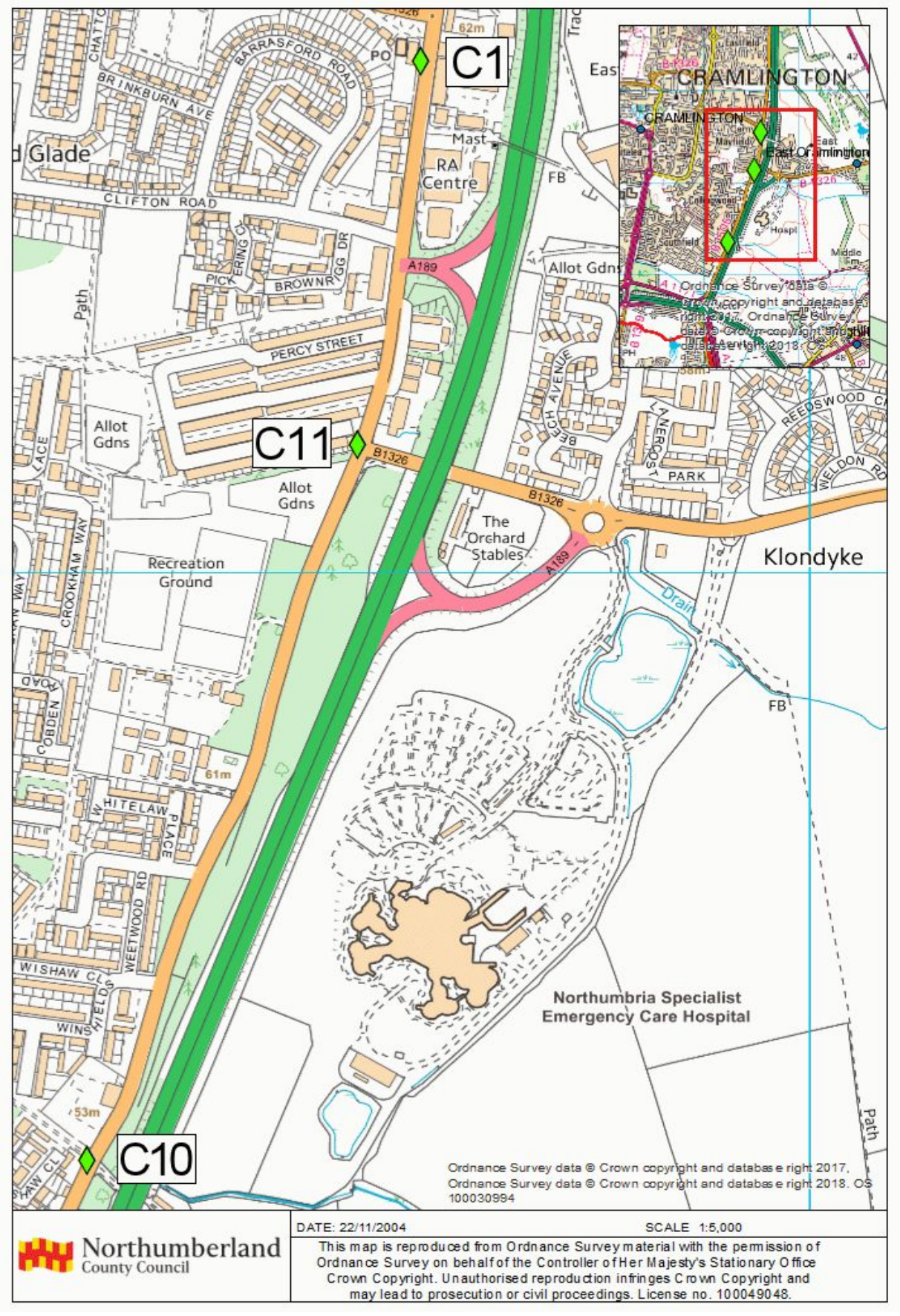


Figure D.7 – West Cramlington NO_2 Diffusion Tube Monitoring Locations

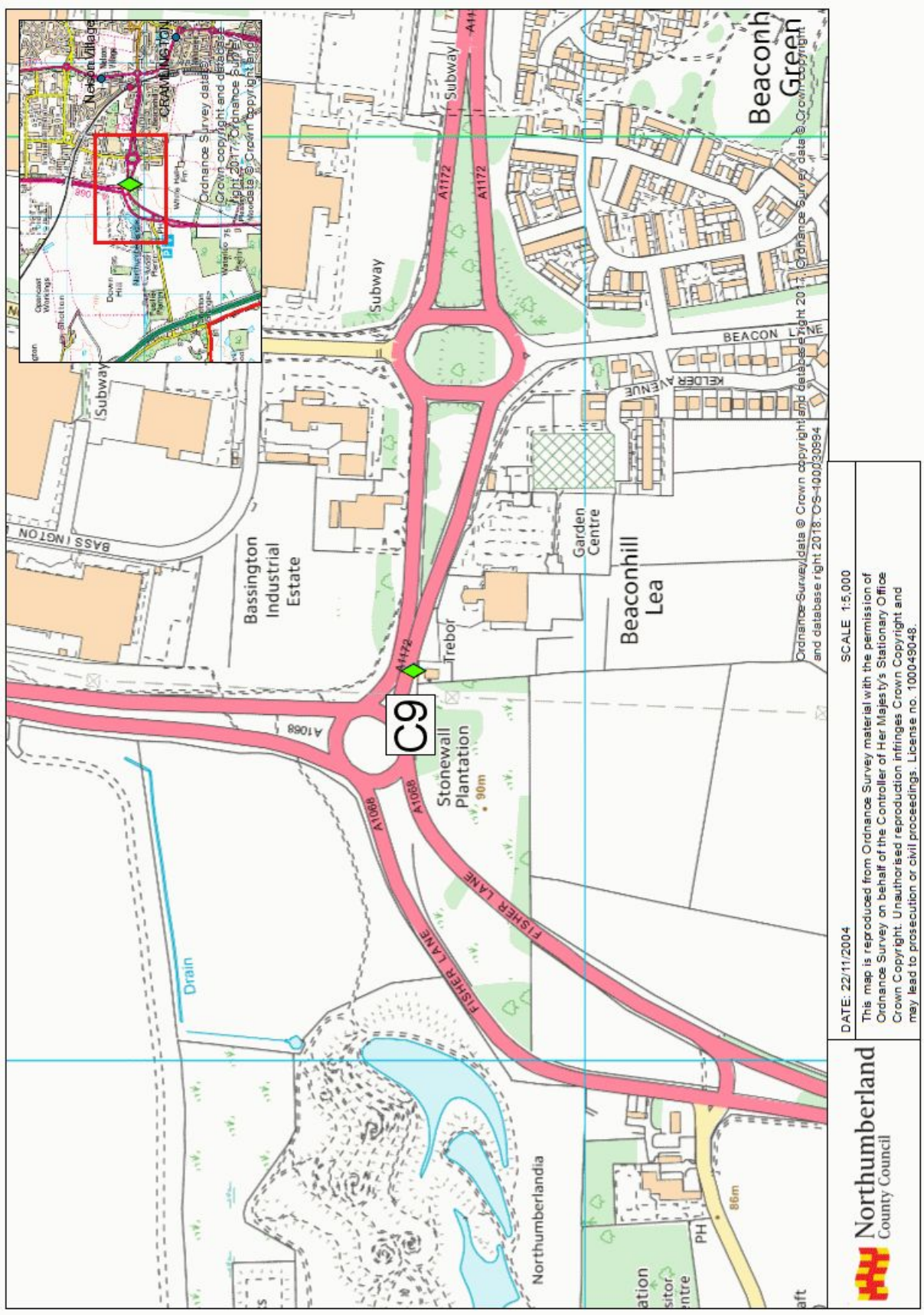


Figure D.8 – Ashington NO_2 Diffusion Tube Monitoring Locations

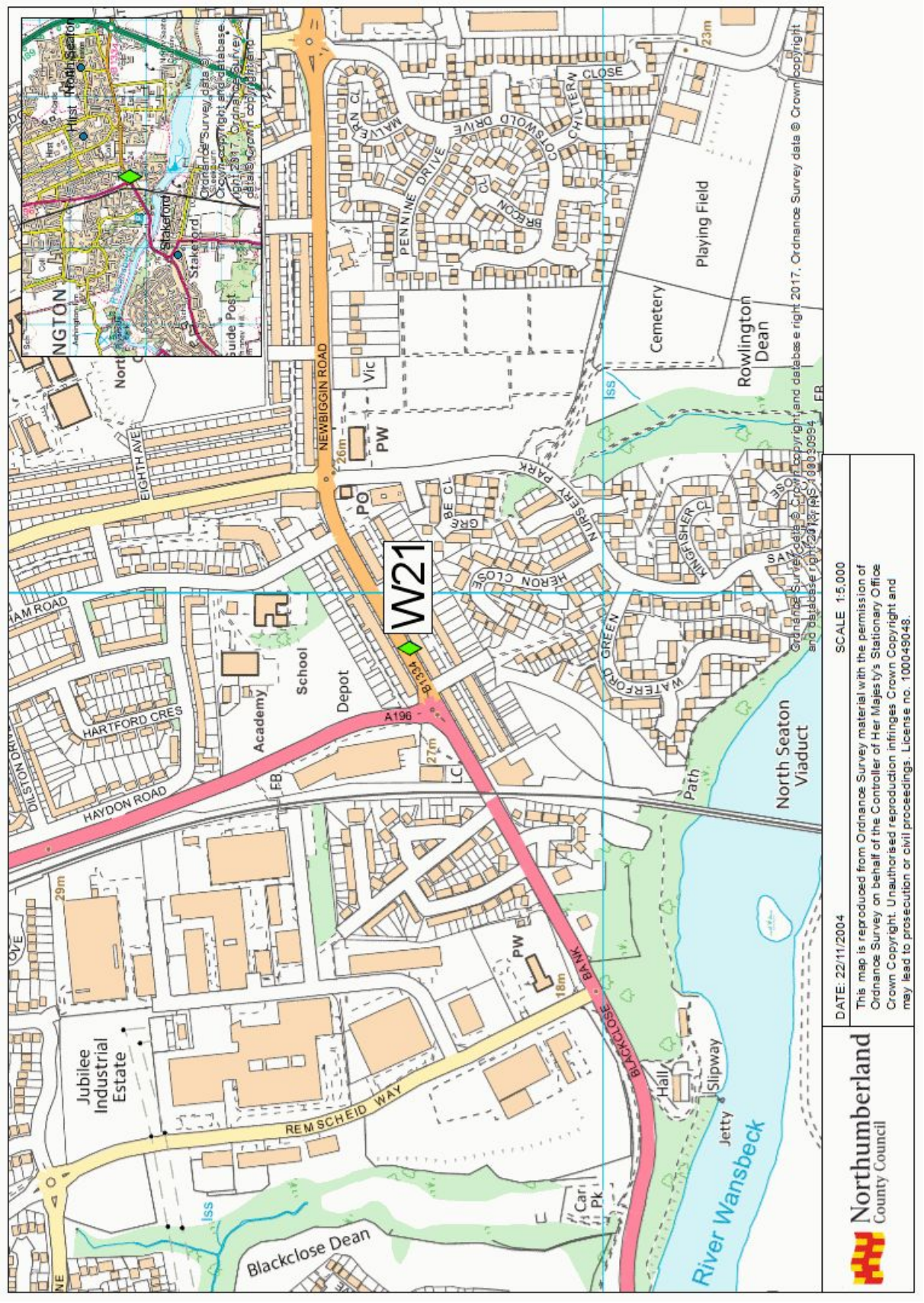
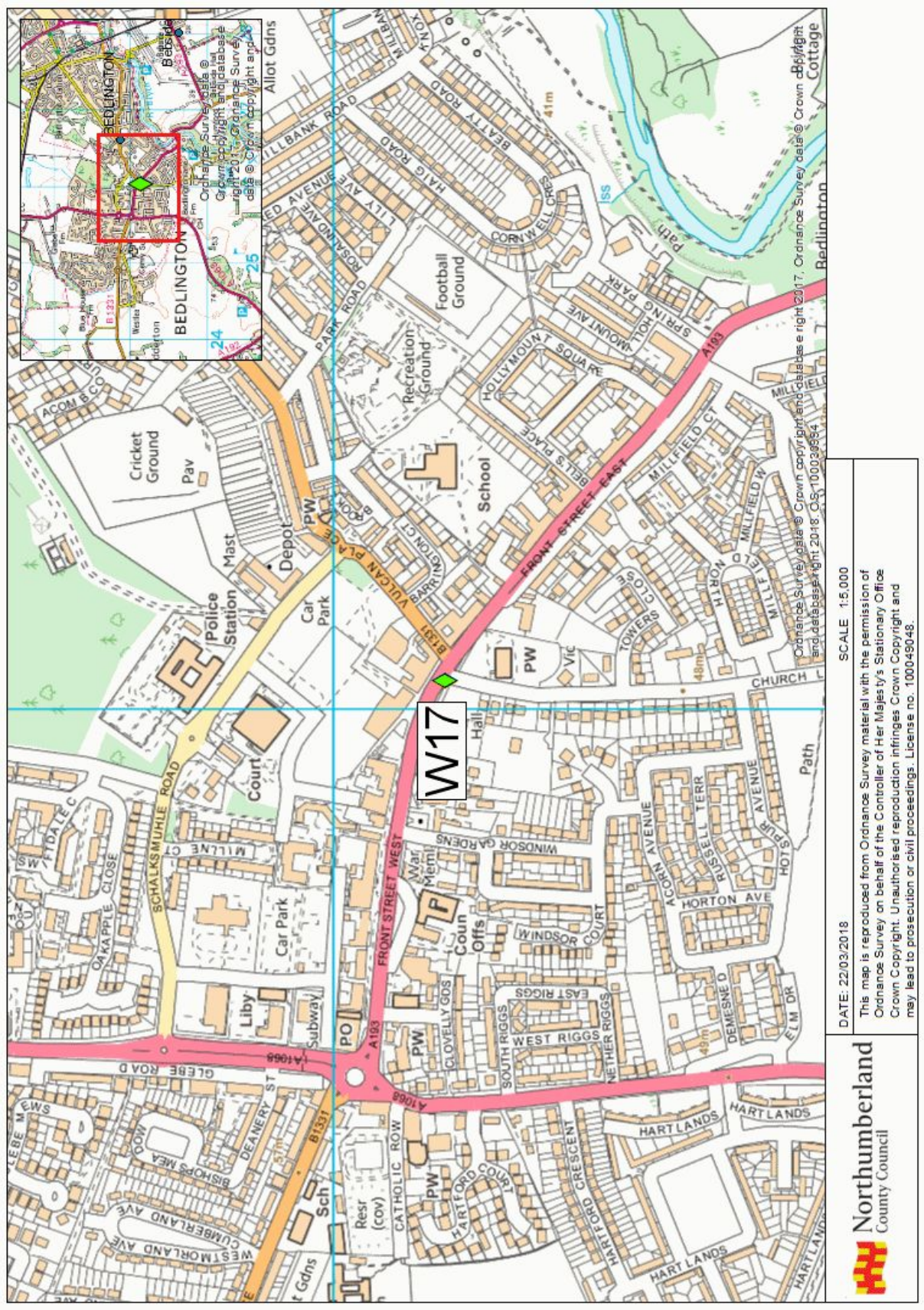


Figure D.9 – Bedlington NO_2 Diffusion Tube Monitoring Locations



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[4]		
	Concentration	Measured as	Equivalent Percentile
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	99.8th
	40 µg/m^3	Annual mean	/
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	90.4th
	40 µg/m^3	Annual mean	/
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	99.7th
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	99.2nd
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	99.9th

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

Appendix F: Data Summaries and Time Series Plots

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

	PM2.5	PM10	NO	NO2	NOx
Number Very High	0	0	1	0	2
Number High	0	0	2	0	4
Number Moderate	0	9	28	0	84
Number Low	319	310	5927	5955	5866
Maximum 15-minute Mean	71.3 µg m³	223.9 µg m³	N/A µg m³	N/A µg m³	N/A µg m³
Maximum Hourly Mean	63.7 µg m³	147.9 µg m³	689.3 µg m³	123.8 µg m³	776.7 µg m³
Maximum running 8-hour Mean	34.3 µg m³	56.3 µg m³	308.9 µg m³	78.7 µg m³	373.7 µg m³
Maximum running 24-hour Mean	26.0 µg m³	46.8 µg m³	128.2 µg m³	57.2 µg m³	160.9 µg m³
Maximum Daily Mean	26.3 µg m³	47.2 µg m³	133.4 µg m³	58.4 µg m³	167.1 µg m³
90.4th Percentile (PM) - Daily	-	25.2	-	-	-
99.8th Percentile (NO2) - Hourly	-	-	-	87.1	-
Average	6.2 µg m³	13.5 µg m³	30.6 µg m³	17.8 µg m³	46.9 µg m³
Data Capture	83.6 %	83.6 %	68.0 %	68.0 %	68.0 %

Hourly Time Series Plots

Figure F.1 – Cowpen Road Nitrogen Dioxide (NO_2) Time Series Plot

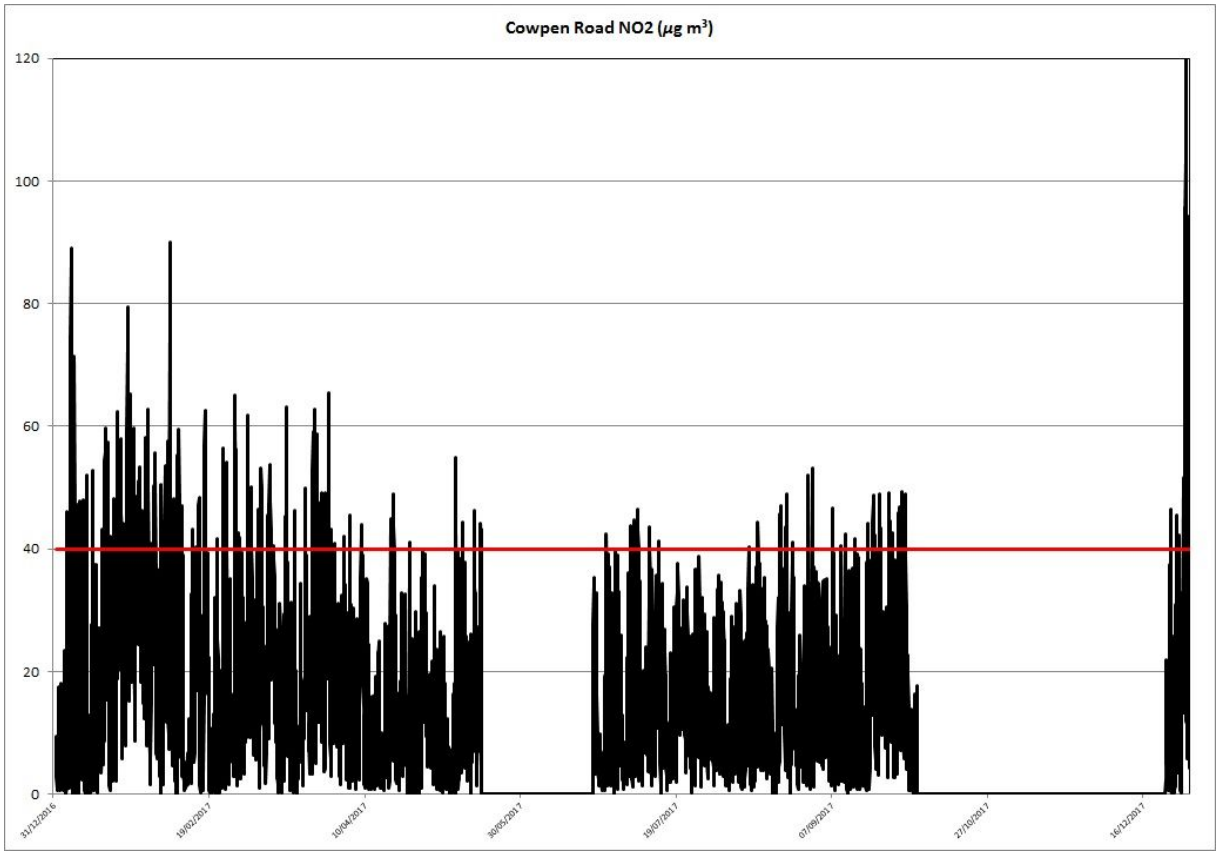


Figure F.2 – Cowpen Road Particulates (PM_{10}) Time Series Plot

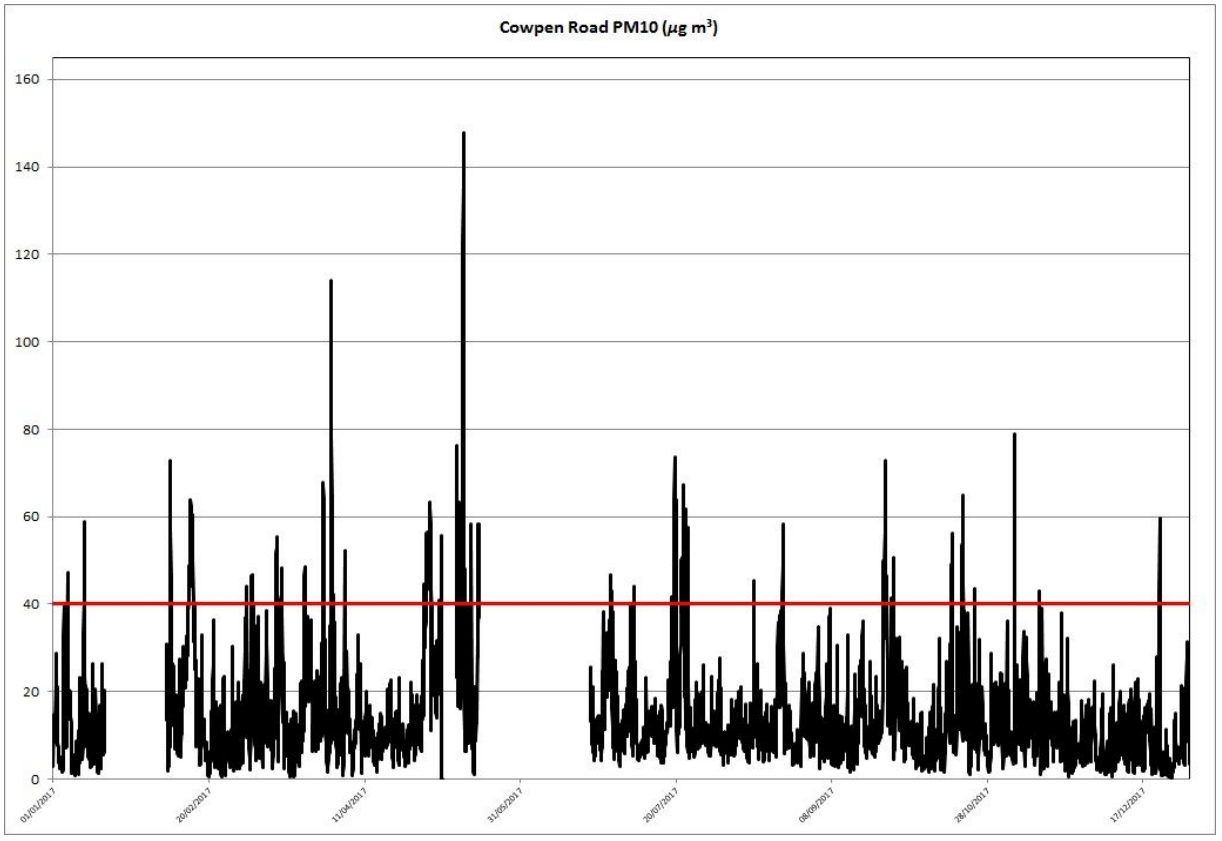


Figure F.3 – Cowpen Road Particulates ($PM_{2.5}$) Time Series Plot

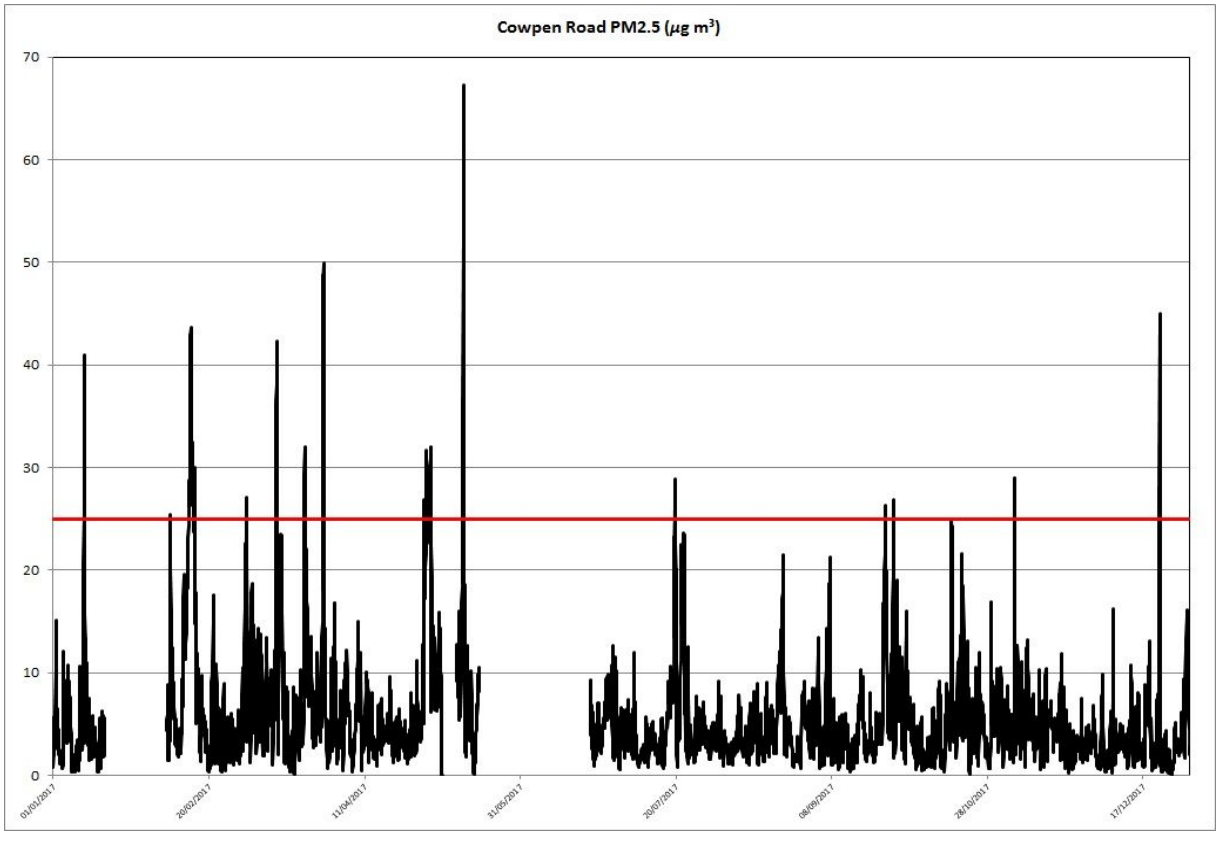


Table F.2 – Blyth Library / Town Centre AQ Monitoring Station - Air Quality Data Summary

	PM2.5	PM10
Number Very High	0	0
Number High	0	3
Number Moderate	0	9
Number Low	294	281
Maximum 15-minute Mean	164.2 μg m^3	492.5 μg m^3
Maximum Hourly Mean	72.7 μg m^3	163.2 μg m^3
Maximum running 8-hour Mean	40.7 μg m^3	88.1 μg m^3
Maximum running 24-hour Mean	34.8 μg m^3	59.5 μg m^3
Maximum Daily Mean	35.3 μg m^3	60.5 μg m^3
90.4th Percentile (PM) - Daily	-	27.4
99.8th Percentile (NO2) - Hourly	-	-
Average	5.5 μg m^3	13.4 μg m^3
Data Capture	80.1 %	80.1 %

Hourly Time Series Plots

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

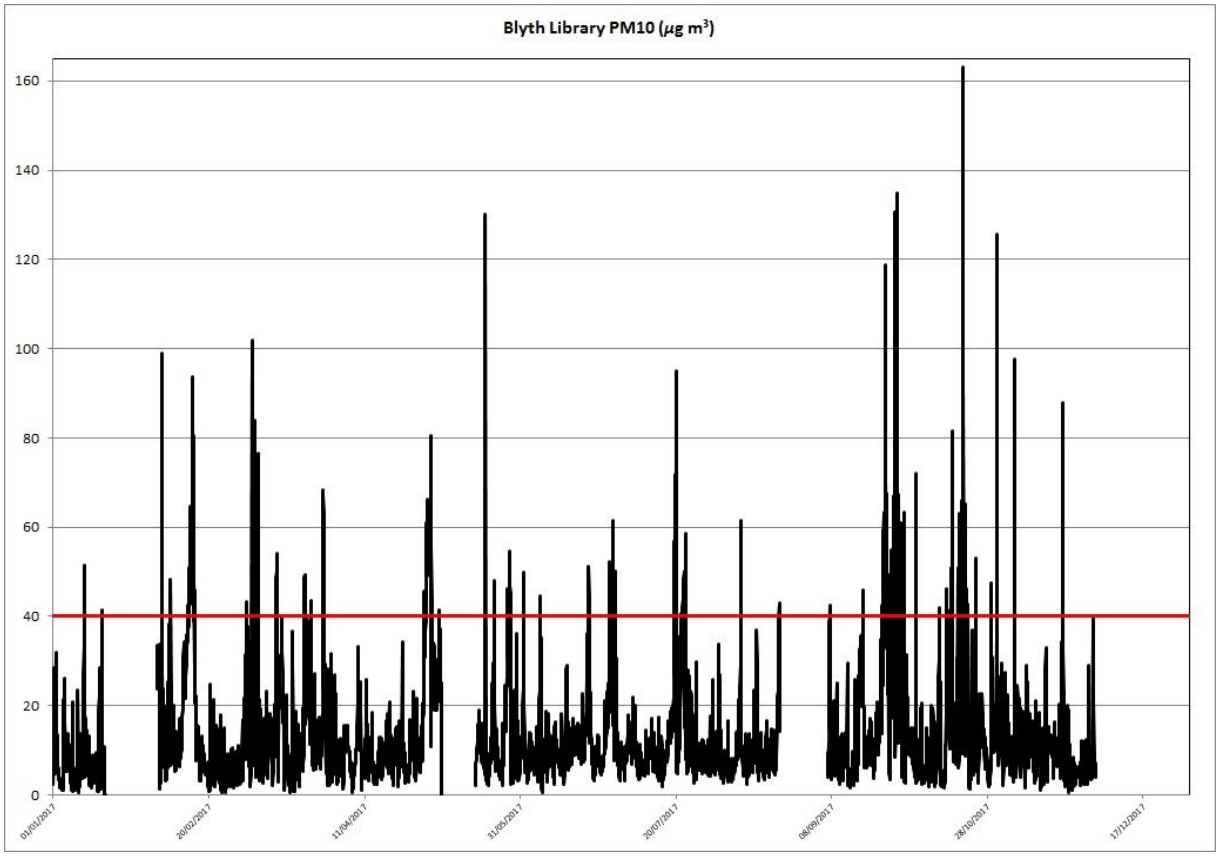
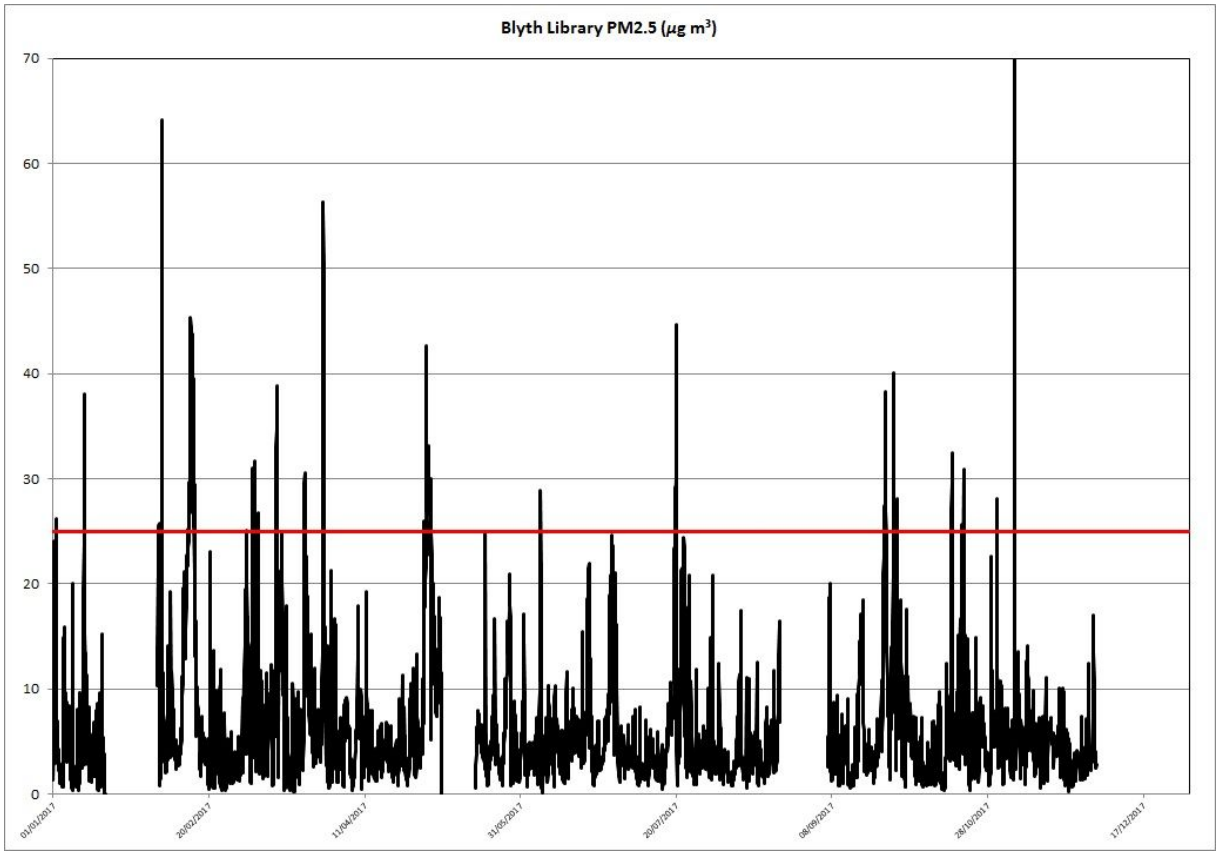


Figure F.5 – Blyth Library Particulates ($PM_{2.5}$) Time Series Plot



Appendix G: Annualising Data

Nitrogen Dioxide (NO_2) - API 200E (Cowpen Road)

The data capture for the Blyth Cowpen Road API 200E nitrogen dioxide monitor was 68.0 per cent in 2017, being less than 85 per cent this requires annualising under guidance and the 99.8th percentile calculated from the one hour mean data. Data was “missing” in two main blocks from 1300 on the 17 May until 0900 on the 22 June 2017 and from 1200 on the 04 October to 0600 on the 22 December 2017 (2801 hours of data).

The process of annualising involves calculating the annual mean and period means (for the periods of data capture) for the local monitor with below 85 percent data capture and annual means and period means from other monitors (for the same periods where data was collected on the local monitor), such as ones on the Automatic Urban and Rural Network (AURN):

https://uk-air.defra.gov.uk/networks/network-info?view=aurn.

A ratio of the annual mean and period mean from these other sources is used to multiply the annual mean for the local monitor and therefore adjust for the missing data.

Nitrogen dioxide monitors on the AURN network within 50 miles of the Blyth Cowpen Road site include Newcastle City Centre (10.7 miles), Sunderland Silksworth (15.7 miles), Stockton B1305 (40.1 miles), and Billingham (37.9 miles). The four stations collected 99.2, 92.6, 97.6 and 99.4 percent data in 2017, respectively.

Given the lack of choice over available monitors to use data from, one of the sites is Urban Traffic (Stockton B1305) and another is Urban Industrial (Billingham) whereas the other two are Urban Background.

The ratio of the annual mean and period mean for three of the sites was 0.96, the ratio varies little between the sites from 0.94 to 0.99.

The result is that the annualised value for the Blyth Cowpen Road API 200E annual mean is lowered to 17.1 $\mu g/m^3$ by less than one microgramme.

Table G.1 – NO_2 Annualising Calculation

	Data Capture (%)	*Annual Mean 2017 (AM)*	*Period Mean 2017 (PM)*	*Annualised Value*
Cowpen API	68	17.8	17.8	**17.1**
Long Term Sites		*Annual Mean 2017 (AM)*	*Period Mean 2017 (PM)*	*Ratio (AM/PM)*
Newcastle City Centre	99.2	27.6	28.0	0.99
Sunderland Silksworth	92.6	12.2	12.6	0.97
Stockton B1305	97.6	15.8	16.6	0.95
Stockton Eaglescliffe	98.9	11.8	12.5	0.94
Billingham	99.4	16.9	17.6	0.96
			Average (Ra)	0.96

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

The data capture for the Blyth Library Osiris particulate monitor was 80.1 per cent in 2017, being less than 85 per cent this requires annualising under the guidance and the 90.4th percentile calculated for the one hour mean. Data was “missing” in four main blocks from 2100 on the 17 January until 1300 on the 03 February, from 2000 on the 05 May to 1200 on the 16 May, from 1100 on the 22 August to 1600 on the 06 September and from 2300 on the 02 December until 0000 on the 31 December (1741 hours of data).

Particulate (PM monitors on the AURN network within 50 miles of the Blyth Library site include Newcastle City Centre (11.1 miles), Middlesbrough (40.2 miles) and Stockton Eaglescliffe (42.6 miles). The three stations collected 97.2, 95.4 and 97.3 per cent data in 2017, respectively.

Table G.2 – Blyth Library PM_{10} Annualising Calculation

	Data Capture (%)	*Annual Mean 2017 (AM)*	*Period Mean 2017 (PM)*	*Annualised Value*
Blyth Library Osiris	80.1	13.4	13.4	**14.8**
Long Term Sites		*Annual Mean 2017 (AM)*	*Period Mean 2017 (PM)*	*Ratio (AM/PM)*
Newcastle City Centre	97.2	11.8	10.4	1.13
Middlesbrough	95.4	14.1	13.0	1.08
Stockton Eaglescliffe	97.3	15.0	13.8	1.09
			Average (Ra)	1.10

Given the lack of choice over available monitors to use data from, one of the sites is Urban Traffic (Stockton Eaglescliffe) and another is Urban Industrial (Middlesbrough) whereas Newcastle City Centre is an Urban Background site.

For PM_{10}, the ratio of the annual mean and period mean for three of the sites was 1.10, the ratio varies little between the sites from 1.08 to 1.13.

The result is that the annualised value for the Blyth Library Osiris PM_{10} annual mean is increased from 13.4 $\mu g/m^3$ to 14.8 $\mu g/m^3$.

Table G.3 – Blyth Library $PM_{2.5}$ Annualising Calculation

	Data Capture (%)	***Annual Mean 2017 (AM)***	***Period Mean 2017 (PM)***	***Annualised Value***
Cowpen Road Osiris	83.6	5.5	5.5	**6.0**
Long Term Sites		***Annual Mean 2017 (AM)***	***Period Mean 2017 (PM)***	***Ratio (AM/PM)***
Newcastle City Centre	97.4	7.0	6.3	1.11
Middlesbrough	92.7	7.5	6.9	1.09
Stockton Eaglescliffe	97.0	8.5	7.8	1.09
			Average (Ra)	1.10

For $PM_{2.5}$, the ratio of the annual mean and period mean for three of the sites was 1.10, the ratio varies little between 1.09 to 1.11 at the three sites.

The result is that the annualised value for the Blyth Library Osiris $PM_{2.5}$ annual mean is increased from 5.5 $\mu g/m^3$ to 6.0 $\mu g/m^3$.

Particulates (PM_{10} and $PM_{2.5}$) - TNO3314 - Cowpen Road

The data capture for the Blyth Cowpen Road Osiris particulate monitor was 83.6 per cent in 2017, being less than 85 per cent this requires annualising under the guidance and the 99.8th percentile calculated for the one hour mean. Data was "missing" in three main blocks from 1200 on the 17 January until 1200 on the 06 February, from 0000 on the 05 May to 0900 on the 10 May and from 2300 on the 18 May to 1100 on the 22 June (1438 hours of data).

Particulate (PM monitors on the AURN network within 50 miles of the Blyth Library site include Newcastle City Centre (10.8 miles), Middlesbrough (40.9 miles) and

Stockton Eaglescliffe (43.1 miles). The three stations collected 97.2, 95.4 and 97.3 per cent data in 2017, respectively.

Given the lack of choice over available monitors to use data from, one of the sites is Urban Traffic (Stockton Eaglescliffe) and another is Urban Industrial (Middlesbrough) whereas Newcastle City Centre is an Urban Background site.

Table G.4 – Cowpen Road PM_{10} Annualising Calculation

	Data Capture (%)	***Annual Mean 2017 (AM)***	***Period Mean 2017 (PM)***	***Annualised Value***
Cowpen Road Osiris	83.6	13.5	13.2	**15.3**
Long Term Sites		***Annual Mean 2017 (AM)***	***Period Mean 2017 (PM)***	***Ratio (AM/PM)***
Newcastle City Centre	97.2	11.8	10.0	1.18
Middlesbrough	95.4	14.1	12.8	1.10
Stockton Eaglescliffe	97.3	15.0	13.5	1.11
			Average (Ra)	1.13

For PM_{10}, the ratio of the annual mean and period mean for three of the sites was 1.13, the ratio varies little between the sites from 1.10 to 1.18.

The result is that the annualised value for the Blyth Cowpen Road Osiris annual mean is increased from 13.5 $\mu g/m^3$ to 15.3 $\mu g/m^3$.

Table G.5 – Cowpen Road $PM_{2.5}$ Annualising Calculation

	Data Capture (%)	***Annual Mean 2017 (AM)***	***Period Mean 2017 (PM)***	***Annualised Value***
Blyth Library Osiris	80.1	6.2	6.2	**6.8**
Long Term Sites		***Annual Mean 2017 (AM)***	***Period Mean 2017 (PM)***	***Ratio (AM/PM)***
Newcastle City Centre	97.4	7.0	6.5	1.08
Middlesbrough	92.7	7.5	6.9	1.09
Stockton Eaglescliffe	97.0	8.5	7.7	1.10
			Average (Ra)	1.09

For $PM_{2.5}$, the ratio of the annual mean and period mean for three of the sites was 1.09, the ratio varies little between 1.08 to 1.10 at the three sites.

The result is that the annualised value for the Cowpen Road Osiris $PM_{2.5}$ annual mean is increased from 6.2 $\mu g/m^3$ to 6.8 $\mu g/m^3$.

Glossary of Terms

Abbreviation	Description
AM	Annual Mean
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
AQO	Air Quality Objectives, sometimes referred to as the Air Quality Standards (AQS)
ASR	Annual Status Report (for air quality)
AURN	Automatic Urban Rural Network
BAM	Beta Attenuation Monitor
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
DEFRA	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – includes an air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LGR	Local Government Reorganisation
LSO	Local Site Operatives
LTP	Local Transport Plan
NO	Nitrous Oxide
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PAH	Poly-Aromatic Hydrocarbons
PM	Period Mean
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10 μm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5 μm or less
QA/QC	Quality Assurance / Quality Control
SO_2	Sulphur Dioxide
…	…

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