Northumberland

Northumberland County Council

2016 Air Quality Annual Status Report (ASR)

Northumberland County Council

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

Date August 2016

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Executive Summary: Air Quality in Our Area

This is the local air quality 2016 Annual Status Report for Northumberland County Council. 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 2015, including monitoring results for the calendar year.

The main findings for 2015 are:

- The Council is involved in a number of projects which have the aim of improving air quality either directly or indirectly (ie economic, fuel economy, health benefits etc.)

- The Council has continued to monitor air quality at two monitoring stations in Blyth with three real-time, continuous analysers.

- 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.

- The national air quality objectives have been met for annual means and hourly exceedance for particulates (PM_{10}) and nitrogen dioxide (NO_2).

- $PM_{2.5}$ meets the unofficial cap limit and also meets the stricter objective set in Scotland at one of the busiest roads in Northumberland, with relevant receptors present.

- 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 2017.

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. The NO_2 monitor was removed in from the Blyth Library site in 2013.

Measured particulate levels are less clear but still indicate a slight downward trend for the Cowpen Road site but an almost static level for three years at the Blyth Library site. In 2014 there was a pronounced drop in measured levels at the Blyth Library site. This change may be as a result of dust generated in the previous year(s) by the redevelopment of the library during 2012-2013 and a change in the type of monitor in August 2013 (from BAM to Osiris).

Air quality objectives for NO_2 and PM_{10} continue to be met in Northumberland and the Council continuously examines locations with high traffic volumes with relevant receptors as possible locations for diffusion tubes.

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

The Blyth Air Quality management Area (AQMA) declared for particulates (PM_{10}) was revoked in 2012. This was detailed in our 2012 Updating and Screening Assessment.

Air quality impacts are regularly addressed through the planning process, particularly where they involve significant changes in road traffic. Generally, compliance with a DMRB air quality screening assessment is required.

The construction of the Morpeth Northern Bypass has predicted, through modelling, to have a positive impact upon air quality when it becomes operational at the end of 2016. Diffusion tube assessments of pre-opening background levels have been completed and subsequent assessments in Year 1 and Year 5 will be carried out

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[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

after the bypass opens to confirm the model and demonstrate a positive impact for residents within Morpeth. This will be reported in subsequent air quality reports.

Since Local Government Reorganisation (LGR) in April 2009, the air quality in Northumberland has consistently met the national Air Quality Objectives for all pollutants. One exception was an anomalous annual mean exceedance for nitrogen dioxide in 2010. This was assessed through a Detailed Assessment and no further action was required. Large programmes of diffusion tube (NO2 and BTEX) have been greatly reduced since LGR because of long-term compliance.

Monitoring from 2015 has indicated a trend of decreasing nitrogen dioxide and particulate levels at our continuous monitoring stations, nitrogen dioxide monitoring ceased at Blyth Library in 2013.

Northumberland currently has no declared Air Quality Management Areas (AQMAs) and there is no indication that one would need to be declared based upon monitoring results.

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 is currently undergoing conversion to be fuelled by biomass and has been sold to Energetický a Průmyslový Holding (EPH), the Czech-based company. It is understood that the conversion will be completed by the end of 2016. It is hoped that a new partnership will be revived at that time.

There are no other individual, major commercial air pollution sources within Northumberland. Other main industries within Northumberland are controlled through the Environmental Permitting legislation where they pose a risk to air quality.

The main remaining impact upon air quality within Northumberland is road traffic which is monitored at a number of locations with either continuous or non-continuous methods.

To date, there has been little work done on any action plans or collaborative work with other agencies, departments etc., however, departments within Northumberland County Council, neighbouring councils and non-governmental groups have initiated a number of projects aimed at improving travel options, access to those travel options and improving fuel consumption on fleet vehicles.

Actions to Improve Air Quality

A full list of actions / projects are contained in Table 2.1. However, below are a summary of some of the actions/projects.

Go Smarter Northumberland (GSN) Scheme

During 2012, Northumberland County Council was successful in its bid for three years of funding through the Department of Transport's local sustainable transport fund (LSTF). Since this time, the council has received additional funding to deliver the project during 2015/16.

The project delivered through local sustainable transport funding (LSTF), Go Smarter Northumberland, 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 southeast Northumberland, where there are concentrations of key economic, social and environmental challenges, but also areas where transport to work barriers can be addressed by encouraging greater use of sustainable travel modes.

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

The objectives of the Northumberland LSTF bid are 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 is 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 who operate the buses. This has improved thirty fleet buses which are on a route which includes journeys to Blyth in Northumberland.

More details are available here:

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

and here:

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

Taxis

Northumberland County Council Licensing require that taxis be upgraded to Euro 5 in the coming years.

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

- The Euro V Technology standard in respect of passenger cars.

- The Euro IV Technology standard in respect of light commercial vehicles

One of the larger taxi companies in Blyth have of their own volition moved to mostly LPG fleet and some electric vehicles.

Biomass

Where planning applications have indicated a biomass combustion component these have been considered through the planning process and The Clean Air Act, 1993. However, the number of planning applications are limited and there were only two in 2015 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; short-term construction phase and long-term operation phase.

Assessment of the operational phase is normally done through the methodology contained within the Design Manual for Roads and Bridges (DMRB). The trigger for requiring and air quality assessment is contained within:

"*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)*"

We 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 utilises two management systems for its fleet vehicles; Ashwood's Lightfoot and Masternaut. The former gives voice warnings to the driver where inappropriate driving has occurred (poor gear choices, excessive acceleration etc.) and delivers reports to manager where a violation occurs. The latter tracks vehicles movements and in particular, any exceedances of a speed limit and engine idling and this, too, reports to managers.

Additionally, the fleet replacement program at Northumberland County Council requires all new vehicles over 3.5 tonne to be either Euro 5 or Euro 6 emission standard.

Local Priorities and Challenges

Northumberland has consistently met the limits in the national Air Quality Objectives including the "cap" limit for $PM_{2.5}$ and as such there has been no impetus to develop any air quality action plans or strategies. However, as a momentum now seems to be gathering towards improving air quality above and beyond the AQS limits. The Public

Health Protection Unit will play a more pivotal rôle in future co-ordination of projects which have a positive improvement in air quality.

One of these will be to engage 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 generator.

- Assessing the impact of small biomass appliances including wood burning stoves within the more populated towns in the county.

- Engaging with the Director of Public and raise the awareness of air quality in relation to the Public Health Outcomes Framework.

- Engaging with other council departments and feed into projects or programmes which have any aspect relating to air quality.

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

Table of Contents

List of Tables

List of Figures

1   Local Air Quality Management

This report provides an overview of air quality in Northumberland County Council during 2015. 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 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

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of the objectives.

Northumberland County Council does not have any Air Quality Management Areas.

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 the current reporting year of 2015 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1.

Most of the projects listed in Table 2.1 were originated without the involvement of the Public Health Protection Unit.

Northumberland County Council's priorities for the coming year are to become involved and influence decisions where air quality impacts may be relevant.

Table 2.1   Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	For special events (Morpeth Gathering & Fair Day, Tall Ships at Blyth)	Bus based Park & Ride	Alternatives to private vehicle use	NCC	Various	Various	N/A	N/A	N/A	On going	/
2	HGV routing used by the LPA for some quarries / surface mine schemes	Route Management Plans/ Strategic routing strategy for HGV's	Freight and Delivery Management	NCC	Various	Various	N/A	N/A	N/A	On going	/
3	Bids for funding to improve bus fleet vehicles	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	Policy Guidance and Development Control	NECA	/	/	/	N/A	/	Completed	Bid by Newcastle and Sunderland city councils – however bus fleet enters Northumberland
4	All taxis to be EURO 5	Taxi emission incentives	Promoting Low Emission Transport	NCC	N/A	Up to 2017	Complete conversion of taxi fleets to Euro 5	N/A	/	1 April 2017	http://www.northumberland.gov.uk/Business/Licences/Taxi.aspx
5	Home working some departments (such as IT)	Encourage / Facilitate home-working	Promoting Travel Alternatives	NCC	/	/	/	N/A	/	On going	/
6	Go Smarter	Personalised Travel Planning	Promoting Travel Alternatives	NCC	/	2012	/	N/A	/	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	Promotion of cycling	Promoting Travel Alternatives	NCC	/	/	/	N/A	/	On going	http://gosmarter.co.uk/
8	Go Smarter promoting Modeshift STARS	School Travel Plans	Promoting Travel Alternatives	NCC	/	/	/	N/A	/	On going	http://modeshiftstars.org/
9	Travel planner and cycle routes	Via the Internet	Public Information	NCC	/	/	/	N/A	/	On going	http://www.northumberland.gov.uk/Highways/Cycling.aspx
10	Informal anti-idling policy through taxi licensing	Anti-idling enforcement	Traffic Management	NCC	/	/	/	N/A	/	On going	/

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
11	20mph zones imposed in many residential areas especially surrounding schools	Reduction of speed limits, 20mph zones	Traffic Management	NCC	/	/	/	N/A	/	On going	http://www.northumberland.gov.uk/Highways/Roads/Traffic.aspx#4trafficregulationorderprepared
12	Parking enforcement on highways carried out by Council	Workplace Parking Levy, Parking Enforcement on highway	Traffic Management	NCC	/	/	/	N/A	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.	Cycle network	Transport Planning and Infrastructure	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.	Driver training and ECO driving aids	Vehicle Fleet Efficiency	NCC	N/A	/	N/A	N/A	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	Driver training and ECO driving aids	Vehicle Fleet Efficiency	NCC	N/A	/	N/A	N/A	/	On going	http://www.masternaut.com/
16	Bid for Euro 6 buses	Promoting Low Emission Public Transport	Vehicle Fleet Efficiency	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	Testing Vehicle Emissions	Vehicle Fleet Efficiency	NCC	N/A	N/A	N/A	N/A	/	On going	http://www.northumberland.gov.uk/Highways/Roads/Commercial.aspx#mottesting
18	Liaise with the Director of Public Health in Northumberland on issues 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/Health-and-social-care/Public%20Health/DPH-Annual-Report-Northumberland-2015.pdf

NCC refers to Northumberland County Council
NECA refer to the North East Combined Authority

2.3 PM$_{2.5}$ – Local Authority Approach to Reducing Emissions and or Concentrations

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

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

Northumberland County Council invested in new monitoring equipment in 2013 in anticipation that monitoring of PM$_{2.5}$ was to become mandatory. 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$_{2.5}$:

- Continue to monitor PM$_{2.5}$ at specific locations in Northumberland
- Report the levels of PM$_{2.5}$ at these location on an annual basis.
- Monitor for any exceedance of the "cap" limit of 25 μg/m³.
- Continue to instigate and support initiatives which directly or indirectly improve air quality within Northumberland.
- Initiate a dialogue with the Director of Public Heath in Northumberland and look towards better integration of air quality and the Public Health Outcomes Framework.

From two years of PM$_{2.5}$ monitoring data adjacent to Cowpen Road, compliance with the the "cap" limit of 25 μg/m³ and even compliance with the stricter 10 μg/m³ imposed in Scotland has been demonstrated

DEFRA background maps for PM$_{2.5}$ for 2015 have been examined and although the model slightly over-estimates the measured levels at Cowpen Road and the Blyth Library site they do provide a useful tool for looking at the rest of the County which indicates no significant PM$_{2.5}$ levels and no modelled levels above 10 μg/m³.

Should reviewing and assessing of PM$_{2.5}$ become a statutory requirement then this position may be revised.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Northumberland County Council undertook automatic (continuous) monitoring at two sites during 2015. Table A.1 in Appendix A shows the details of the sites.

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

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

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

3.1.2 Non-Automatic Monitoring Sites

Northumberland County Council undertook non-automatic (passive diffusion tube) monitoring of NO_2 at 19 sites during 2015.

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

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) 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 adjustments are provided in Appendix C.

3.2.1   Nitrogen Dioxide (NO$_2$)

Northumberland County Council maintains one continuous nitrogen dioxide monitor at the Cowpen Road site, no service contract is in place for this instrument and as reported in previous reports the intention is to mothball this instrument should it breakdown at any point. Data capture for this instrument in 2015 was 99 per cent and therefore there was no need to annualise the data or present the relevant percentile in place of actual measured data.

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40 $\mu g/m^3$.

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B.

Table A. in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200 $\mu g/m^3$, not to be exceeded more than 18 times per year.

3.2.2   Particulate Matter (PM_{10})

Northumberland County Council maintains two continuous 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 these instruments in 2015 was 83 and 86 per cent and therefore the data from the Cowpen Road monitor has been annualised and the relevant percentiles presented.

Table A5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40 $\mu g/m^3$.

Table A. in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50 $\mu g/m^3$, not to be exceeded more than 35 times per year.

3.2.3   Particulate Matter ($PM_{2.5}$)

Table A. in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 2 years.

The annual mean in 2015 has been 6 $\mu g/m^3$ for both monitoring sites (Blyth Library & Cowpen Road), this is slightly lower than the results for 2014. These results are substantially below the "cap" limit of 25 $\mu g/m³$ and below the limit set in Scotland for $PM_{2.5}$.

3.2.4   Sulphur Dioxide (SO_2)

Northumberland County Council no longer routinely monitor for sulphur dioxide.

Appendix A: Monitoring Results

Table A.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure) [1]	Distance to kerb of nearest road (N/A if not applicable) [2]	Inlet Height (m)
BL	Blyth Library	Urban Centre / Roadside	X431536	Y581531	PM$_{10}$	NEP	N	Y (3m)	3m	3
CR	Cowpen Road	Roadside	X428817	Y581815	NO$_2$, PM$_{10}$	CL, NEP	N	Y (3m)	3m	3

CL = chemiluminescent
NEP = nephelometer

(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	OS Grid Ref		Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road [2]	Tube collocated with Continuous Analyser??	Height (m)
8N	Bondgate Without, Alnwick	Roadside	X419025	Y613074	NO$_2$	N	20	1	N	3
B1	Waterloo Road, Blyth	Urban Centre	X431537	Y581537	NO$_2$	N	5	1	N	3
B3	Cowpen Rd. West, Blyth	Roadside	X428815	Y581813	NO$_2$	N	6	1	Y	3
B5	Cowpen Rd. East, Blyth	Roadside	X429850	Y581947	NO$_2$	N	25	1	N	3
B11	Blyth YMCA, Blyth	Urban Centre	X431160	Y581415	NO$_2$	N	2	1	N	3
B12	Bridge St, Blyth	Urban Centre	X431612	Y581586	NO$_2$	N	1	1	N	3
B15	South Newsham Road	Roadside	X430552	Y578950	NO$_2$	N	6	2	N	3
C1	High Pit Road, Cramlington	Roadside	X427593	Y576555	NO$_2$	N	1	1	N	3
C9	Trebor, Cramlington	Roadside	X424456	Y577173	NO$_2$	N	30	3	N	3
C10	Bay Horse (B1505)	Roadside	X427527	Y576145	NO$_2$	N	13	1	N	3
C11	Storey Street (B1505)	Roadside	X427214	Y575361	NO$_2$	N	10	1	N	3
CM2	Newgate St, Morpeth	Roadside	X419525	Y586380	NO$_2$	N	2	2	N	1.5
CM4	Bridge St, Morpeth	Roadside	X419947	Y585937	NO$_2$	N	2	2	N	3
CM5	Thorpe Ave, Morpeth	Roadside	X420134	Y586329	NO$_2$	N	1	1.5	N	2
CM6	Telford Bridge, Morpeth	Roadside	X420077	Y585814	NO$_2$	N	1	1	N	2.5
CM7	Greystoke Cottage, Clifton	Roadside	X420371	Y582724	NO$_2$	N	3	2	N	1.5
W17	Front Street East, Bedlington	Urban Centre	X581879	Y426014	NO$_2$	N	25	1	N	3
W21	Newbiggin Road, Ashington	Roadside	X427939	Y586210	NO$_2$	N	4.5	1	N	2.5
SD1	Salvation Army, Seaton Delaval	Roadside	X430387	Y575433	NO$_2$	N	1	1	N	3

(1)   0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).
(2)   N/A if not applicable.

Table A.3 Annual Mean NO$_2$ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO$_2$ Annual Mean Concentration (μg/m^3) [3]				
					2011	2012	2013	2014	2015
CR	Roadside	Automatic	N/A	98.7	29	28	27 (28^c)	24 (22)	25
8N	Roadside	Diffusion Tube	N/A	83.3	33	30	28	30	30
B1	Urban Centre	Diffusion Tube	N/A	100.0	30	31	29	27	29
B3	Roadside	Diffusion Tube	N/A	100.0	28	28	33	32	32
B5	Roadside	Diffusion Tube	N/A	100.0	21	20	24	24	23
B11	Urban Centre	Diffusion Tube	N/A	100.0	26	27	25	26	26
B12	Urban Centre	Diffusion Tube	N/A	100.0	26	27	25	24	24
B15	Roadside	Diffusion Tube	N/A	100.0	19	20	21	20	19
C1	Roadside	Diffusion Tube	N/A	100.0	25	25	24	25	23
C9	Roadside	Diffusion Tube	N/A	100.0	27	21	21	22	20
C10	Roadside	Diffusion Tube	N/A	100.0	N/A	20 (23)	28	27	23
C11	Roadside	Diffusion Tube	N/A	91.7	N/A	18 (21)	19	22	19
CM2	Roadside	Diffusion Tube	N/A	100.0	19	22	22	23	19
CM4	Roadside	Diffusion Tube	N/A	91.7	25	28	28	26	22
CM5	Roadside	Diffusion Tube	100	75.0	N/A	N/A	N/A	N/A	21
CM6	Roadside	Diffusion Tube	100	66.7	N/A	N/A	N/A	N/A	25
CM7	Roadside	Diffusion Tube	100	66.7	N/A	N/A	N/A	N/A	26
W17	Urban Centre	Diffusion Tube	N/A	100.0	27	24	27	28	20
W21	Roadside	Diffusion Tube	N/A	91.7	N/A	N/A	N/A	21 (19)	24
SD1	Roadside	Diffusion Tube	N/A	91.7	33	34	26	25	25

Notes: Exceedances of the NO$_2$ annual mean objective of 40 μg/m^3 are shown in **bold**.   NO$_2$ annual means exceeding 60 μg/m^3, indicating a potential exceedance of the NO$_2$ 1-hour mean objective are shown in **bold and underlined.**

(1) 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 Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.4 Annual Mean NO2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	Annual mean concentrations (μg/m^3)				
					2011	2012	2013	2014	2015
CR	Roadside	Automatic	N/A	98.7	29	28	27 (28[3])	24 (22[3])	25

Notes: Exceedances of the PM$_{10}$ annual mean objective of 40 μg/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 Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 85%. See Appendix C for details.

Table A.5 1-Hour Mean NO2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO$_2$ 1-Hour Means > 200μg/m^3 [3]				
					2011	2012	2013	2014	2015
CR	Roadside	Automatic	N/A	98.7	0	3	0 (113[3])	0 (107[3])	0

Notes: Exceedances of the NO$_2$ 1-hour mean objective (200 μg/m^3 not to be exceeded more than 18 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 90%, the 99.8th percentile of 1-hour means is provided in brackets.

Table A.6 Annual Mean PM$_{10}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	PM$_{10}$ Annual Mean Concentration (µg/m^3) [3]				
				2011	2012	2013	2014	2015
BL	Roadside	N/A	85.8	30 (30)	30	36 (35^3)	15	13
CR	Roadside	N/A	82.9	19 (19)	16	25 (24^3)	14 (14^3)	14 (13^3)

Notes: Exceedances of the PM$_{10}$ annual mean objective of 40 μg/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 Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 85%. See Appendix C for details.

Table A.7 24-Hour Mean PM$_{10}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	PM$_{10}$ 24-Hour Means > 50µg/m^3 [3]				
				2011	2012	2013	2014	2015
BL	Roadside	N/A	85.8	24 (49)	22	11 (42^3)	6	2
CR	Roadside	N/A	82.9	4 (32)	0	9 (36^3)	2 (22^3)	2 (21^3)

Notes: Exceedances of the PM$_{10}$ 24-hour mean objective (50 μg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**
(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).
(3) If the period of valid data is less than 90%, the 90.4th percentile of 24-hour means is provided in brackets.

Table A.8 Annual Mean PM$_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	PM$_{2.5}$ Annual Mean Concentration (µg/m^3) [3]				
				2011	2012	2013	2014	2015
BL	Roadside	N/A	85.8	N/A	N/A	N/A	6.5	6.0
CR	Roadside	N/A	82.9	N/A	N/A	N/A	6.5	6.1

(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 Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 85%. See Appendix C for details.

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 NO$_2$ Monthly Diffusion Tube Results - 2015

| Site ID | NO$_2$ Mean Concentrations ($\mu g/m^3$) | | | | | | | | | | | | | | |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean | | |
													Raw Data	Bias	Bias Adjusted [1]
8N	35.4	35.9	41.9	-	29.5	30.1	33.4	40.3	-	44.0	37.7	37.7	37	0.81	30
B1	45.0	48.3	34.0	30.9	26.5	25.3	26.1	29.0	36.7	42.6	44.6	39.3	36	0.81	29
B3	33.8	48.1	40.9	27.0	29.7	32.5	37.2	35.6	41.3	48.9	51.6	49.9	40	0.81	32
B5	33.4	33.6	26.3	31.2	21.8	21.4	22.0	23.0	26.5	35.7	34.1	30.3	28	0.81	23
B11	33.1	38.2	39.2	28.8	23.9	24.2	28.9	24.6	29.6	35.1	39.8	32.4	31	0.81	26
B12	33.1	33.4	33.2	31.4	21.0	24.7	21.5	23.9	29.1	37.7	33.2	32.1	30	0.81	24
B15	25.8	29.2	26.9	21.6	13.0	18.9	19.7	18.8	23.5	29.4	30.9	24.3	24	0.81	19
C1	24.5	28.1	32.9	30.9	21.9	22.7	23.3	27.9	27.2	46.1	29.6	31.5	29	0.81	23
C9	27.3	34.1	32.1	23.7	18.4	24.5	24.6	23.4	24.8	37.6	2.9	22.7	25	0.81	20
C10	21.4	28.5	29.7	27.4	17.3	22.6	25.4	30.7	26.9	44.3	31.2	39.3	29	0.81	23
C11	17.2	20.1	25.9	-	17.9	22.1	22.5	22.9	26.5	37.7	21.8	28.1	24	0.81	19
CM2	21.7	25.3	27.7	25.5	16.6	19.6	19.0	20.8	26.0	33.0	25.7	24.3	24	0.81	19
CM4	25.1	28.7	28.9	33.5	24.6	25.9	25.9	25.7	30.8	-	25.7	28.2	28	0.81	22
CM5	-	-	-	24.6	17.9	18.6	17.8	23.9	25.1	36.2	26.9	28.5	24	0.81	20
CM6	-	-	-	-	22.9	25.4	23.7	27.3	32.6	45.8	30.3	32.1	30 (31)	0.81	25
CM&	-	-	-	-	26.8	29.8	27.0	28.6	30.2	34.9	34.9	33.1	31 (32)	0.81	26
W17	33.0	35.4	28.3	38.3	21.3	22.4	30.5	27.4	32.3	46.0	35.3	35.6	32	0.81	26
W21	26.7	36.1	31.7	27.1	20.4	21.6	20.7	-	25.4	38.7	33.4	37.1	29	0.81	23
SD1	30.9	35.1	39.0	28.1	23.9	20.8	28.4	29.4	28.3	-	32.2	27.9	29	0.81	24

(1) See Appendix C for details on bias adjustment

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

Biomass

Of the sixty five biomass appliances in Northumberland which have come through the planning process since 2007, the vast majority are widely spread across the more rural parts of the county. Only seven are within the more populated south-east area, which is almost entirely covered by smoke control areas.

Of the seven within the south-east area; one is to be a permitted process (I-PPC) and the remaining are all DEFRA exempt appliances. The average distance between these appliances is almost 6 kilometres (closest being 1.2 kilometres apart).

In 2015, two applications were submitted to the Council which included a biomass boiler. Both of these are in very rural locations and have few receptors, seven dwellings within 300 metres at one and eleven at the other within 300 metres. Both meet the screening criteria for particulates and NOx using the AEA Biomass Screening Tool (22 Dec 2008).

Factor from Local Co-location Studies (if available)

Northumberland did not carry out any co-location studies in 2015.

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. 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: 03/16. The bias factor was calculated to be 0.81 for ESG.

The results of the laboratory performance scheme (AIR PT) are included below; the Environmental Scientifics Group received a 87.5 per cent performance for the first quarter of 2015 but 100 per cent for the other three quarters.

Figure A.1 National Diffusion Tube Bias Adjustment Spreadsheet ver 03/16 showing results for ESG (Didcot) using 50% TEA in acetone.

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/16

Analysed By [1]	Method [2]	Year [5]	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision [6]	Bias Adjustment Factor (A) (Cm/Dm)
ESG Didcot	50% TEA in acetone	2015	R	Dumfries and Galloway Council	12	35	30	14.6%	G	0.87
ESG Didcot	50% TEA in acetone	2015	B	Gravesham Borough Council	12	40	30	34.1%	G	0.75
ESG Didcot	50% TEA in acetone	2015	B	Gravesham Borough Council	12	30	23	29.8%	P	0.77
ESG Didcot	50% TEA in acetone	2015	UI	North Lincolnshire	11	24	18	36.5%	P	0.73
ESG Didcot	50% TEA in acetone	2015	R	Swale BC	11	38	32	19.3%	P	0.84
ESG Didcot	50% TEA in acetone	2015	R	Swale BC	10	48	39	21.0%	G	0.83
ESG Didcot	50% TEA in acetone	2015	R	Swale Borough Council	11	40	34	19.7%	P	0.84
ESG Didcot	50% TEA in acetone	2015	R	Wrexham County Borough Council	12	19	19	0.6%	G	0.99
ESG Didcot	50% TEA in acetone	2015	UC	Cardiff Council	10	26	26	1.6%	G	0.98
ESG Didcot	50% TEA in acetone	2015	KS	Marylebone Road Intercomparison	12	104	81	27.9%	G	0.78
ESG Didcot	50% TEA in acetone	2015	R	Vale of White Horse District Council	11	34	29	15.7%	G	0.86
ESG Didcot	50% TEA in acetone	2015	UI	Stockton on Tees	12	24	18	29.4%	G	0.77
ESG Didcot	50% TEA in acetone	2015	R	Stockton on Tees	12	17	14	21.5%	G	0.82
ESG Didcot	50% TEA in acetone	2015	KS	Suffolk Coastal DC	12	44	35	26.0%	P	0.79
ESG Didcot	50% TEA in acetone	2015	SU	Thanet District Council	9	17	15	10.6%	G	0.90
ESG Didcot	50% TEA in acetone	2015	R	Thanet District Council	12	27	23	17.8%	G	0.85
ESG Didcot	50% TEA in acetone	2015	B	Medway Council	12	21	12	77.3%	G	0.56
ESG Didcot	50% TEA in acetone	2015	R	Medway Council	11	32	23	42.6%	G	0.70
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	10	34	28	21.2%	P	0.83
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	11	39	28	38.6%	G	0.72
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	11	55	47	16.2%	G	0.86
ESG Didcot	50% TEA in acetone	2015		**Overall Factor [3] (21 studies)**					**Use**	**0.81**

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].

Year [5]: To undo your selection, choose (All) from the pop-up list.

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 [4] 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

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

The spreadsheet 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 2016. 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.

LAQM Helpdesk – March 2016

Summary of Laboratory Performance in AIR NO2 Proficiency Testing Scheme (April 2014 – February 2016).

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 combines 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 http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html. This information will be updated on a quarterly basis following completion of each AIR PT round.

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

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

AIR NO$_2$ PT Scheme overview

Purpose of scheme

The AIR PT scheme uses laboratory spiked Palmes type diffusion tubes to test each participating laboratory's analytical performance on a quarterly basis and continues the format used in the preceding WASP PT scheme. Such tubes are not designed to test other parts of the measurement system e.g. sampling. Every quarter, roughly January, April, July and October each year, each laboratory receives four diffusion tubes doped with an amount of nitrite, known to LGC Standards, but not the participants. At least two of the tubes are usually duplicates, which enables precision, as well as accuracy, to be assessed. The masses of nitrite on the spiked tubes are different each quarter, and reflect the typical analytical range encountered in actual NO$_2$ ambient monitoring in the UK.

NO$_2$ PT Summary – AIR PT Rounds AR001, 3, 4, 6, 7, 8, 10 and 12

LAQM Helpdesk – March 2016

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:

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

Where:

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

NO_2 PT Summary – AIR PT Rounds AR001, 3, 4, 6, 7, 8, 10 and 12

LAQM Helpdesk – March 2016

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 may have significant systematic sources of bias in their assay.

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 AR001, 3, 4, 6, 7, 8, 10 and 12

LAQM Helpdesk – March 2016

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 AR001, 3, 4, 6, 7, 8, 10 and 12

Table 1: Laboratory summary performance for AIR NO$_2$ PT rounds AR001, 3, 4, 6, 7, 9, 10 and 12

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	AR001	AR003	AR004	AR006	AR007	AR009	AR010	AR012
Round conducted in the period	April – May 2014	July – August 2014	October – November 2014	January – February 2015	April – May 2015	July – August 2015	October – November 2015	January – February 2016
Aberdeen Scientific Services	100 %	100 %	100 %	100 %	100 %	75 %	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 %	75 %	100 %	100 %	100 %	100 %
Environmental Services Group, Didcot [1]	100 %	100 %	100 %	87.5 %	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 %	100 %	100 %	100 %	100 %	100 %	100 %	75 %
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 %	100 %	75 %	100 %	100 %	100 %	100 %
Lambeth Scientific Services	50 %	100 %	100 %	25 %	100 %	100 %	100 %	100 %
Milton Keynes Council	100 %	100 %	75 %	100 %	100 %	100 %	100 %	50 %
Northampton Borough Council	100 %	0 %	0 %	100 %	100 %	100 %	100 %	50 %
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	100 %	100 %	100 %	75 %	100 %
Staffordshire County Council	100 %	25 %	100%	100 %	100 %	75 %	75 %	75 %
Tayside Scientific Services (formerly Dundee CC)	NR [2]	100 %	100 %	100 %	NR [2]	NR [2]	NR [2]	100 %
West Yorkshire Analytical Services	75 %	100 %	75 %	100 %	75 %	75 %	75 %	75 %

[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] Kent Scientific Services, Cardiff Scientific Services and Exova (formerly Clyde Analytical) no longer carry out NO$_2$ diffusion tube monitoring and therefore did not submit results.

Appendix D: Maps of Monitoring Locations

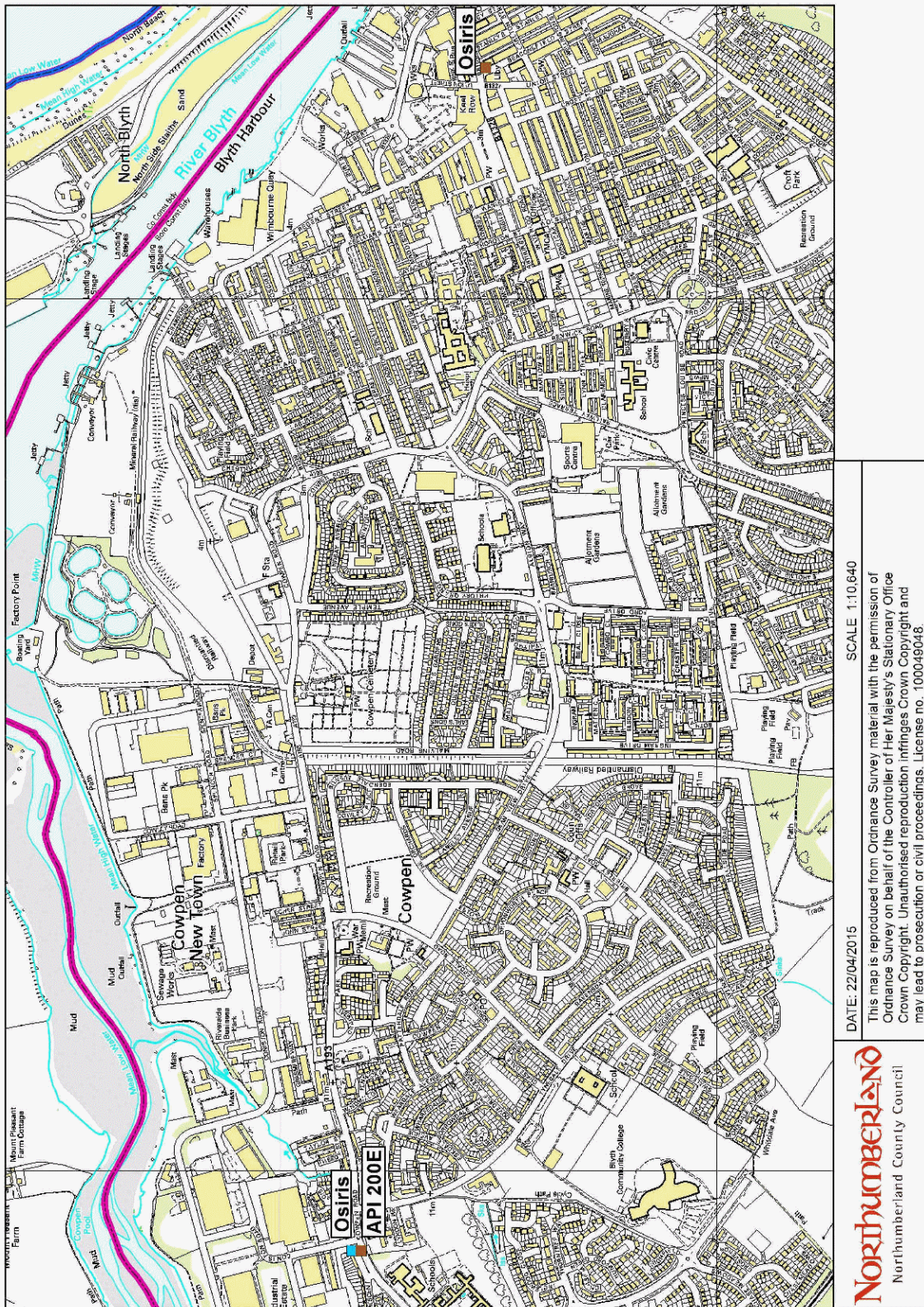**Figure D.1   Blyth and Cowpen Automatic Monitoring Station Locations**

Figure D.2   Alnwick NO$_2$ Diffusion Tube Monitoring Locations
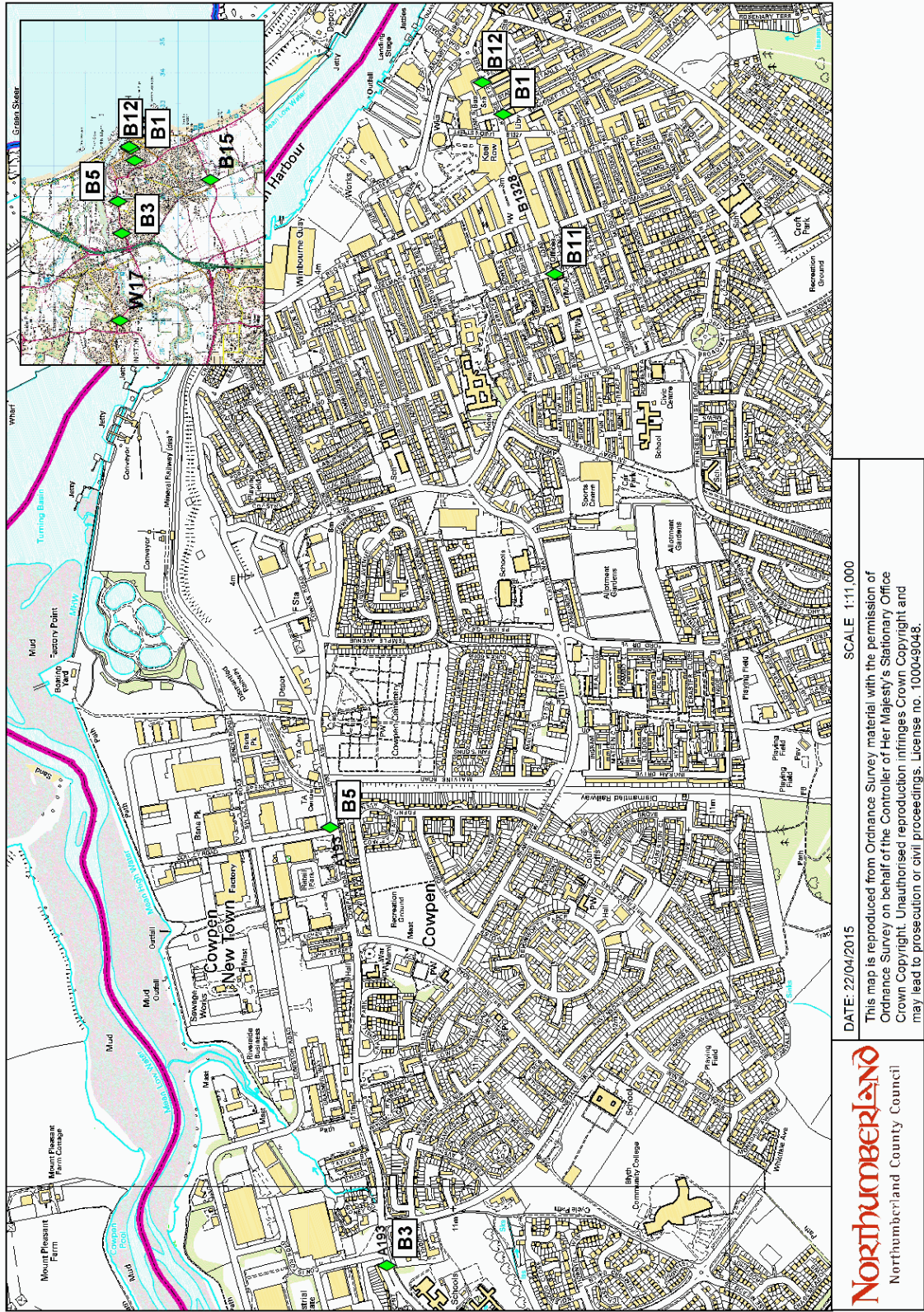
Figure D.3   Blyth NO₂ Diffusion Tube Monitoring Locations

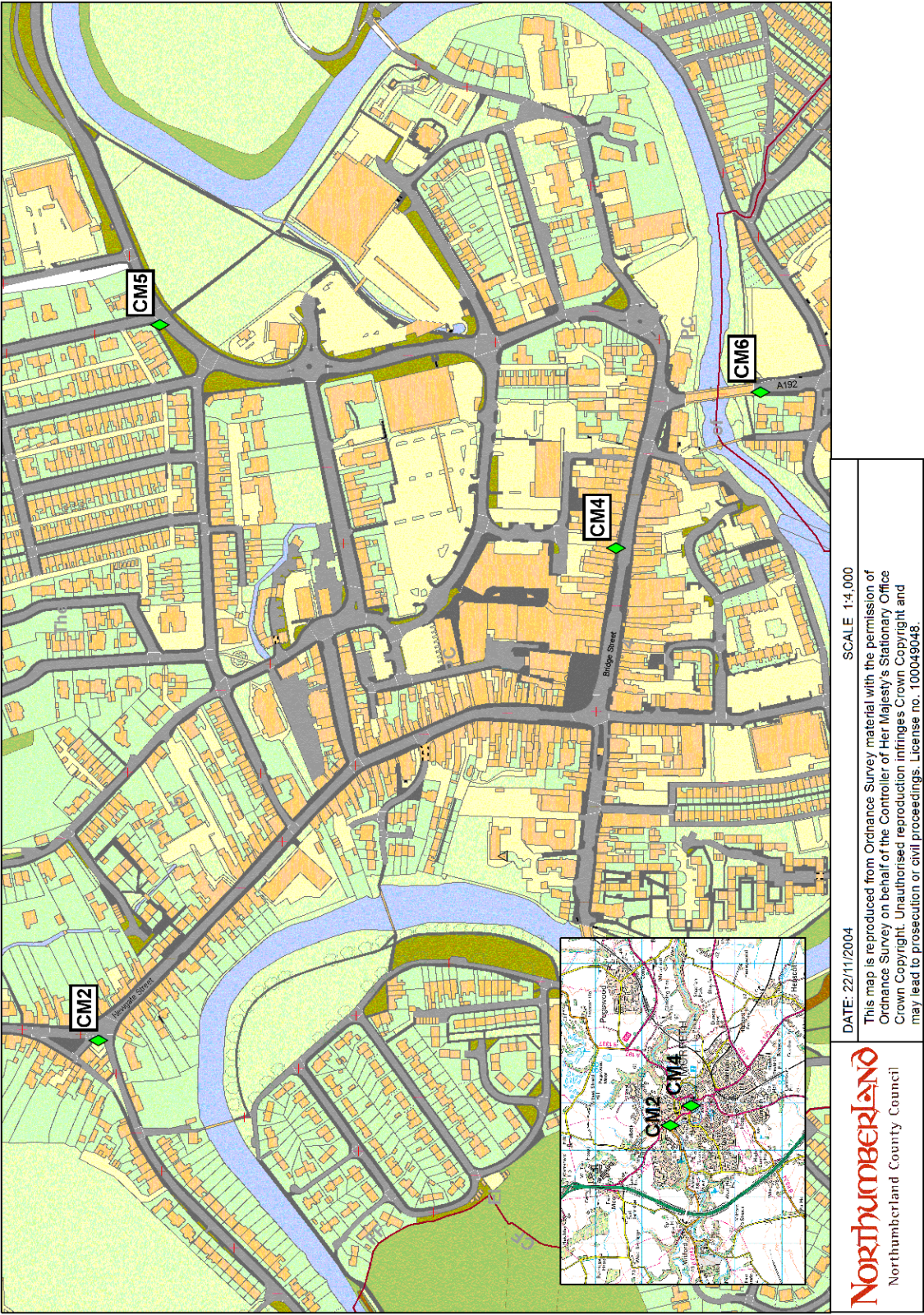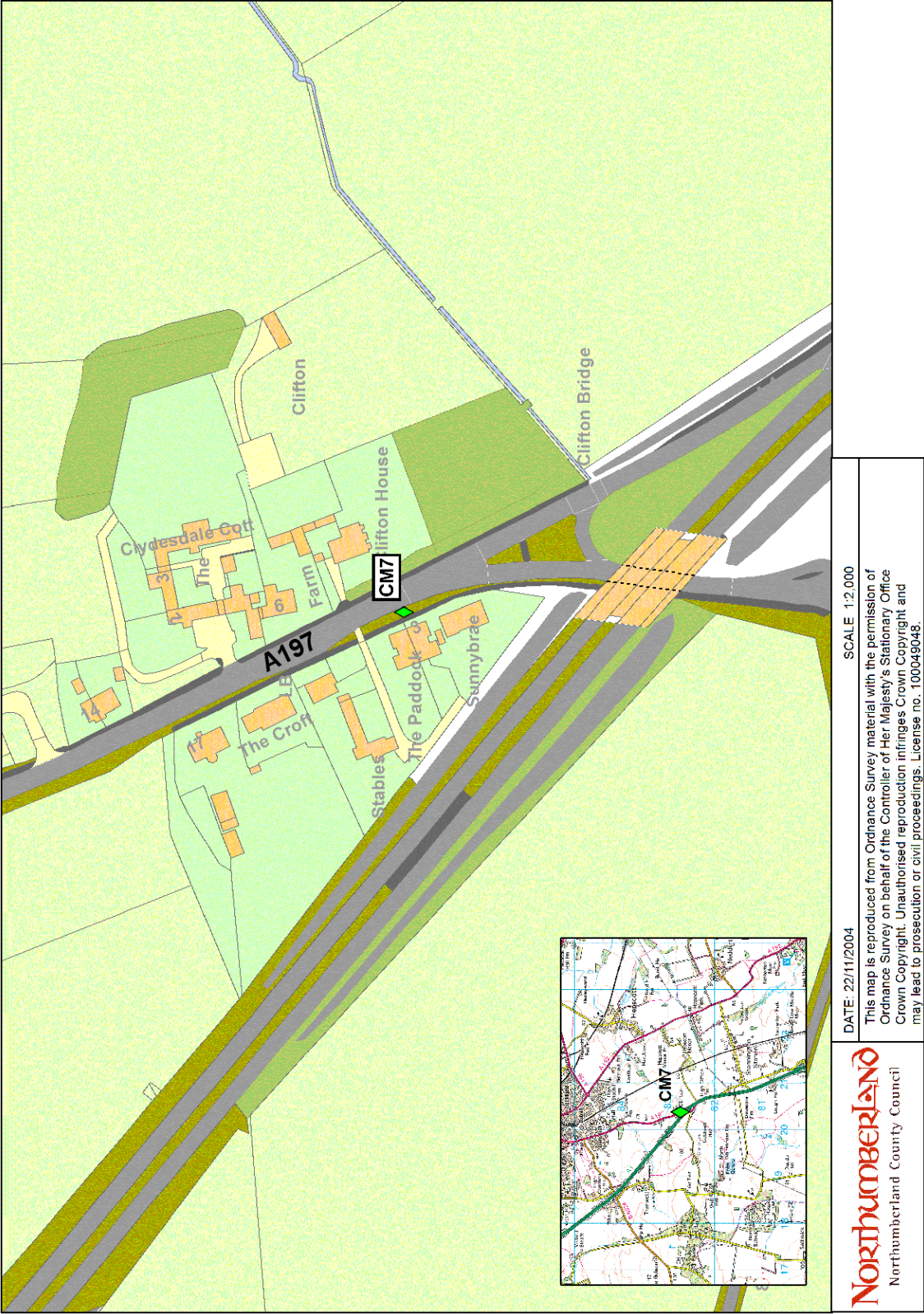**Figure D.4   Morpeth NO₂ Diffusion Tube Monitoring Locations**

Figure D.5   Cliffwell NO$_2$ Diffusion Tube Monitoring Location

Figure D.6   Cramlington NO₂ Diffusion Tube Monitoring Locations
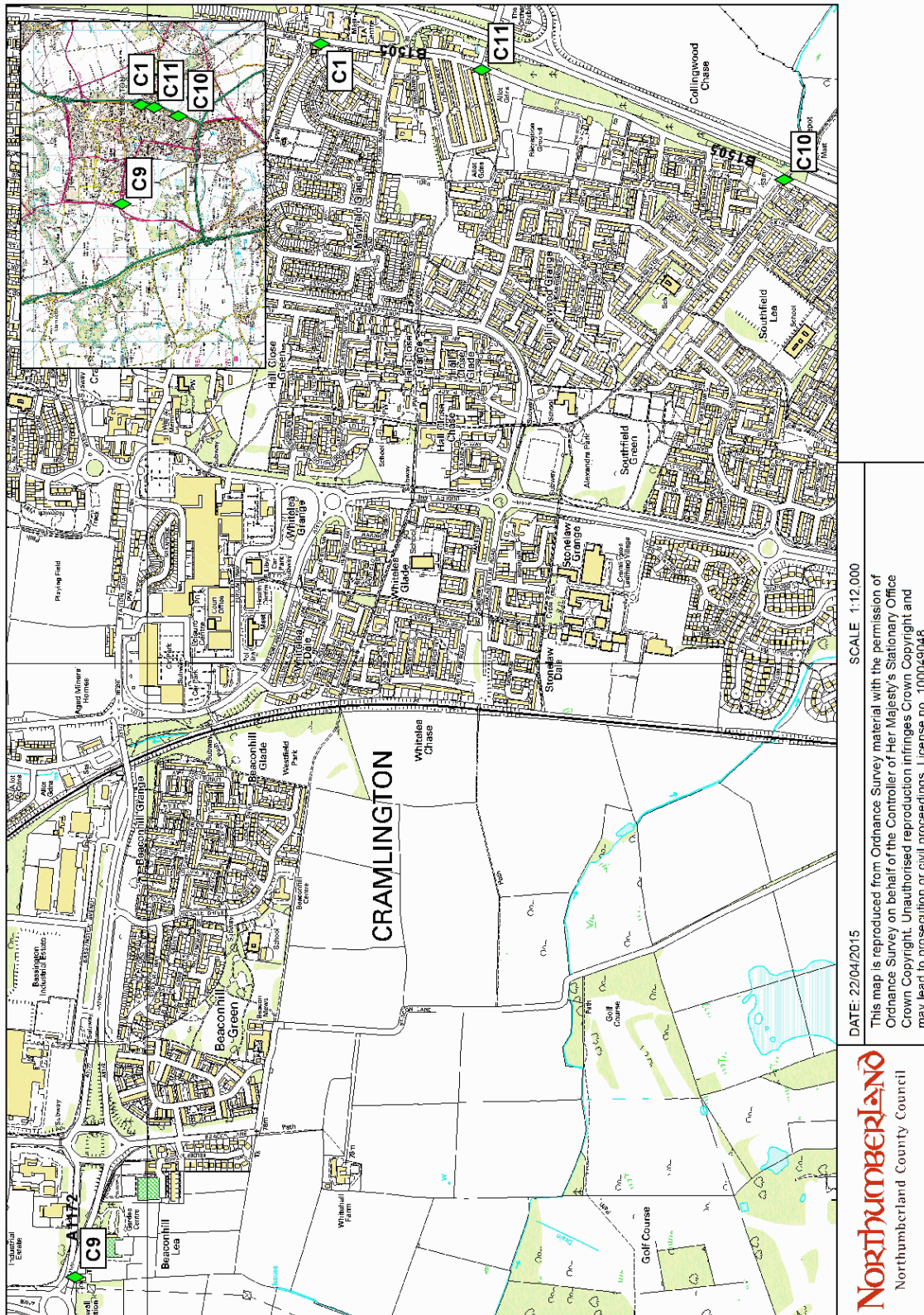
Figure D.7   Ashington NO₂ Diffusion Tube Monitoring Locations
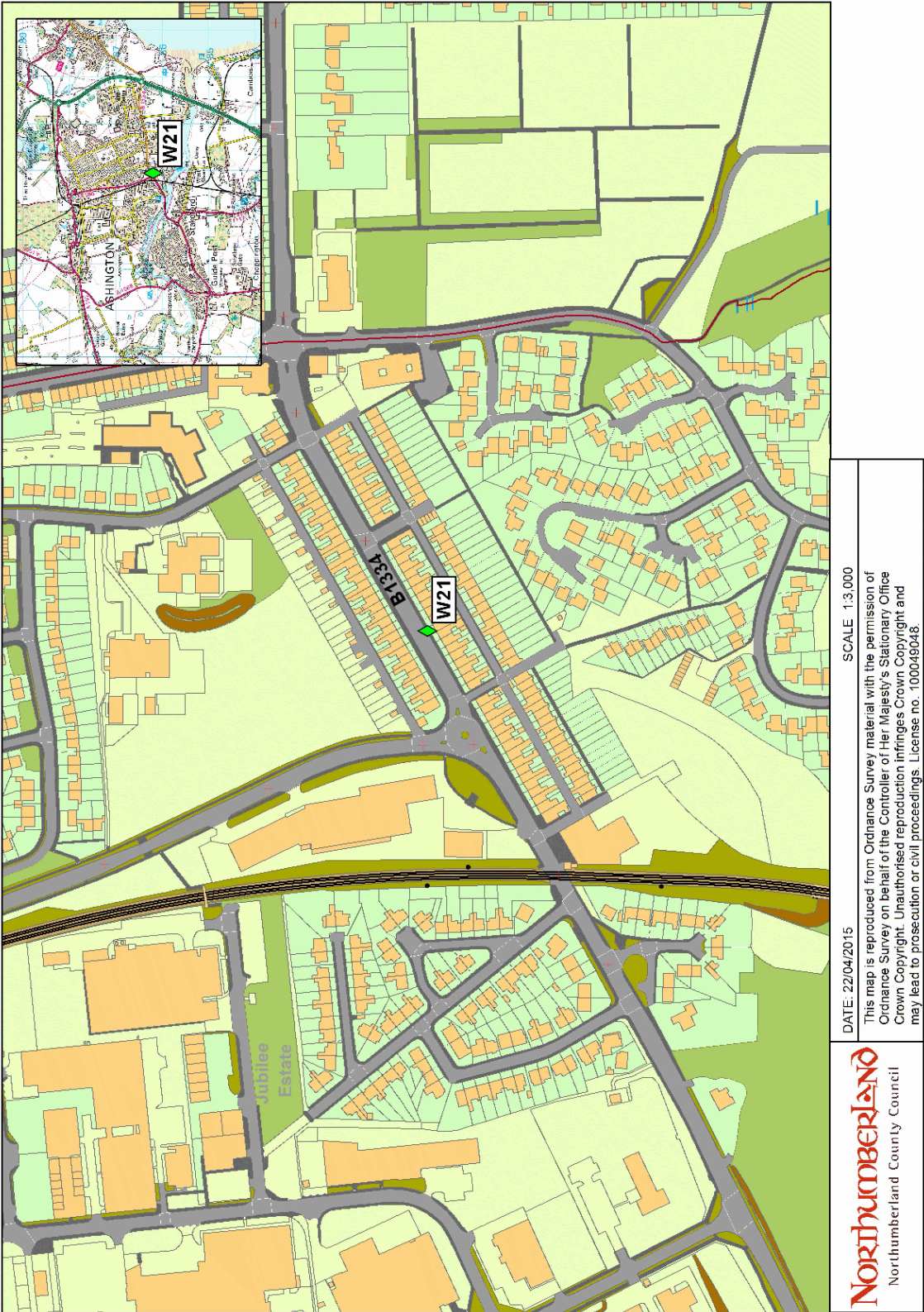
Figure D.8   Bedlington NO₂ Diffusion Tube Monitoring Locations
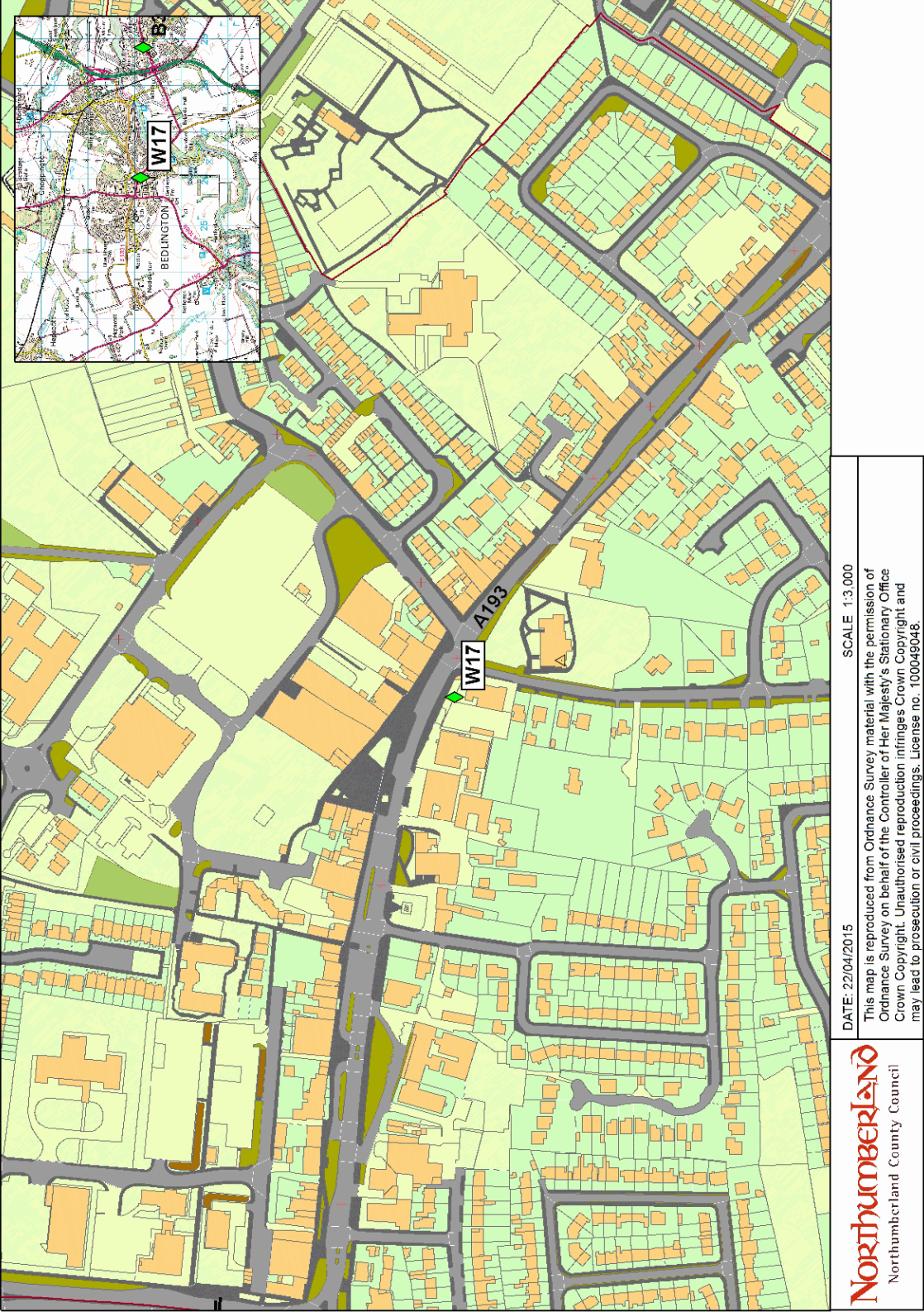
Appendix E: Summary of Air Quality Objectives in England

Table E.1   Air Quality Objectives in England

Pollutant	Air Quality Objective[4]		
	Concentration	Measured as
Nitrogen Dioxide (NO₂)	200 μg/m³ not to be exceeded more than 18 times a year	1-hour mean
	40 μg/m³	Annual mean
Particulate Matter (PM₁₀)	50 μg/m³, not to be exceeded more than 35 times a year	24-hour mean
	40 μg/m³	Annual mean
Sulphur Dioxide (SO₂)	350 μg/m³, not to be exceeded more than 24 times a year	1-hour mean
	125 μg/m³, not to be exceeded more than 3 times a year	24-hour mean
	266 μg/m³, not to be exceeded more than 35 times a year	15-minute mean

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

Appendix F: Data Summaries and Time Series Plots

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

	PM2.5	PM10	NO	NOx	NO2
Number Very High	0	0	-	-	0
Number High	0	1	-	-	0
Number Moderate	0	1	-	-	0
Number Low	305	303	-	-	8648
Maximum 15-minute Mean	63.4 μg m³	301.5 μg m³	922.5 μg m³	922.5 μg m³	165.2 μg m³
Maximum Hourly Mean	37.9 μg m³	127.6 μg m³	816.4 μg m³	841.5 μg m³	133.8 μg m³
Maximum running 8-hour Mean	33.1 μg m³	67.0 μg m³	401.8 μg m³	441.9 μg m³	91.6 μg m³
Maximum running 24-hour Mean	29.8 μg m³	56.5 μg m³	258.7 μg m³	299.0 μg m³	73.2 μg m³
Maximum Daily Mean	29.1 μg m³	88.1 μg m³	266.5 μg m³	307.1 μg m³	74.3 μg m³
90.4th Percentile (PM)	10	21	-	-	-
99.8th Percentile (NO2)	-	-	-	-	-
Average	6.1 μg m³	13.7 μg m³	80.8 μg m³	82.4 μg m³	25.3 μg m³
Data Capture	83.0%	83.0%	98.7%	98.7%	98.7%

Hourly Time Series Plots

Figure F.1   Cowpen Road Particulates (PM$_{10}$) Time Series Plot
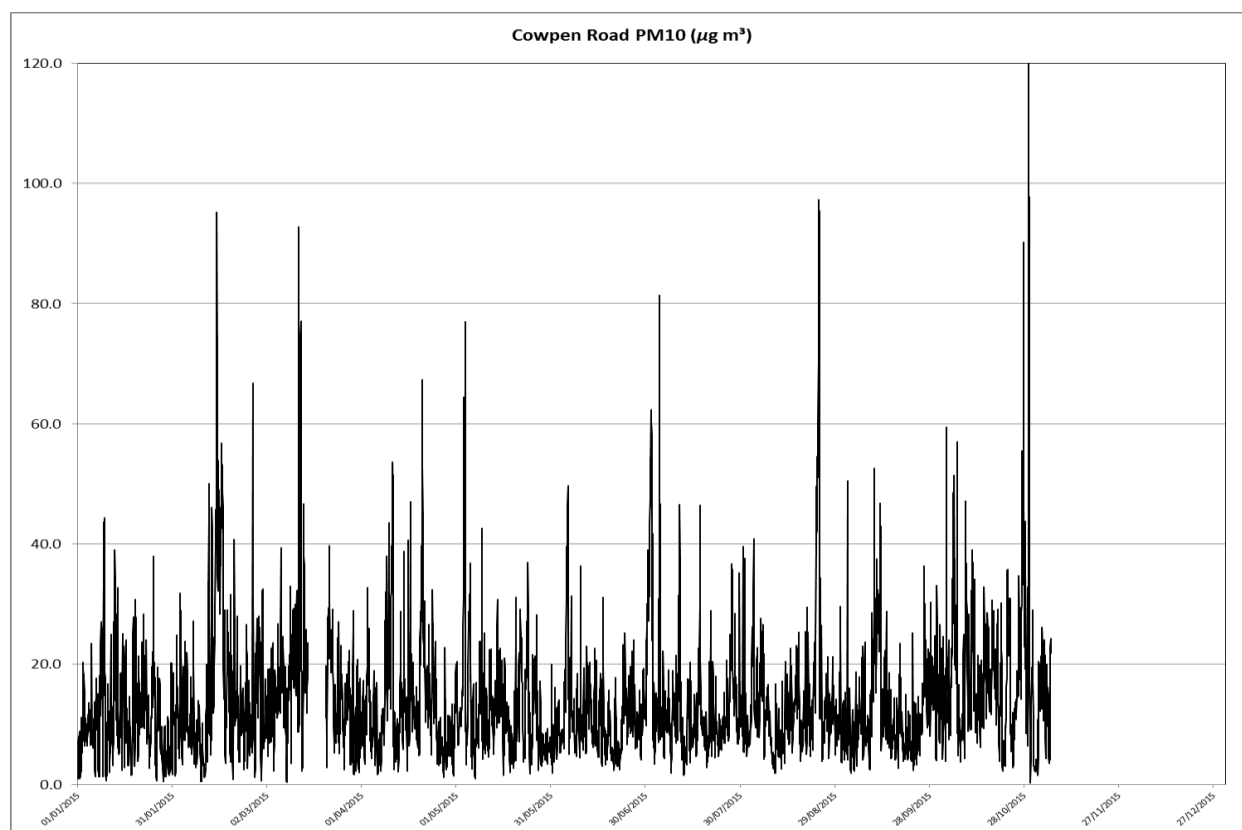
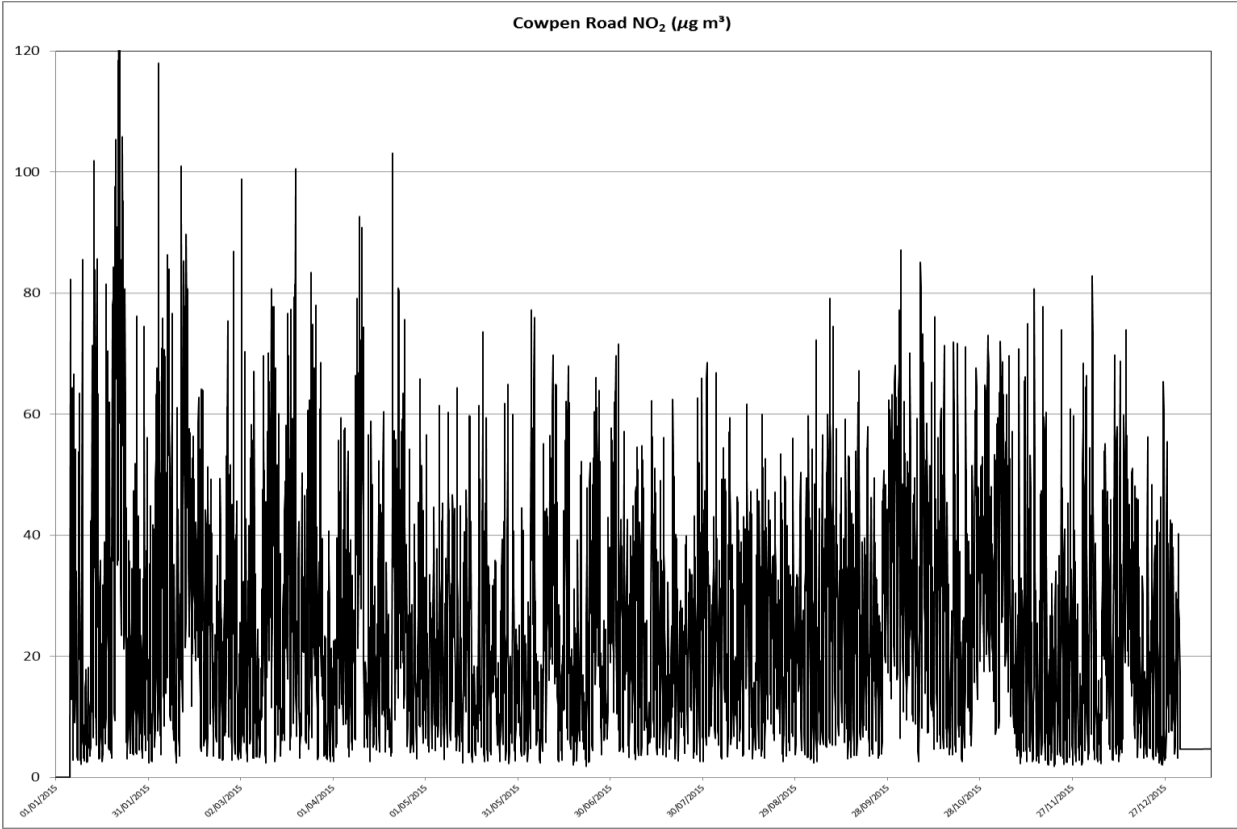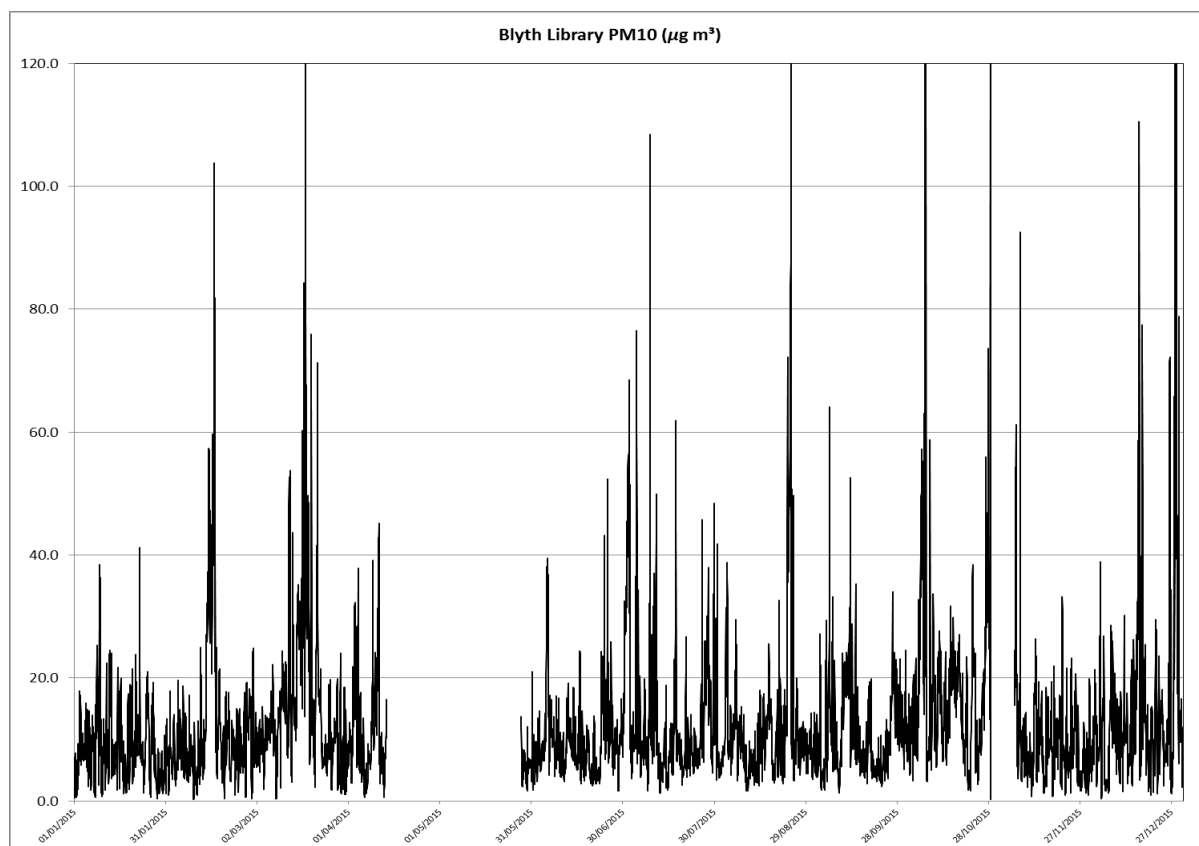**Figure F.2   Cowpen Road Nitrogen Dioxide (NO$_2$) Time Series Plot**

Cowpen Road NO$_2$ ($\mu g\ m^3$)

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

	PM2.5	PM10
Number Very High	0	1
Number High	0	0
Number Moderate	0	0
Number Low	315	313
Maximum 15-minute Mean	112.1 $\mu g\ m^3$	527.8 $\mu g\ m^3$
Maximum Hourly Mean	60.9 $\mu g\ m^3$	232.3 $\mu g\ m^3$
Maximum running 8-hour Mean	44.0 $\mu g\ m^3$	158.4 $\mu g\ m^3$
Maximum running 24-hour Mean	31.5 $\mu g\ m^3$	109.8 $\mu g\ m^3$
Maximum Daily Mean	31.5 $\mu g\ m^3$	109.8 $\mu g\ m^3$
90.4th Percentile (PM)	-	-
99.8th Percentile (NO2)	-	-
Average	6.0 $\mu g\ m^3$	12.1 $\mu g\ m^3$
Data Capture	85.8%	85.8%

Hourly Time Series Plots

Figure F.3   Blyth Library Particulates (PM$_{10}$) Time Series Plot

Appendix G: Trend Plots

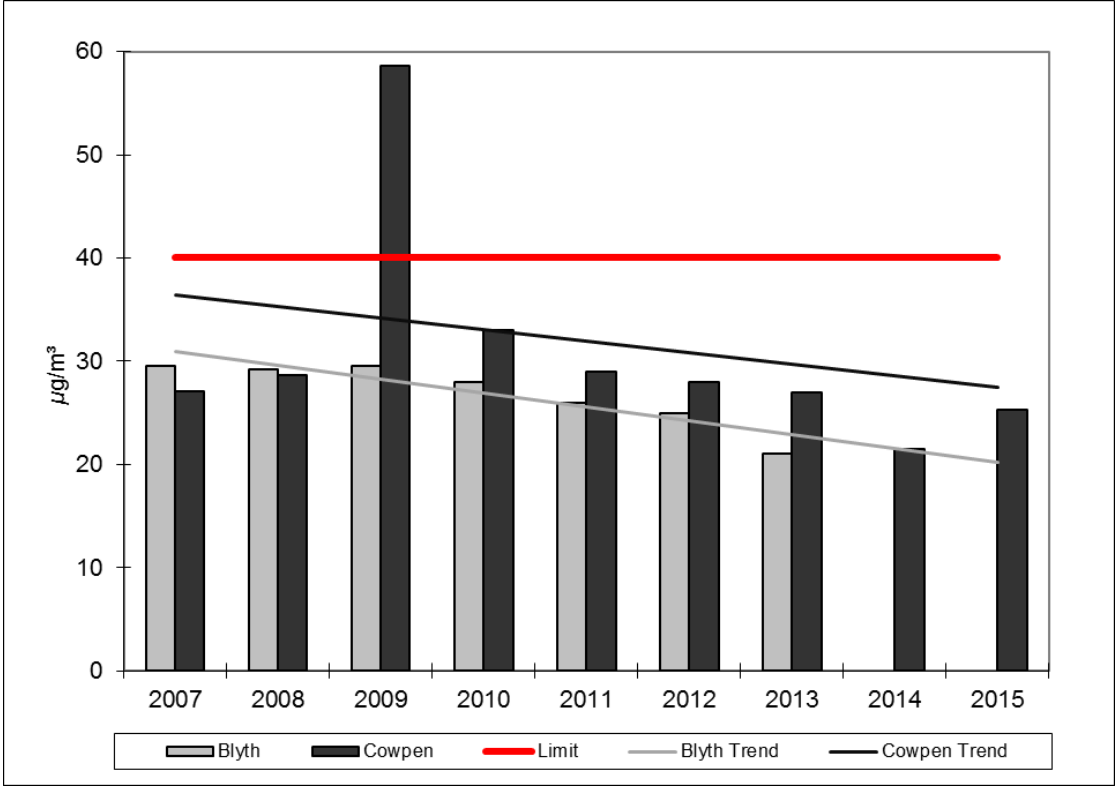**Figure G.1   Nitrogen Dioxide (NO2) Trend Plot**
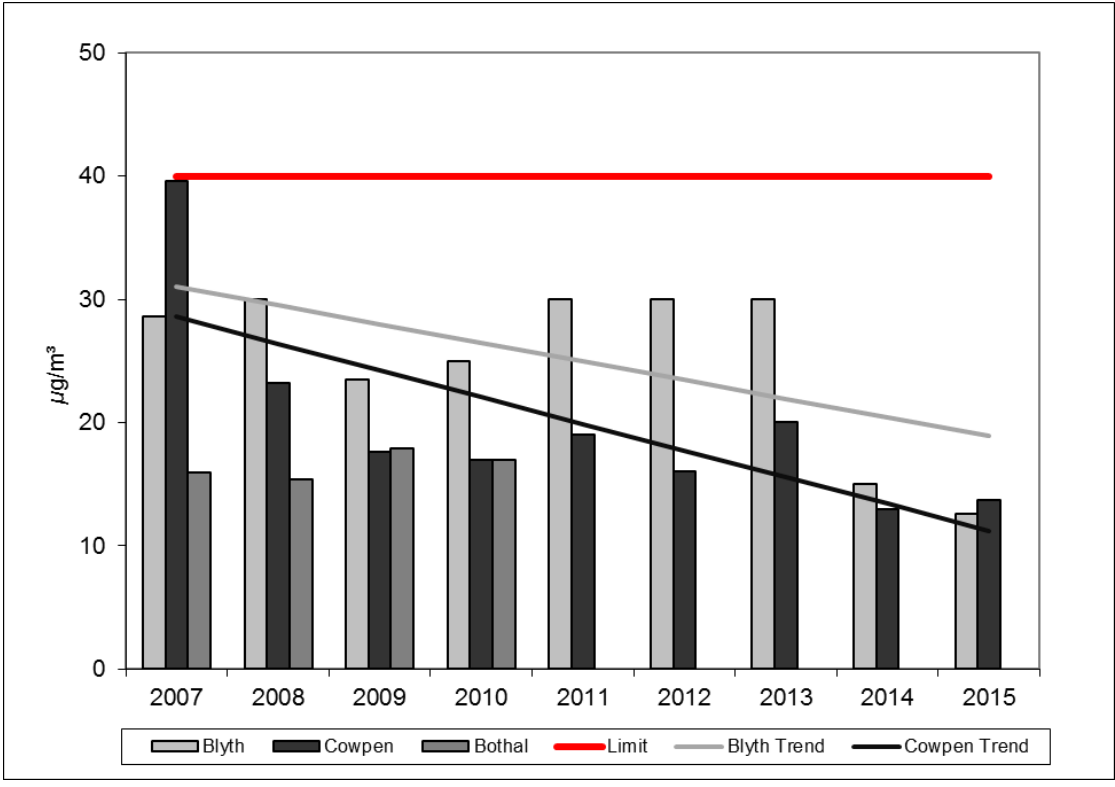

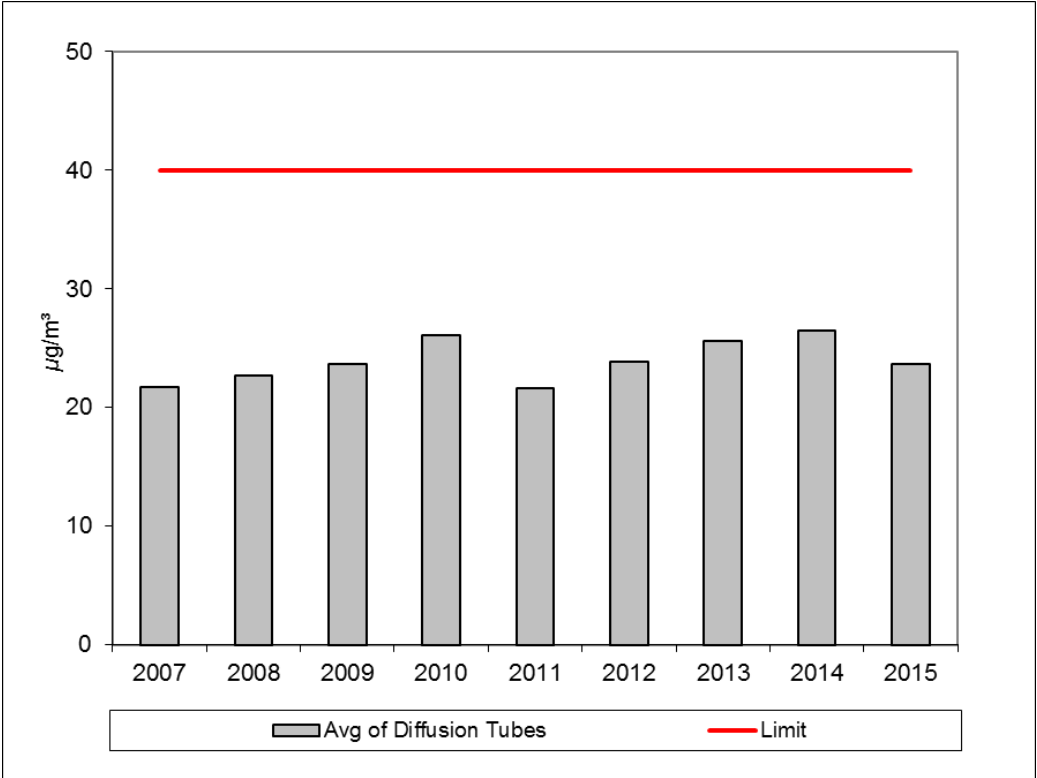
Figure G.2   Particulate (PM10) Trend Plot

Figure G.3   Diffusion Tube (NO2) Trend Plot

Appendix H: Annualising Data

The data capture for the Cowpen Road Osiris particulate monitor was 83 per cent in 2015, being less than 85 per cent this requires annualising under the guidance. Data was "missing" from midday on the 5 November 2015 until the end of the year (1354 hours of data).

The only particulate monitors on the AURN network within 50 miles of the Cowpen Road site are Middlesbrough and Stockton (Eaglescliffe) which have sufficient data capture – the Newcastle City Centre monitor had only 37 per cent data capture and other stations no longer monitor PM10.

Therefore, data from a Banks Mining Topas monitor located at the Milkhope Centre, Blagdon (NZ2176) and the Council's other Osiris monitor located at Blyth Library (NZ3181) have also been included in the annualising process, being much closer than the stations on the AURN network.

Table H.1   Annualising Calculation

	Data Capture (%)	Annual Mean 2015 (AM)	Period Mean 2015 (PM)	Annualised Value
Cowpen Osiris (PM10)	83.0	13.5	13.5	**13.3**
Long Term Site		Annual Mean 2015 (AM)	Period Mean 2015 (PM)	Ratio (AM/PM)
Banks TEOM	99.7	8.2	8.4	0.98
Blyth Library	85.8	12.6	12.4	1.02
Stockton - Eaglescliffe	95.0	15.8	16.3	0.97
Middlesbrough	95.9	16.6	17.0	0.98
			Average (Ra)	0.98

The ratio of the annual mean and period mean for all sites was almost identical. The range of corrected values using each individual ration would have either been 13 or 14 μg/m^3.

The result is that the annualised value for the Cowpen Road Osiris was brought down by 0.2 which resulted in being rounded down to 13 μg/m^3 rather than up to 14 μg/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
ASR	Annual Status Report for air quality
AURN	Automatic Urban Rural Network
BAM	Beta Attenuation Monitor
DEFRA	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
LSO	Local Site Operatives
NO	Nitrous Oxide
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM	Period Mean
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10 μm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5 μm or less
QA/QC	Quality Assurance / Quality Control
SO_2	Sulphur Dioxide
…	…

References

AEA Energy & Environment Document "Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance for Laboratories and Users." Ref: ED48673043, Issue 1a, February 2008. Available at http://laqm.defra.gov.uk/documents/0802141004_NO2_WG_PracticalGuidance_Issue1a.pdf

Automatic Urban and Rural Network (AURN) Data Archive Data Selector, DEFRA. Available at http://uk-air.defra.gov.uk/data/data_selector (accessed 20/04/2016)

"Local Air Quality Management", Technical Guidance (TG16), DEFRA, April 2016. Available at http://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf

"Local Air Quality Management", Policy Guidance (PG16), DEFRA, February 2009. Available at http://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf

The Diffusion Tube Bias Adjustment Factors Spreadsheet (v.03/16). Available at http://laqm.defra.gov.uk/documents/Database_Diffusion_Tube_Bias_Factors_v03_16_Final_v2.xls accessed 20/04/2016)

Summary of Laboratory Performance in AIR/WASP NO2 Proficiency Testing Scheme 121-124 (April 2013 – Feb 2015). Available at http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html (accessed 27/04/2015)