



**West Lothian
Council**

2014 Air Quality Progress Report for **West Lothian Council**

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

June 2014



Local Authority Officer	Paul Matassa Technical Officer
Department	Environmental Health
Address	West Lothian Council County Buildings High Street Linlithgow EH49 7EZ
Telephone	01506 282500
e-mail	environmentalhealth@westlothian.gov.uk
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Executive Summary

This report is the 2014 Progress Report undertaken in accordance with West Lothian Council's statutory obligation under the National Air Quality Strategy.

The report considers measured pollutant concentrations from within West Lothian for the calendar year 2013 and considers the potential for exceedences of Air Quality Objectives as a result of new or significantly changed local emission sources.

Measured pollutant concentrations across the Council area in 2013 were typically lower than those measured in 2012 except at the new Linlithgow High Street site (Linlithgow High Street 2) and Newton. Initial monitoring at Linlithgow High Street 2 indicates NO₂ and PM₁₀ concentrations are elevated. Therefore this site will progress to a Detailed Assessment. Measured PM₁₀ annual mean concentration at Newton exceeded the objective and therefore will proceed to a Detailed Assessment.

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1 Introduction

1.1 Description of Local Authority Area

West Lothian is situated between Edinburgh and the Borders to the east, Falkirk, and North Lanarkshire to the west and South Lanarkshire to the south with the Firth of Forth to the north. The region rises from the lowlands in the north and northeast to the Pentland Hills in the southeast and moor land in the south and west. Its 428 sq. km (165 sq. miles) are mainly used for agriculture or urban development. The major source of air pollution is from road traffic with several main roads including the M8, M9, A89 and A71 passing east-west through the district. Industrial sources of air pollution in West Lothian are relatively scarce and are mostly situated in designated industrial areas away from relevant receptors.

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedences are considered likely, the local authority must then 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.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the LAQM process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in **Scotland** are set out in the [Air Quality \(Scotland\) Regulations 2000 \(Scottish SI 2000 No 97\)](#), the [Air Quality \(Scotland\) \(Amendment\) Regulations 2002 \(Scottish SI 2002 No 297\)](#), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in Scotland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m ³	Running annual mean	31.12.2003
	3.25 µg/m ³	Running annual mean	31.12.2011
1,3-Butadiene	2.25 µg/m ³	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m ³	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m ³	Annual mean	31.12.2004
	0.25 µg/m ³	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m ³	Annual mean	31.12.2005
Particulate Matter (PM ₁₀) (gravimetric)	50 µg/m ³ , not to be exceeded more than 7 times a year	24-hour mean	31.12.2011
	18 µg/m ³	Annual mean	31.12.2011
Sulphur dioxide	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Report Type	Report Date	Outcomes
Review and Assessment Stages 1 and 2	October 2000	<ul style="list-style-type: none"> • Prescribed air quality objectives are all likely to be achieved. • Recommended that current air quality monitoring work in West Lothian be continued.
Updating and Screening Assessment	June 2003	<ul style="list-style-type: none"> • Objectives for both NO₂ and PM₁₀ currently being met. To continue monitoring in worst-case situations including locations close to busy roads. • No need for Detailed Assessment of Benzene, however consideration to be given for monitoring at petrol stations at Deer Park and Lizzie Bryce roundabouts. • No need for further monitoring of 1,3-Butadiene and Lead. • No need for Detailed Assessment of CO or SO₂
Progress Report	2004	<ul style="list-style-type: none"> • No Detailed Assessments required for any pollutant. • Benzene to be monitored at Lizzie Bryce petrol station.
Progress Report	2005	<ul style="list-style-type: none"> • Groundhog moved to Cairnie Place, Whitburn from 31/01/2005 • NO₂ analyser problems, low data capture. • One exceedence of 24-hour mean PM₁₀ due to elevated background. • No Detailed Assessments required for any pollutant.
Updating and Screening Assessment	July 2006	<ul style="list-style-type: none"> • No exceedences of any pollutant therefore no requirement to proceed to a Detailed Assessments for any pollutant.
Progress Report	April 2007	<ul style="list-style-type: none"> • No exceedences of any pollutant therefore no requirement to proceed to a Detailed Assessments for any pollutant. • Monitoring of Benzene to cease due to low measured concentrations. • PM₁₀ very close to objective in Linlithgow. • Automatic monitoring of NO₂ proposed for Broxburn.

Progress Report	March 2008	<ul style="list-style-type: none"> • No exceedences of any pollutant therefore no requirement to proceed to a Detailed Assessments for any pollutant. • Automatic monitoring of NO₂ and PM₁₀ proposed for Broxburn. • Upgrade to FDMS planned at Linlithgow
Updating and Screening Assessment	September 2009	<ul style="list-style-type: none"> • No exceedences of any of the pollutants objective values. • Real time monitoring to continue in Linlithgow and Broxburn. PM₁₀ concentration at Linlithgow close to objective with elevated levels measured at Broxburn. • NO₂ diffusion tubes to be deployed in West Calder Main Street for Detailed Assessment. • A poultry farm was identified as requiring a Detailed Assessment. • Further traffic surveys required to assess identified busy roads/junctions using DMRB. • Mobile monitoring station (Groundhog) to be relocated to Uphall Station. • Osiris units measuring to be deployed at various locations throughout West Lothian.
Progress Report	June 2010	<ul style="list-style-type: none"> • Poultry farm detailed assessment not required per Scottish Government advice. • Broxburn exceeded annual PM₁₀ objective, detailed assessment to be undertaken
Progress Report	July 2011	<ul style="list-style-type: none"> • Groundhog relocated to Whitburn Cross providing data from 08/02/10. • Monitoring at Broxburn continued to exhibit an exceedence (21µg/m³) of the PM₁₀ annual objective. A Detailed Assessment (DA) was commissioned. • A diffusion tube survey was also undertaken in Broxburn in 2010 which highlighted elevated concentrations of NO₂ levels. Potential for an Air Quality Management Area (AQMA) to be declared for PM₁₀ and potentially NO₂. • Monitoring at Linlithgow High Street in 2010 highlighted a reduction in PM₁₀ concentrations, however poor data capture was experienced. Measured concentrations in Linlithgow identified to be close to

		<p>exceedence of PM₁₀ annual objective level, continuing trend. It was therefore considered that a DA should be undertaken.</p> <ul style="list-style-type: none"> • A diffusion tube survey for NO₂ in West Calder was undertaken as recommended in the 2009 Progress Report. The levels of concentration were well below the annual objective level. The survey continued through 2011.
Updating and Screening Assessment	October 2012	<ul style="list-style-type: none"> • Monitoring at Broxburn continued to exhibit exceedences of both the PM₁₀ and NO₂ annual objectives. • Broxburn DA recommended AQMA declaration for PM₁₀ and NO₂ annual objectives. • Broxburn AQMA declared 29/03/11 • Linlithgow DA recommended AQMA for annual PM₁₀ objective. Declaration to be postponed until analysers moved to worst case position.
Progress Report	March 2014 (2013 Report)	<ul style="list-style-type: none"> • Monitoring at Broxburn continued to exhibit exceedence of NO₂ annual objectives. The AQMA is to remain. • Diffusion tubes in Linlithgow High Street indicated NO₂ exceedence. To go to Detailed Assessment. • Automatic monitoring station in Linlithgow High Street moved to worst case (canyon) location (October 2013)

Figure 1.1 Map(s) of AQMA Boundaries

Broxburn AQMA boundary is detailed in [Figure 1.1 in Appendix B](#)

2 New Monitoring Data

During 2013 West Lothian Council monitored both PM₁₀ and NO₂ at several locations throughout the Council area using both automatic and passive sampling methods.

All automatic monitoring PM₁₀ and NO₂ data have been fully ratified by Ricardo-AEA on behalf of the Scottish Government (detailed in [Appendix A](#)). Diffusion tube data have been corrected using a local bias correction (detailed in [Appendix C](#)). Details of the quality control and data correction are reported in [Appendix A](#).

2.1 Summary of Monitoring Undertaken

West Lothian Council monitor PM₁₀ and NO₂ using a combination of automatic analysers and passive diffusion tubes (PDT). The automatic monitoring sites are presented in [Table 2.1](#) and the details of non-automatic monitoring sites are presented in [Table 2.2](#).

2.1.1 Automatic Monitoring Sites

During 2013 the Council operated three real time automatic analysers. The Linlithgow High Street unit was decommissioned on 17/10/13 due to not being in a worst case location and relocated to a canyon area at the east end of Linlithgow High Street on 30/10/13 (and renamed Linlithgow High Street 2). The two other automatic analysers continued to operate at Broxburn East Main Street (CMC) and Newton Main Street.

Figure 2.1 Map of Automatic Monitoring Sites

All monitoring site locations are detailed in [Figure 2.1 Appendix B](#)

Table 2.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
CM1	Linlithgow ROMON	Roadside	299989	677090	2.4m	PM ₁₀ NO ₂	N	FDMS NO _x analyser	Y(-5.5m)	7m	N
CM1(2)	Linlithgow High St 2	Roadside	300426	677172	2.4m	PM ₁₀ NO ₂	N	FDMS NO _x analyser	Y(4m)	1.3m	Y
CM2	Broxburn CNC	Roadside	308314	672231	2.3m	PM ₁₀ NO ₂	Y	FDMS NO _x analyser	Y(3.5m)	2m	Y
CM3	Newton CNC	Roadside	309258	677728	2.4m	PM ₁₀ NO ₂	N	FDMS NO _x analyser	Y(2.0m)	2.4m	Y

2.1.2 Non-Automatic Monitoring Sites

The Council continues to maintain its network of 42 diffusion tubes at 20 sites. The monitoring sites represent public exposure and areas of high pollution concentrations at a variety of roadside and urban background locations. There are 2 tubes at 18 sites and 3 tubes co-located with the real time analysers at Linlithgow High Street and Broxburn West Main Street. The co-located tubes at Linlithgow moved with the automatic unit in October 2013 to the Linlithgow High Street 2 site. Diffusion tube data remains valuable and the Council is committed to making it publicly available. The Council has therefore continued to input data on the web based data entry system.

Diffusion tube QA/QC is detailed in [Appendix A](#).

Figure 2.2 Map(s) of Non-Automatic Monitoring Sites (if applicable)

All monitoring site locations are detailed in [Figure 2.1 in Appendix B](#)

Table 2.2 Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DT1	Newton	Roadside	309223	677711	2.5	NO ₂	N	N	Y(3m)	2m	Y
DT2	Broxburn WMS	Roadside	308165	672222	2.0	NO ₂	Y	N	Y(Façade)	3m	Y
DT3	Broxburn EMS	Roadside	308426	672233	2.5	NO ₂	Y	N	Y(1.5m)	4m	Y
DT4	Broxburn CNC	Roadside	308314	672231	2.2	NO ₂	Y	Y	Y(3m)	2m	Y
DT5	Broxburn E Mains	Roadside	309368	672213	2.3	NO ₂	Y	N	Y(4m)	2m	Y
DT6	Dedridge Cedric Rise	Urban Background	306403	666341	2.4	NO ₂	N	N	Y(4m)	3m	N
DT7	West Calder	Roadside	301758	663158	2.4	NO ₂	N	N	Y(2m)	2m	Y
DT8	Whitburn Cross	Roadside	294687	665030	2.1	NO ₂	N	N	Y(Façade)	3m	Y
DT9	Armadale Cross	Roadside	293842	668588	2.4	NO ₂	N	N	Y(2m)	2m	Y
DT10	Bathgate S Bridge	Roadside	297401	668772	2.2	NO ₂	N	N	Y(Façade)	3m	Y

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Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DT11	Bathgate Steelyard	Roadside	297467	668734	2.5	NO ₂	N	N	Y(12m)	4m	Y
DT12	Bathgate King St	Roadside	297570	668586	2.5	NO ₂	N	N	Y(5m)	4m	Y
DT13	Bathgate High St	Urban Background	297656	669298	1.8	NO ₂	N	N	Y(3m)	10m	N
DT14	Linlithgow ROMON	Roadside	299989	677090	2.3	NO ₂	N	Y	Y(-5.5m)	7m	Y
DT14/2	Linlithgow High St 2	Roadside	300426	677172	2.3	NO ₂	N	Y	Y(4m)	1.3m	Y
DT15	Linlithgow H St NW	Roadside	299930	677070	2.5	NO ₂	N	N	Y(Façade)	1.4m	Y
DT16	Linlithgow H St SW	Roadside	299911	677052	2.5	NO ₂	N	N	Y(2m)	2.9m	Y
DT17	Linlithgow H St NE	Roadside	300479	677148	2.5	NO ₂	N	N	Y(3.4)	2m	Y
DT18	Linlithgow H St SE	Roadside	300485	677125	2.5	NO ₂	N	N	Y(7.5m)	2.2m	Y
DT19	Linlithgow H St N	Roadside	300398	677132	2.5	NO ₂	N	N	Y(Façade)	2.4m	Y
DT20	Linlithgow H St S	Roadside	300405	677118	2.5	NO ₂	N	N	Y(Façade)	3m	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

The following section considers measured PM₁₀ and NO₂ concentrations and compares the monitoring results with the relevant air quality objective.

2.2.1 Nitrogen Dioxide (NO₂)

During 2013 the Council monitored NO₂ using three real time automatic analysers. The Linlithgow High Street unit was decommissioned on 17/10/13 and relocated to a canyon area at the east end of Linlithgow High Street on 30/10/13 (and renamed Linlithgow High Street 2). The two other automatic analysers continued to operate at Broxburn East Main Street (CMC) and Newton Main Street.

Automatic Monitoring Data

The annual mean and 1-hour mean NO₂ automatic monitoring data for 2013 and previous years are presented in [Tables 2.3](#) and [2.4](#). Trends in the annual mean NO₂ concentrations measured at automatic monitoring sites are illustrated in [Figure 2.3](#). Measured exceedences of National Air Quality Strategy objectives are highlighted in bold.

Data capture at Broxburn was considered good at well above 90%. Newton data capture was less than 90% while as the new Linlithgow High Street 2 site only operated for part of the year data capture levels were such that both this site's data required annualisation.

Measured concentrations are considerably below the annual mean objective level of 40µg/m³ at Linlithgow (CM1) and Newton (CM3). At Broxburn (CM2) the measured concentration of 39µg/m³ is just below the objective level. At the new Linlithgow site (CM1(2)) the annualised mean of 44.5µg/m³ was above the annual mean objective but this was only based on 2 months data and when adjusted for distance to the nearest relevant receptor becomes 36µg/m³.

There were no measured exceedences of the 1-hour objective for NO₂.

Table 2.3 Results of Automatic Monitoring for NO₂: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013 % ^b	Annual Mean Concentration (µg/m ³)				
					2009* ^c	2010* ^c	2011* ^c	2012* ^c	2013 ^c
CM1	Roadside	N	98.6	78.4	21	26	18	18	17
CM1(2)	Roadside	N	85.5	14.5	N/A	N/A	N/A	N/A	44.5(36)^c
CM2	Roadside	Y	93.7	93.7	39	46 (38)	43 (36)	45 (38)	39
CM3	Roadside	N	84.9	84.9	N/A	N/A	N/A	32 ^c	24

In bold, exceedence of the NO₂ annual mean AQS objective of 40µg/m³

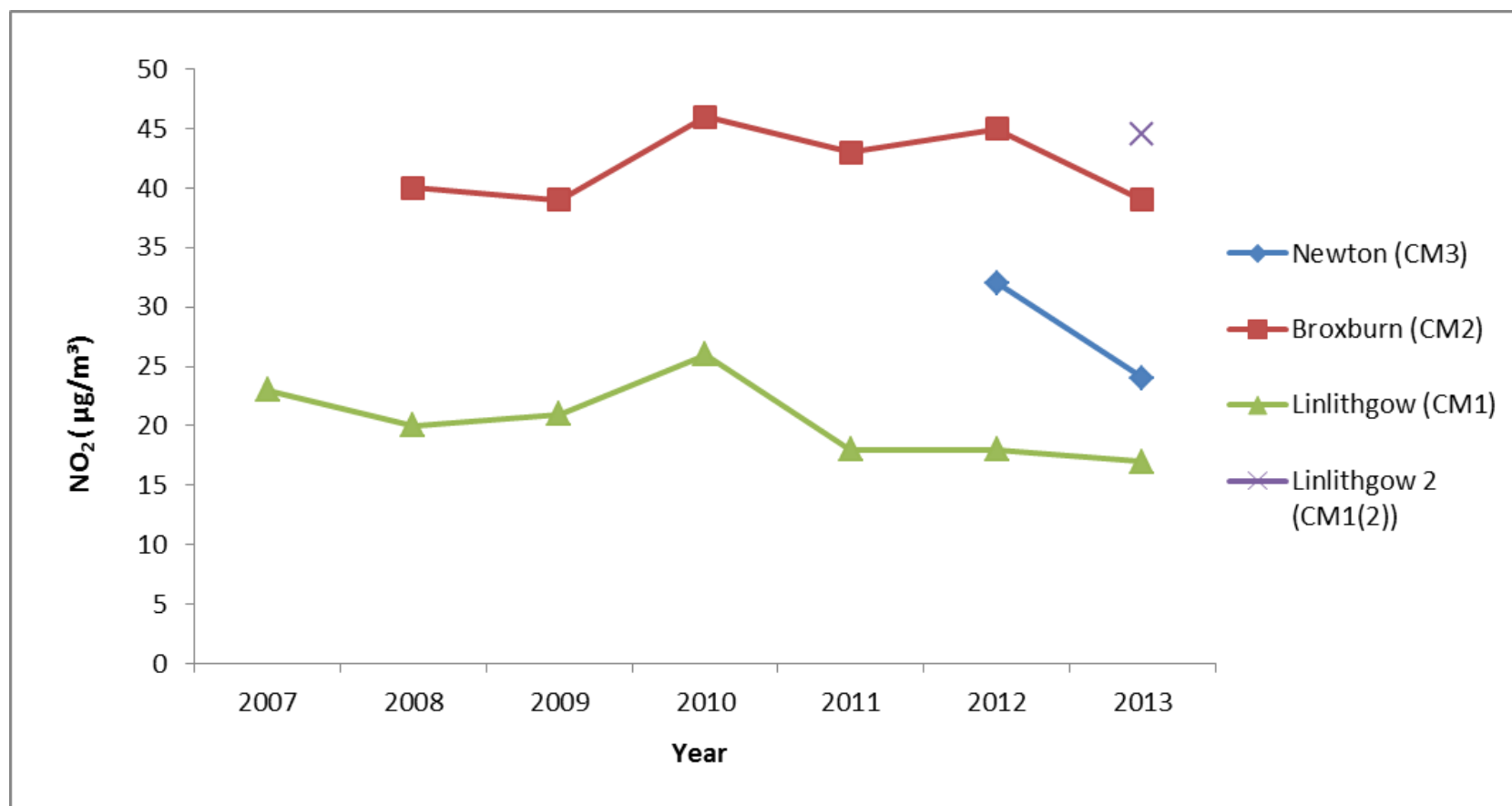
^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

^c Means should be “annualised” [as in Box 3.2 of TG\(09\)](http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38) (<http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38>), if valid data capture is less than 75%

* Annual mean concentrations for previous years are optional

Data in brackets represents the estimated annual concentration at relevant receptors using the NO₂ Fall Off with Distance calculator (DEFRA website, LAQM, Tools, 2013).

Figure 2.3 Trends in Annual Mean NO₂ Concentrations Measured at Automatic Monitoring Sites

Broxburn measured annual NO₂ concentration of 39µg/m³ has fallen to just below above the annual objective of 40µg/m³. Newton remains well below the objective level while the new Linlithgow site showed an annualised concentration of 44.5µg/m³ which exceeds

the annual objective of $40\mu\text{g}/\text{m}^3$ but was calculated from only 2 months data and falls to $36\mu\text{g}/\text{m}^3$ after adjustment for distance to the nearest relevant receptor.

Table 2.4 Results of Automatic Monitoring for NO₂: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013 % ^b	Number of Hourly Means > $200\mu\text{g}/\text{m}^3$				
					2009* ^c	2010* ^c	2011* ^c	2012* ^c	2013 ^c
CM1	Roadside	N	98.6	78.4	0	0 (149)	0	0	0 (80)
CM1(2)	Roadside	N	85.5	14.5	N/A	N/A	N/A	N/A	0 (101)
CM2	Roadside	Y	93.7	93.7	1	0	0	0	0
CM3	Roadside	N	84.9	84.9	N/A	N/A	N/A	0 (147)	0 (141)

In bold, exceedence of the NO₂ hourly mean AQS objective ($200\mu\text{g}/\text{m}^3$ – not to be exceeded more than 18 times per year)

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

^c If the data capture for full calendar year is less than 90%, include the 99.8th percentile of hourly means in brackets

* Number of exceedences for previous years is optional

Diffusion Tube Monitoring Data

The NO₂ diffusion tube monitoring data for 2013 and previous years are presented in [Tables 2.5](#) and [2.6](#) respectively. At diffusion tube locations where data capture is less than 75% it has been necessary to annualise measured concentrations.

The diffusion tube monitoring results have been adjusted for laboratory bias and where appropriate corrected for distance. Details of bias adjustment factors are explained in [Appendix A](#). Trends in the annual mean NO₂ concentrations measured at roadside diffusion tube sites with historic data are illustrated in [Figure 2.4](#).

Table 2.5 Results of NO₂ Diffusion Tubes 2013

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months or %) ^a	2013 Annual Mean Concentration (µg/m ³) - Bias Adjustment factor = 1.02 ^b
DT1	Newton	Roadside	N	N	12	30
DT2	Broxburn WMS	Roadside	Y	N	11	37
DT3	Broxburn EMS	Roadside	Y	N	12	34
DT4	Broxburn CNC	Roadside	Y	Triplicate and Co-located	12	41(35) ^b
DT5	Broxburn E Mains	Roadside	Y	N	10	37
DT6	Dedridge Cedric Rise	Urban Background	N	N	11	18
DT7	West Calder	Roadside	N	N	11	32
DT8	Whitburn Cross	Roadside	N	N	12	31
DT9	Armadale Cross	Roadside	N	N	11	34
DT10	Bathgate S Bridge	Roadside	N	N	12	24
DT11	Bathgate Steelyard	Roadside	N	N	12	37
DT12	Bathgate King Street	Roadside	N	Triplicate and Co-located	12	38
DT13	Bathgate High St	Urban Background	N	N	11	14

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months or %) ^a	2013 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Bias Adjustment factor = 1.02 ^b
DT14	Linlithgow ROMON	Roadside	N	Triplicate and Co-located	9	24
DT14 (2)	Linlithgow High St 2	Roadside	N	Triplicate and Co-located	2	44^a(36)^b
DT15	Linlithgow H St NW	Roadside	N	N	12	40
DT16	Linlithgow H St SW	Roadside	N	N	12	45(41)^b
DT17	Linlithgow H St NE	Roadside	N	N	12	33
DT18	Linlithgow H St SE	Roadside	N	N	12	41(32)^b
DT19	Linlithgow H St N	Roadside	N	N	12	40
DT20	Linlithgow H St S	Roadside	N	N	12	42

In bold, exceedence of the NO₂ annual mean AQS objective of 40 $\mu\text{g}/\text{m}^3$

Underlined, annual mean > 60 $\mu\text{g}/\text{m}^3$, indicating a potential exceedence of the NO₂ hourly mean AQS objective

^a Means should be “annualised” as in Box 3.2 of TG(09) (<http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38>), if full calendar year data capture is less than 75%

^b If an exceedence is measured at a monitoring site not representative of public exposure, NO₂ concentration at the nearest relevant exposure should be estimated based on the “NO₂ fall-off with distance” calculator (<http://laqm.defra.gov.uk/tools-monitoring-data/no2->

[falloff.html](#)), and results should be discussed in a specific section. The procedure is also explained [in Box 2.3 of Technical Guidance LAQM.TG\(09\)](#) (<http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=30>).

Data in brackets represents the estimated annual concentration at relevant receptors using the NO₂ Fall Off with Distance calculator (DEFRA website, LAQM, Tools, 2013).

Table 2.6 Results of NO₂ Diffusion Tubes (2009 to 2013)

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m ³) - Adjusted for Bias ^a				
			2009 (Bias Adjustment Factor = 0.89)	2010 (Bias Adjustment Factor = 1.08)	2011 (Bias Adjustment Factor = 1.04)	2012 (Bias Adjustment Factor = 1.09)	2013 (Bias Adjustment Factor = 1.02)
DT1	Roadside	N	N/A	33	32	37	30
DT2	Roadside	Y	N/A	49	35	39	37
DT3	Roadside	Y	N/A	40	36	38	34
DT4	Roadside	Y	N/A	47	36 ^b	39 ^b	35 ^b
DT5	Roadside	Y	N/A	40	37	39	37
DT6	Urban Background	N	14	21	17	19	18
DT7	Roadside	N	N/A	32	30	31	32
DT8	Roadside	N	27	49	31	37	31
DT9	Roadside	N	29	37	34	34	34
DT10	Roadside	N	N/A	N/A	25	25	24
DT11	Roadside	N	N/A	N/A	38	38	37

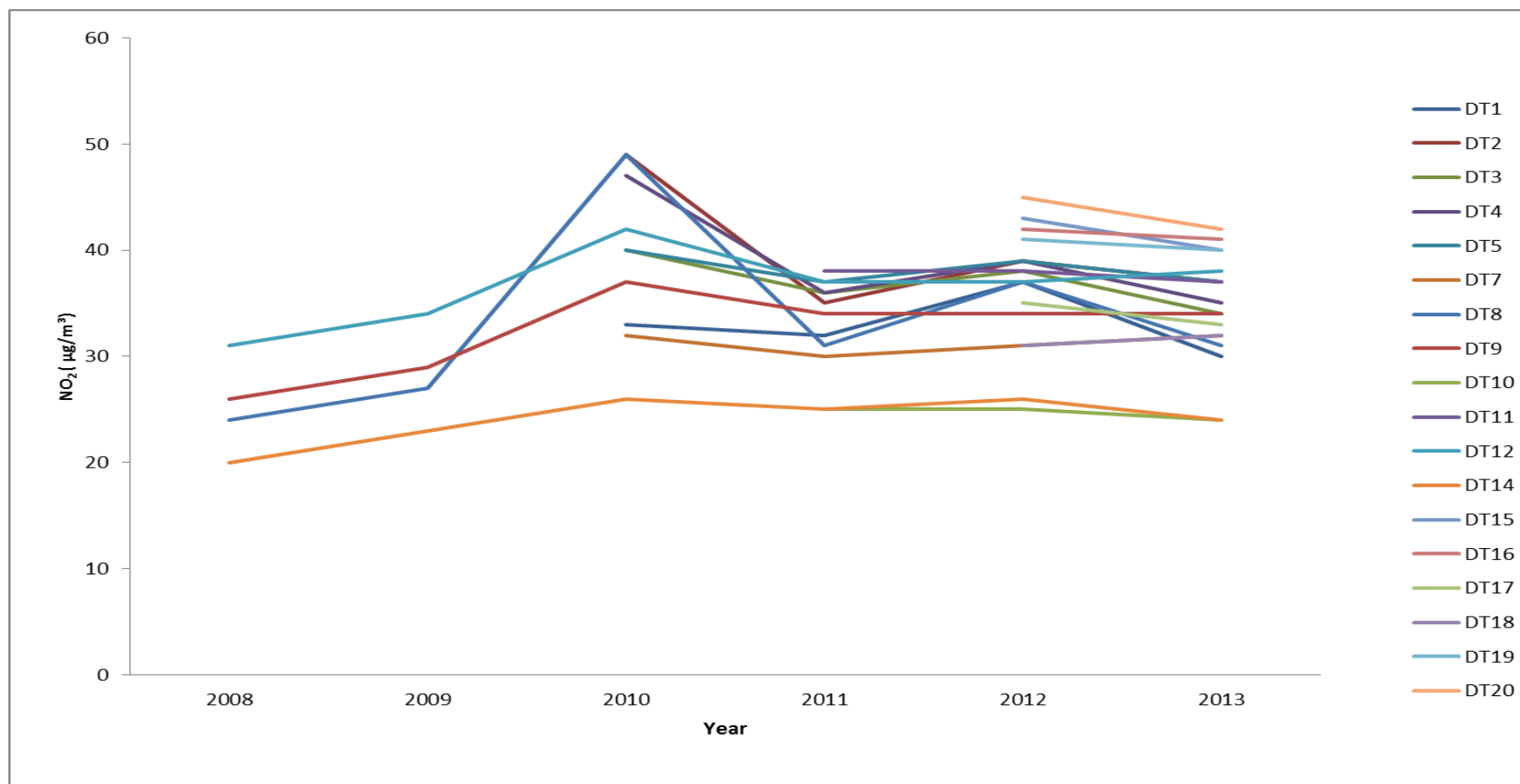
Site ID	Site Type	Within AQMA?	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Adjusted for Bias ^a				
			2009 (Bias Adjustment Factor = 0.89)	2010 (Bias Adjustment Factor = 1.08)	2011 (Bias Adjustment Factor = 1.04)	2012 (Bias Adjustment Factor = 1.09)	2013 (Bias Adjustment Factor = 1.02)
DT12	Roadside	N	34	42	37	37	38
DT13	Urban Background	N	14	18	15	15	14
DT14	Roadside	N	23	26	25	26	24
DT14 (2)	Roadside	N	N/A	N/A	N/A	N/A	36 ^{ab}
DT15	Roadside	N	N/A	N/A	N/A	43^b	40
DT16	Roadside	N	N/A	N/A	N/A	42^b	41^b
DT17	Roadside	N	N/A	N/A	N/A	35	33
DT18	Roadside	N	N/A	N/A	N/A	31 ^b	32 ^b
DT19	Roadside	N	N/A	N/A	N/A	41^a	40
DT20	Roadside	N	N/A	N/A	N/A	45^a	42

In bold, exceedence of the NO₂ annual mean AQS objective of 40 $\mu\text{g}/\text{m}^3$

Underlined, annual mean > 60 $\mu\text{g}/\text{m}^3$, indicating a potential exceedence of the NO₂ hourly mean AQS objective

^a Means should be “annualised” as in Box 3.2 of TG(09) (<http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38>), if full calendar year data capture is less than 75%

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites



NO₂ annual mean diffusion tube results at roadside locations over the past 6 years are illustrated in Figure 2.4 above. The general trend shows neither an increase nor decrease in NO₂ concentration from 2008 to 2013 at most roadside sites. The measured concentrations at the new Linlithgow High Street sites (DT15 to DT20) remain near or above the AQSO objective of 40µg/m³.

2.2.2 Particulate Matter (PM₁₀)

During 2013 the Council monitored PM₁₀ using three real time automatic analysers. The Linlithgow High Street unit was decommissioned on 17/10/13 and relocated to a canyon area at the east end of Linlithgow High Street on 30/10/13 (and renamed Linlithgow High Street 2). The two other automatic analysers continued to operate at Broxburn East Main Street (CMC) and Newton Main Street.

The measured annual mean and 24-hour mean PM₁₀ concentrations for 2013 and previous years are presented in [Tables 2.7](#) and [2.8](#) respectively.

Table 2.7 Results of Automatic Monitoring for PM₁₀: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013 % ^b	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration (µg/m ³)				
						2009* ^c	2010* ^c	2011* ^c	2012* ^c	2013 ^c
CM1	Roadside	N	93.1	74	Y	18	12	13	12	13.9 ^c
CM1(2)	Roadside	N	97.3	18.4	Y	N/A	N/A	N/A	N/A	18 ^c
CM2	Roadside	Y	79.4	79.4	Y	19	21	18	16	16
CM3	Roadside	N	94.4	94.4	Y	N/A	N/A	N/A	14.7 ^c	19

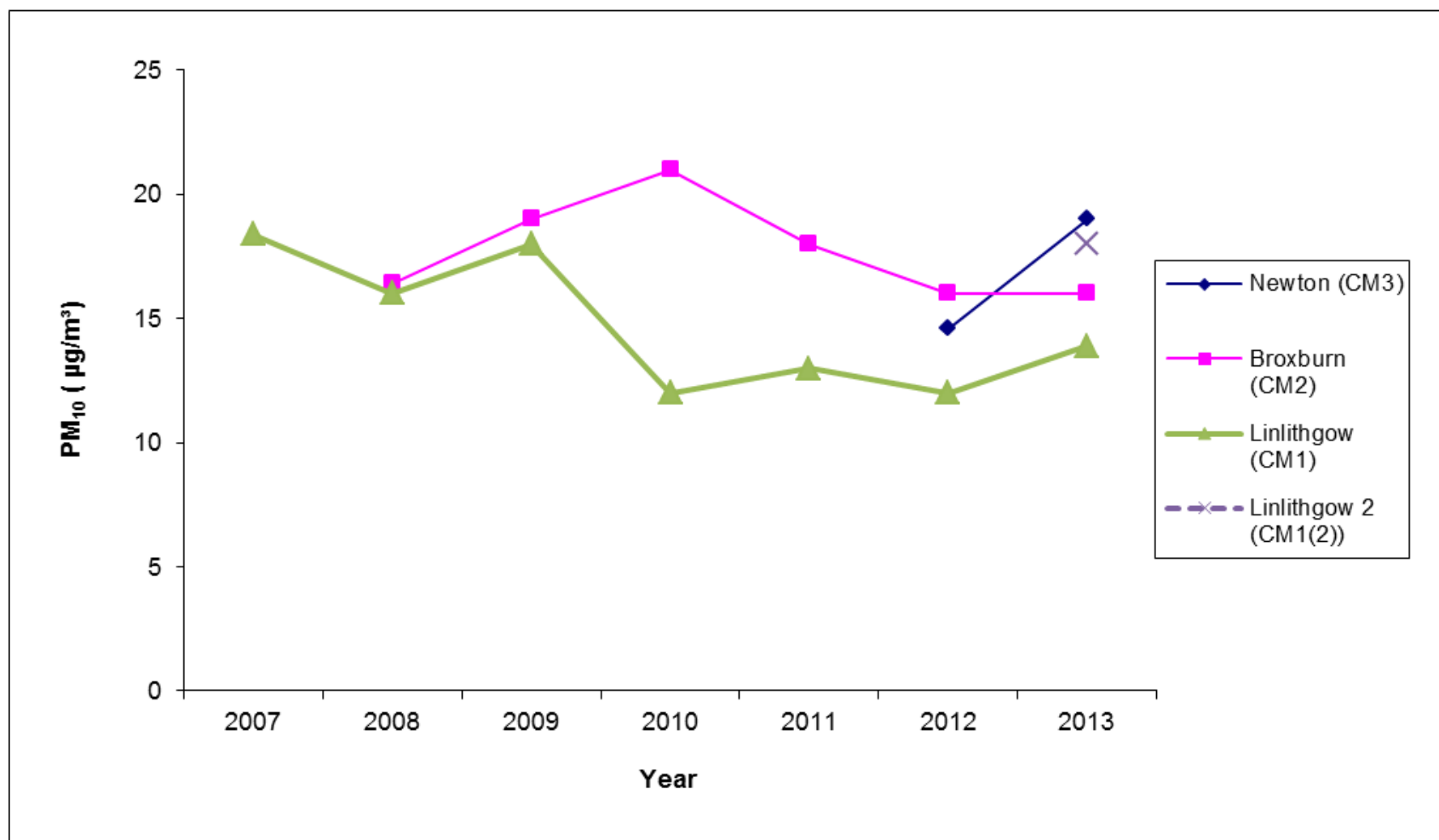
In bold, exceedence of the PM₁₀ annual mean AQS objective of 18µg/m³

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

^c Means should be “annualised” [as in Box 3.2 of TG\(09\)](http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38) (<http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38>), if valid data capture is less than 75%

* Annual mean concentrations for previous years are optional

Figure 2.5 Trends in Annual Mean PM₁₀ Concentrations

PM₁₀ annual mean results over the past 7 years are illustrated in Figure 2.5 above. The first full year of results from Newton (CM3) show an increase in measured PM₁₀ concentration to 19µg/m³ which exceeds the AQS objective of 18µg/m³. Broxburn (CM2) PM₁₀ concentration remained at the 2012 level of 16µg/m³ while Linlithgow (CM1) remained well below the AQS objective of 18µg/m³.

Table 2.8 Results of Automatic Monitoring for PM₁₀: Comparison with 24-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013 % ^b	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m ³				
						2009* ^c	2010* ^c	2011* ^c	2012* ^c	2013 ^c
CM1	Roadside	N	93.1	74	Y	2	0 (30)	1	1 (35)	0 (35)
CM1(2)	Roadside	N	97.3	18.4	Y	N/A	N/A	N/A	N/A	0 (35)
CM2	Roadside	Y	79.4	79.4	Y	5	4	3	2	0 (33)
CM3	Roadside	N	94.4	94.4	Y	N/A	N/A	N/A	0 (25)	4

In bold, exceedence of the PM₁₀ daily mean AQS objective (50µg/m³ – not to be exceeded more than 7 times per year)

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

^c if data capture for full calendar year is less than 90%, include the 98.1th percentile of 24-hour means in brackets

* Number of exceedences for previous years is optional

2.2.3 Summary of Compliance with AQS Objectives

West Lothian Council has measured concentrations of PM₁₀ and NO₂ above the annual mean objective at relevant locations outside of the AQMA. Diffusion tubes indicate an exceedence of the NO₂ annual objective in Linlithgow High Street which **will need to proceed to a Detailed Assessment**. Newton automatic monitoring indicates an exceedence of the PM₁₀ annual objective and **will need to proceed to a Detailed Assessment**.

Measured concentrations within the Broxburn AQMA were below the annual mean objective for NO₂ except for one diffusion tube site which fell below the objective when distance corrected for the nearest receptor. Concentration for PM₁₀ is below the annual mean objective. The Broxburn AQMA will be reviewed in the 2015 Updating and Screening Assessment.

3 New Local Developments

3.1 Road Traffic Sources

There are no new Road Traffic Sources.

3.2 Other Transport Sources

There are no new Other Transport Sources.

3.3 Industrial Sources

There are no new Industrial Sources.

3.4 Commercial and Domestic Sources

While small domestic solid fuel burning stoves are becoming more popular there are no areas where this has been identified as relevant.

3.5 New Developments with Fugitive or Uncontrolled Sources

There are no new Developments with Fugitive or Uncontrolled Sources

West Lothian Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

West Lothian Council confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Local / Regional Air Quality Strategy

There is no Local/Regional Air Quality Strategy at present.

5 Planning Applications

Planning Applications where air quality assessments were required:

1. **0698/P/13** Clarendon Farm, Linlithgow for 6.5Ha Residential Development
2. **0518/P/13** Burghmuir A, Linlithgow for 12.5Ha Residential Development

(Although both 1 and 2 above were subsequently refused Planning Permission these sites may be subject to further Planning Applications for residential development.)

Planning Applications which may have an effect on air quality were granted during 2013:

1. **0511/ARM/09** Part of the ongoing large residential development at Wester Inch, Bathgate
2. **0748/MSC/12** 63 houses and 107 flats at Whitburn Road, Bathgate
3. **0749/FUL/10** 196 houses in East Calder
4. **0081/FUL/12** 90 houses in East Calder
5. **0191/FUL/09** 23Ha residential development in Armadale
6. **0432/MSC/13** 111 homes as part of 352Ha ongoing development in Winchburgh

6 Air Quality Planning Policies

Air quality is explicitly mentioned in the following policies and guidance:

- West Lothian Local Plan 2009

However, West Lothian Council does not have a specific policy on Planning and Air Quality.

7 Local Transport Plans and Strategies

West Lothian Council is in the process of producing a new Local Transport Strategy to replace that from the year 2000.

8 Climate Change Strategies

The Council Climate Change Strategy is not yet available.

9 Implementation of Action Plans

The Broxburn Air Quality Management Area action plan process was initiated towards the end of 2012. A Draft Action Plan is being developed.

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

The measured annual mean NO₂ concentration within the Broxburn AQMA in 2013 is below the annual mean objective level. Measured concentrations at diffusion tube locations within the AQMA were below the annual mean objective level after bias adjustment and distance correction. Although Broxburn NO₂ concentration is below objective levels the AQMA will remain for NO₂ subject to review in the 2015 Updating and Screening Assessment.

There were no measured exceedences of the 1-hour objective for NO₂ at any automatic site.

No exceedences of NO₂ objectives were measured at all other automatic monitoring stations. Furthermore, there were no measured exceedences of the annual mean NO₂ objective at diffusion tube monitoring sites except Linlithgow High Street which will proceed to a Detailed Assessment.

Measured NO₂ concentrations in 2013 were generally lower than in 2012.

Measured PM₁₀ concentration at Newton exceeded the annual mean objective therefore will proceed to a Detailed Assessment. Measured PM₁₀ concentrations at all other automatic sites were below the annual mean objective level. The new Linlithgow site was only operational for two months during 2013 resulting in an annualised PM₁₀ concentration equal to the annual mean objective. Although Broxburn PM₁₀ concentration remains below objective levels the AQMA will remain for PM₁₀ subject to review in the 2015 Updating and Screening Assessment.

Exceedences of the daily mean PM₁₀ objective level were measured at Newton and Linlithgow (CM1) but the numbers of measured exceedences were below the levels permitted under the NAQS objective level at each site.

10.2 Conclusions relating to New Local Developments

No new sources were identified for which there was a need to proceed to a Detailed Assessment.

10.3 Other Conclusions

The West Lothian Local Plan (2009) identifies core development (CDA) areas as the focus of growth until 2015. This includes considerable planned residential development. Air Quality is an ongoing consideration as CDA development progresses.

10.4 Proposed Actions

A new area of concern identified by the Progress Report is PM₁₀ in Newton. Newton will progress to a Detailed Assessment.

The Linlithgow Air Quality monitoring station was relocated to the worst case 'canyon' area identified by a previous Detailed Assessment and approved by the Scottish Government. Measured data in 2013 confirms Linlithgow High Street 'canyon' area as a concern for NO₂ and PM₁₀. The Council will continue to monitor using a network of diffusion tube surveys in Linlithgow High Street. Linlithgow will progress to a Detailed Assessment for NO₂.

The Council should continue to monitor both NO₂ and PM₁₀ within the Broxburn AQMA and proceed with the Action Planning process. Broxburn AQMA status will be reviewed in the 2015 Updating and Screening Assessment.

The Council should prepare an Updating and Screening Assessment on monitored pollutant concentrations and progress with the Broxburn Action Plan in 2014.

11 References

1. AEA/ENV/R/2504-Issue 1a – Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance
2. 2011 Air Quality Progress Report for West Lothian Council
3. 2012 Air Quality Updating and Screening Assessment for West Lothian Council
4. 2013 Air Quality Progress Report for West Lothian Council
5. Local Air Quality Technical Guidance LAQM.TG(09)
6. West Lothian Local Plan 2009

Appendices

[Appendix A](#): Quality Assurance / Quality Control (QA/QC) Data

[Appendix B](#): Maps

Appendix C: Diffusion Tube Monthly Results

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Diffusion tubes were supplied and analysed by ESG Didcot. The LAQM national bias database for this analyst calculates a bias adjustment factor for 2013 of 0.80.

Factor from Local Co-location Studies (if available)

Three diffusion tubes have been located adjacent to the inlet of the automatic monitoring station at a roadside site at West Main Street, Broxburn (CM3). The results from the diffusion tubes were compared to the results over the same periods from the co-located Thermo 42i NOx analyser.

The results were analysed using the Ricardo-AEA spreadsheet to determine precision, accuracy and to calculate a locally derived bias correction factor as detailed in [Appendix C](#) (DT4).

Discussion of Choice of Factor to Use

The analysis of the Broxburn co-location study calculated a locally derived bias factor of 1.02, which was applied to all diffusion tube site data. This local bias correction factor was considered representative of the local situation.

PM Monitoring Adjustment

All PM monitoring data was from FDMS therefore no adjustments were made.

Short-term to Long-term Data adjustment

Two annualisation calculations were necessary for Linlithgow (CM1) and Linlithgow High St 2 (CM1(2)) PM₁₀

Table A.1 Short-Term to Long-Term Monitoring Data Adjustment Linlithgow (CM1) PM₁₀

Site	Site Type	Annual Mean (µg/m ³)	Period Mean (µg/m ³)	Ratio
Grangemouth MC	Urban Background	15	16.3	0.920
Coatbridge Whifflet	Urban Background	15	16.9	0.888
Waulkmillglen Reservoir	Rural	12	12.4	0.968
Average				0.925

Table A.2 Short-Term to Long-Term Monitoring Data Adjustment Linlithgow High St 2 (CM1(2)) PM₁₀

Site	Site Type	Annual Mean (µg/m ³)	Period Mean (µg/m ³)	Ratio
Grangemouth MC	Urban Background	15	12.5	1.2
Coatbridge Whifflet	Urban Background	15	14.5	1.034
Waulkmillglen Reservoir	Rural	12	10.5	1.143
Average				1.126

An annualisation calculation was necessary for Linlithgow High St 2 (CM1(2)) NO₂

Table A.3 Short-Term to Long-Term Monitoring Data Adjustment Linlithgow High St 2 (CM1(2)) NO₂

Site	Site Type	Annual Mean (µg/m ³)	Period Mean (µg/m ³)	Ratio
Bush Estate	Rural	6.5	5.15	1.262
Eskdalemuir	Rural	2.5	2.25	1.111
Edinburgh Currie	Suburban	8	7	1.143
Average				1.172

QA/QC of Automatic Monitoring

The automatic monitoring sites at Linlithgow, Broxburn and Newton and were subject to site audits including calibration checks every 6 months. These were carried out by Ricardo-AEA.

Data validation and ratification was carried out by Ricardo-AEA as summarised in the Air Pollution Reports at the end of this Appendix.

Analyser Maintenance and Calibration

Air Monitors Ltd continues to service and provide engineer call-outs to all automatic monitoring sites. Servicing of analysers at all sites is carried out every six months with engineer maintenance visits made as required. Additional regular site visits are made to check analyser operation and site condition and to change analyser filters. All TEOM/FDMS filters are changed before the filters reach 90%. The TEOM head is cleaned at each filter change.

All automatic monitoring stations use an Air Monitors web logger. Auto calibrations are run daily at each site for NO_x analysers. Calibration data is monitored using Air Monitors AQ Web Manager and AQ Web Reports software.

Data Acquisition, Security and Dissemination

All sites incorporate a web logger allowing data to be viewed, downloaded and reviewed using the associated software, AQ Web Manager, AQ Web Archive and AQ Web Reports.

All West Lothian Council automatic monitoring site data can be accessed via the Scottish Government Air Quality website at www.scottishairquality.co.uk. Ricardo-AEA validated historic data is available from this site.

QA/QC of Diffusion Tube Monitoring

- West Lothian Council diffusion tubes were supplied and analysed by ESG Didcot.
- ESG Didcot used 50% v/v Triethanolamine (TEA) in acetone for the absorbant in which grids are dipped then allowed to dry before being inserted into acrylic tubes.
- Harmonisation Practical Guidance procedures are followed by this laboratory.
- West Lothian has compared diffusion tube results with that of an automatic NO_x analyser in a co-location study at the Broxburn roadside site (see above).
- The bias adjustment factor applied to diffusion tube annual means is 1.02. This was calculated using a local co-location study (see above).

West Lothian Council

- The ESG Didcot laboratory participated in the Workplace Analysis Scheme for Proficiency (WASP) and achieved 100% satisfactory for rounds 120 – 123 (January 2013 –December 2013).

West Lothian Council deploys diffusion tubes according to the procedure detailed in guidance document AEA/ENV/R/2504² – Issue 1a. Diffusion tubes are exposed on the 4/5 week cycle specified in the Ricardo-AEA calendar and are stored in a sealed container in a refrigerator until being returned to the laboratory. Travel blank diffusion tubes are carried throughout the deployment and analysis procedure.

Produced by RICARDO-AEA on behalf of the Scottish Government

WEST LOTHIAN BROXBURN

1st January to 31st December 2013

These data have been fully ratified by RICARDO-AEA

POLLUTANT	PM ₁₀₊	NO ₂	NO _x
Maximum hourly mean	219 µg m ⁻³	168 µg m ⁻³	745 µg m ⁻³
Maximum daily mean	47 µg m ⁻³	89 µg m ⁻³	344 µg m ⁻³
98.08th percentile of daily means	33 µg m ⁻³	-	-
Average	16 µg m ⁻³	39 µg m ⁻³	94 µg m ⁻³
Data capture	79.4 %	93.7 %	93.7 %

+ PM₁₀ instruments:FDMS using a gravimetric factor of 1 from 1st January 2013

All gaseous pollutant mass units are at 20°C and 1013 mb. Particulate matter concentrations are reported at ambient temperature and pressure.

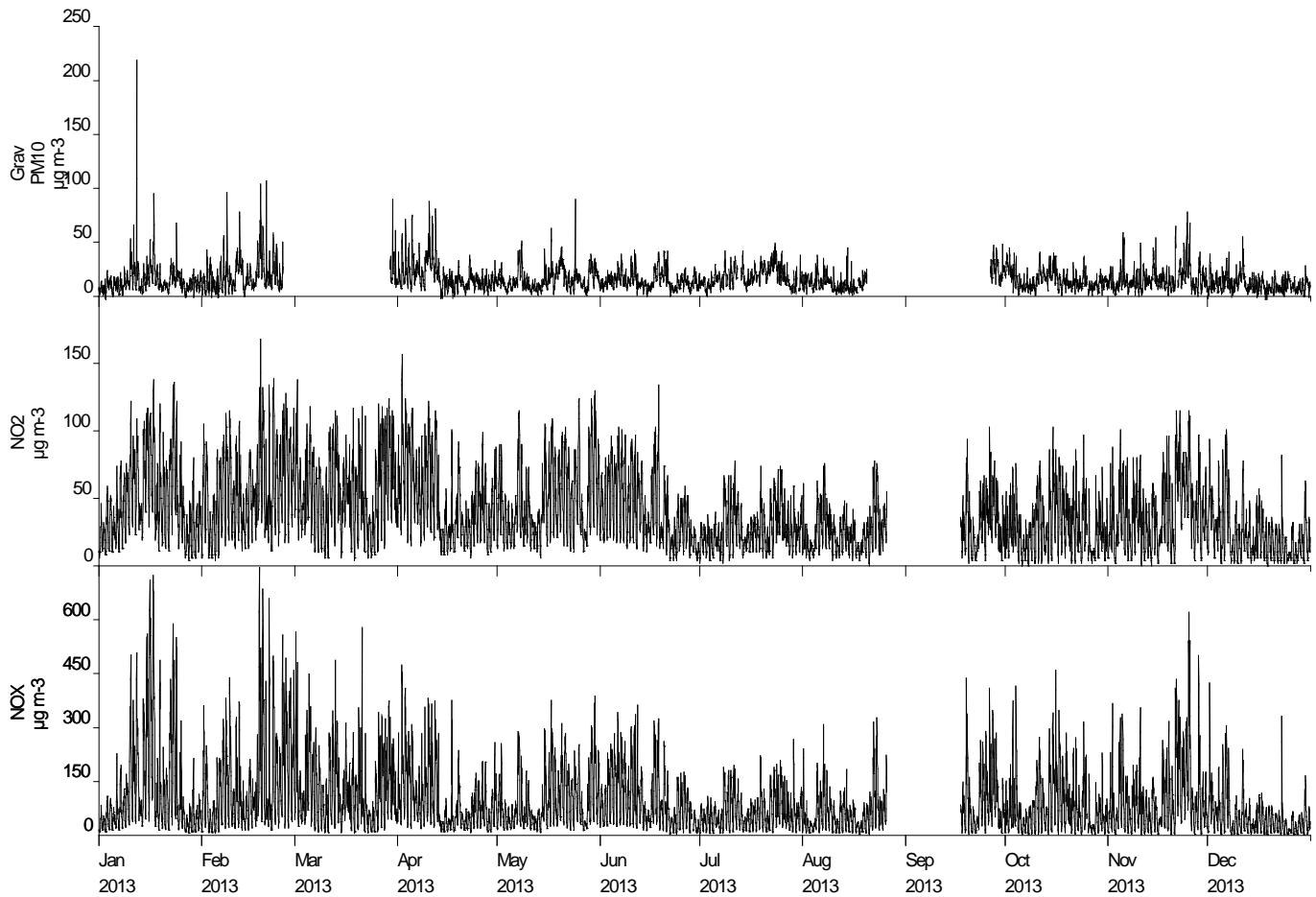
NO_x mass units are NO_x as NO₂ µg m⁻³

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM ₁₀ Particulate Matter (Gravimetric)	Daily mean > 50 µg m ⁻³	0	0
PM ₁₀ Particulate Matter (Gravimetric)	Annual mean > 18 µg m ⁻³	0	-
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by RICARDO-AEA on behalf of the Scottish Government

**West Lothian Broxburn
Hourly Mean Data for 1st January to 31st December 2013**



Date Created: 08/04/2014

Produced by Ricardo-AEA on behalf of the Scottish Government

WEST LOTHIAN LINLITHGOW HIGH STREET 1st January to 31st December 2013

These data have been fully ratified by Ricardo-AEA

POLLUTANT	PM ₁₀₊	NO ₂	NO _x
Maximum hourly mean	94 µg m ⁻³	101 µg m ⁻³	493 µg m ⁻³
99.8th percentile of hourly means	-	80 µg m ⁻³	298 µg m ⁻³
98.08th percentile of daily means	35 µg m ⁻³	45 µg m ⁻³	121 µg m ⁻³
Average	15 µg m ⁻³	17 µg m ⁻³	29 µg m ⁻³
sData capture	74.0 %	78.4 %	78.4 %

+ PM₁₀ instruments:

FDMS using a gravimetric factor of 1 from 1st January 2013 to 14th October 2013

All gaseous pollutant mass units are at 20°C and 1013 mb. Particulate matter concentrations are reported at ambient temperature and pressure.

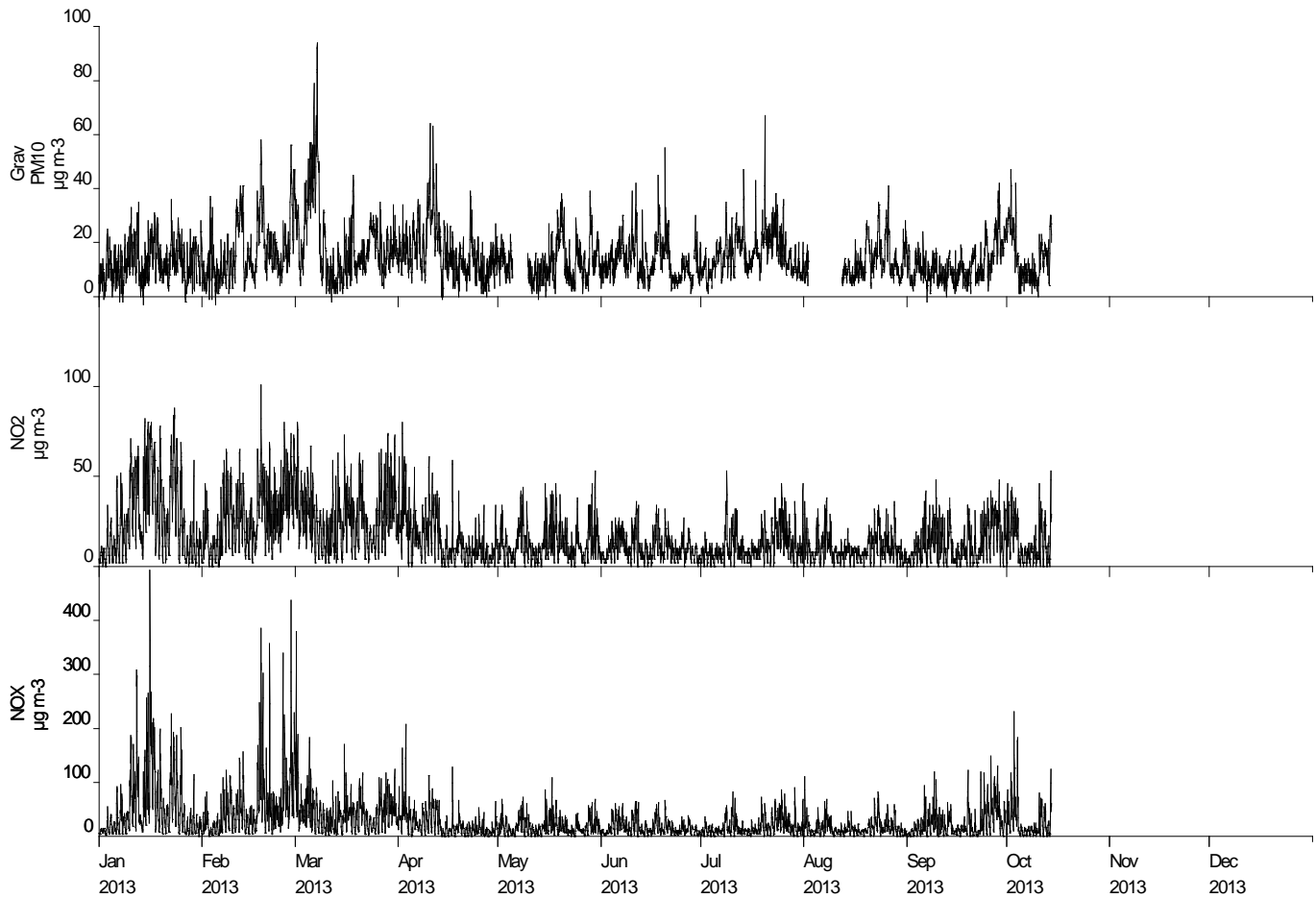
NO_x mass units are NO_x as NO₂ µg m⁻³

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM ₁₀ Particulate Matter (Gravimetric)	Daily mean > 50 µg m ⁻³	1	1
PM ₁₀ Particulate Matter (Gravimetric)	Annual mean > 18 µg m ⁻³	0	-
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by Ricardo-AEA on behalf of the Scottish Government

West Lothian Linlithgow High Street Hourly Mean Data for 1st January to 31st December 2013



Date Created: 08/04/2014

Produced by RICARDO-AEA on behalf of the Scottish Government

WEST LOTHIAN LINLITHGOW HIGH ST 2 1st January to 31st December 2013

These data have been fully ratified by RICARDO-AEA

POLLUTANT	PM ₁₀₊	NO ₂	NO _x
Maximum hourly mean	65 µg m ⁻³	109 µg m ⁻³	592 µg m ⁻³
99.8th percentile of hourly means	-	101 µg m ⁻³	537 µg m ⁻³
98.08th percentile of daily means	35 µg m ⁻³	-	-
Average	16 µg m ⁻³	38 µg m ⁻³	88 µg m ⁻³
Data capture	18.4 %	14.5 %	14.5 %

+ PM₁₀ instruments:
FDMS using a gravimetric factor of 1 from 25th October 2013

All gaseous pollutant mass units are at 20°C and 1013 mb. Particulate matter concentrations are reported at ambient temperature and pressure.

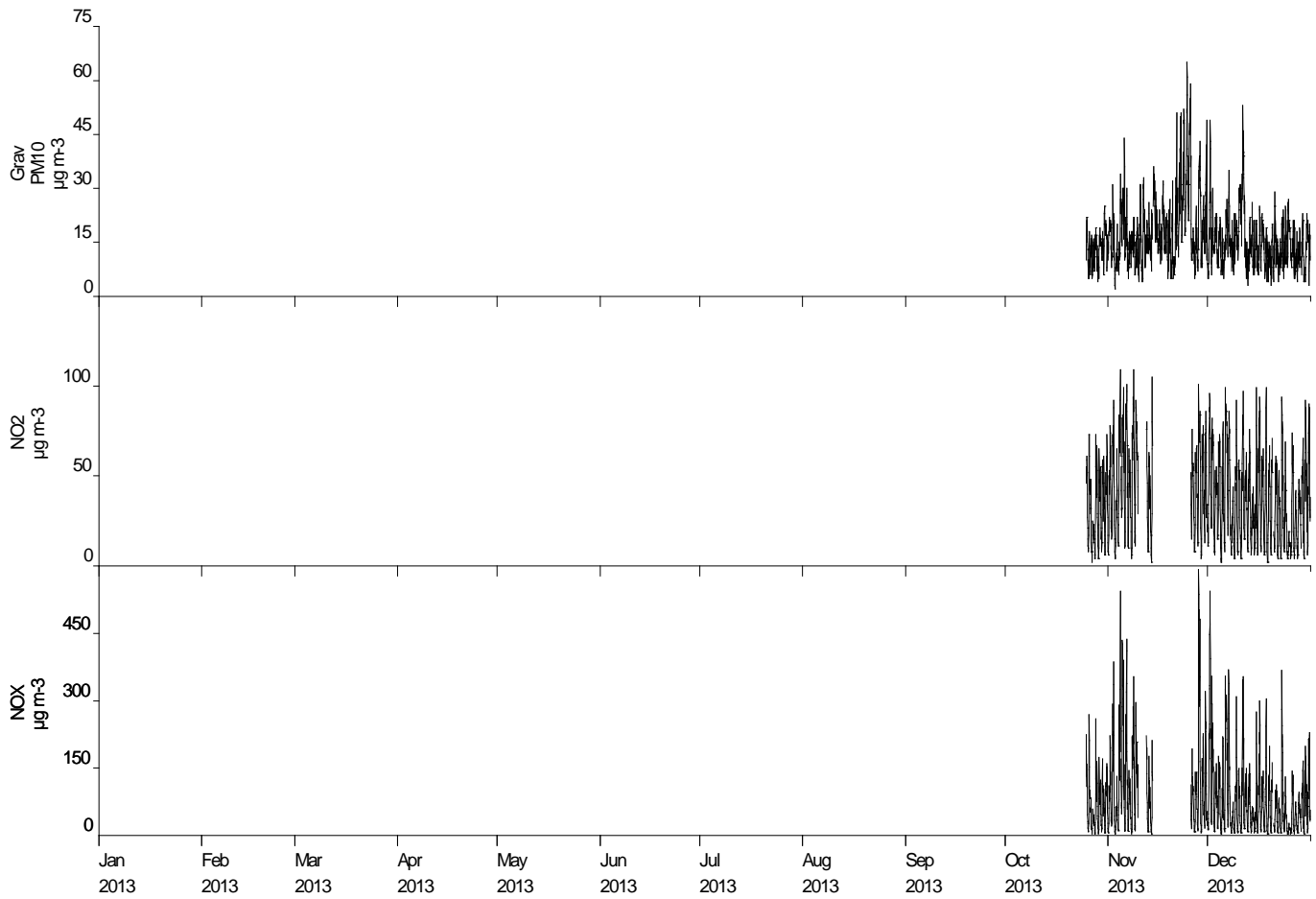
NO_x mass units are NO_x as NO₂ µg m⁻³

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM ₁₀ Particulate Matter (Gravimetric)	Daily mean > 50 µg m ⁻³	0	0
PM ₁₀ Particulate Matter (Gravimetric)	Annual mean > 18 µg m ⁻³	0	-
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by RICARDO-AEA on behalf of the Scottish Government

**West Lothian Linlithgow High St 2
Hourly Mean Data for 1st January to 31st December 2013**



Date Created: 08/04/2014

Produced by Ricardo-AEA on behalf of the Scottish Government

WEST LOTHIAN NEWTON

1st January to 31st December 2013

These data have been fully ratified by Ricardo-AEA

POLLUTANT	PM ₁₀₊	NO ₂	NO _x
Maximum hourly mean	295 µg m ⁻³	181 µg m ⁻³	670 µg m ⁻³
99.8th percentile of hourly means	-	141 µg m ⁻³	434 µg m ⁻³
Maximum running 24-hour mean	97 µg m ⁻³	103 µg m ⁻³	302 µg m ⁻³
Maximum daily mean	87 µg m ⁻³	101 µg m ⁻³	302 µg m ⁻³
Average	19 µg m ⁻³	24 µg m ⁻³	49 µg m ⁻³
Data capture	94.4 %	84.9 %	84.9 %

+ PM10 as measured by a FDMS using a gravimetric factor of 1

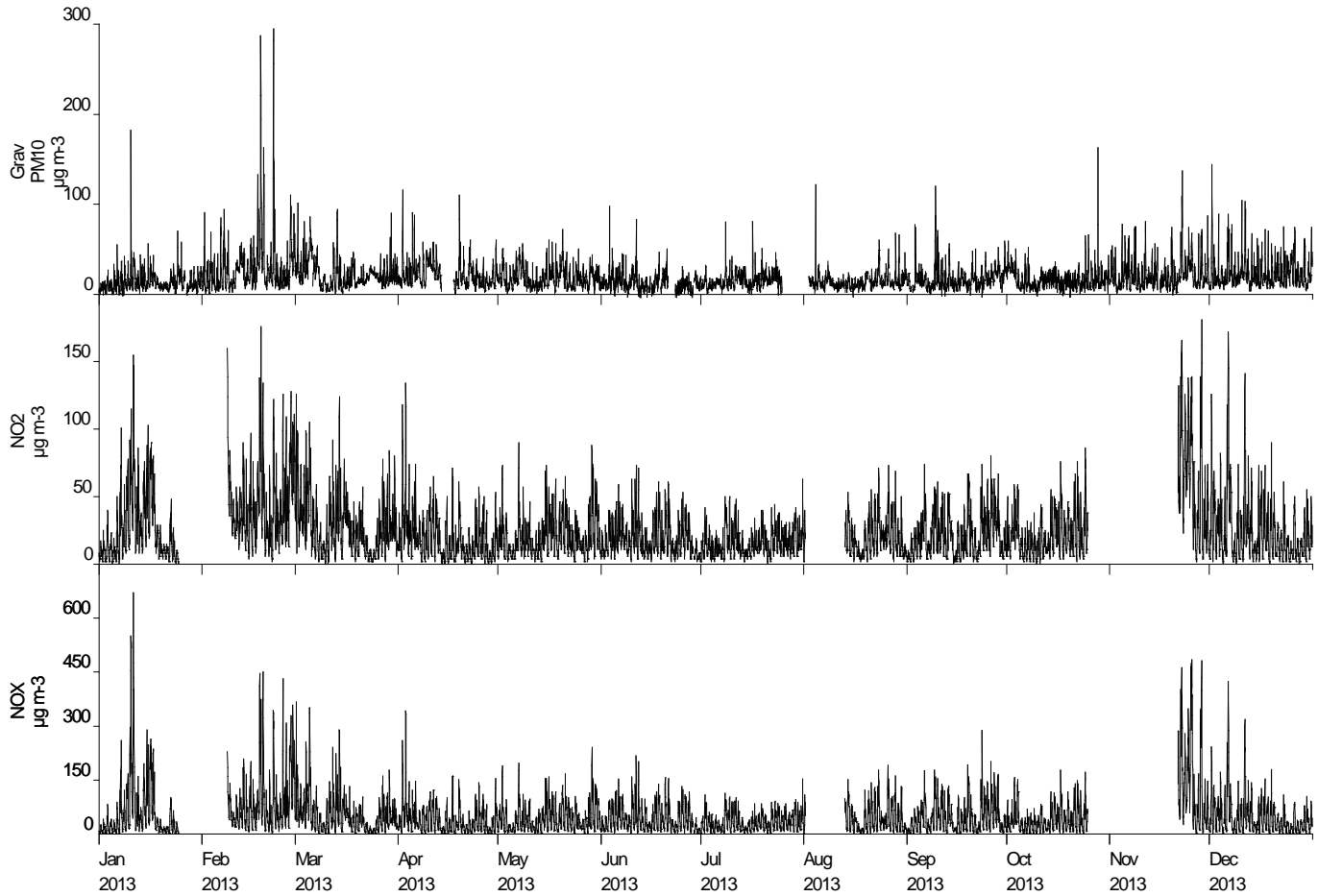
All gaseous pollutant mass units are at 20°C and 1013 mb. Particulate matter concentrations are reported at ambient temperature and pressure.

NO_x mass units are NO_x as NO₂ µg m⁻³

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM ₁₀ Particulate Matter (Gravimetric)	Daily mean > 50 µg m ⁻³	4	4
PM ₁₀ Particulate Matter (Gravimetric)	Annual mean > 18 µg m ⁻³	1	-
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by Ricardo-AEA on behalf of the Scottish Government
West Lothian Newton



Hourly Mean Data for 1st January to 31st December 2013

Date Created: 08/04/2014

Appendix B: Maps

Figure 1.1 Broxburn AQMA Boundary

Figure 2.1 LAQM Monitoring Locations

Figure 1.1

BROXBURN AIR QUALITY MANAGEMENT AREA 2011

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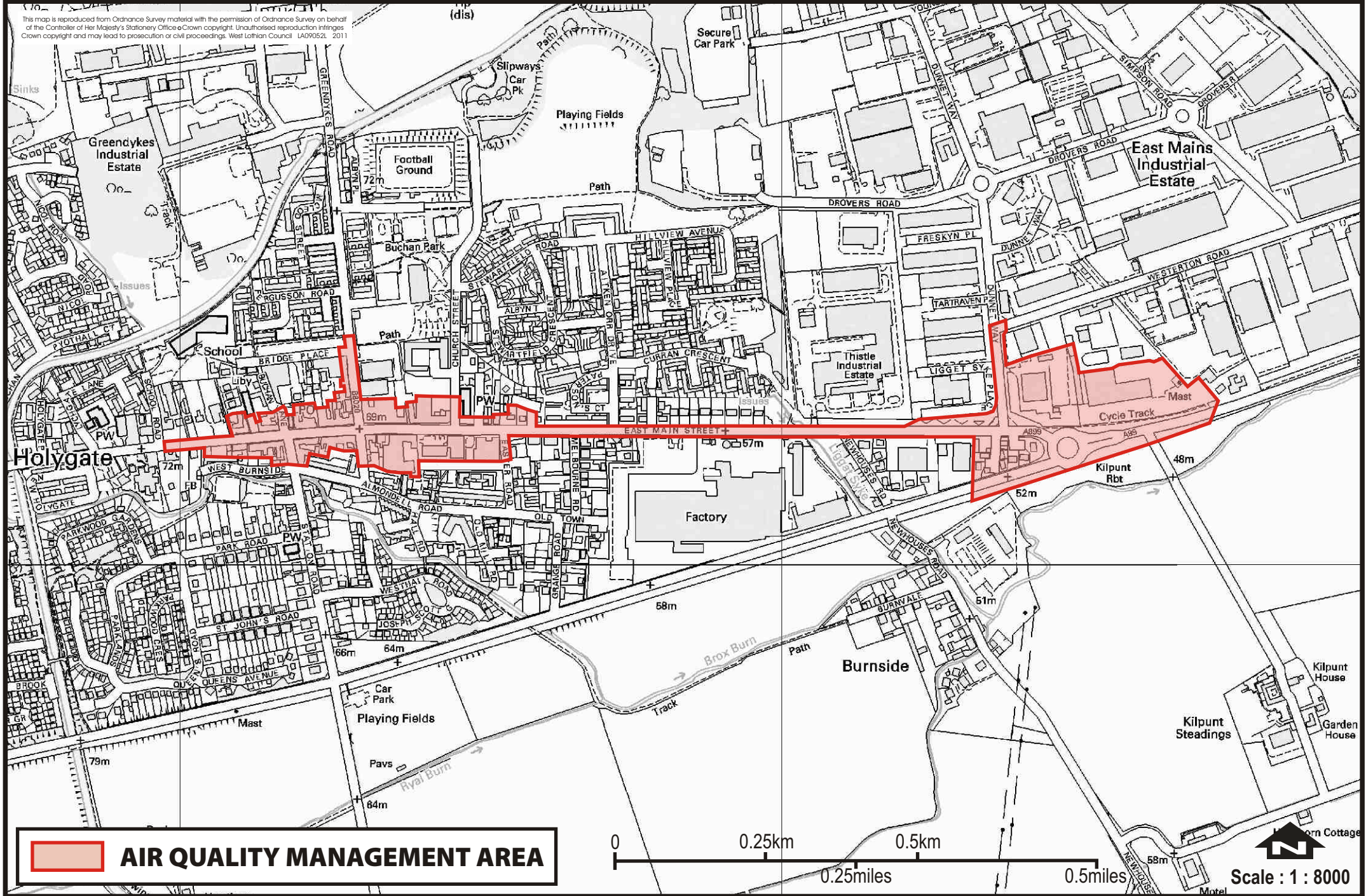
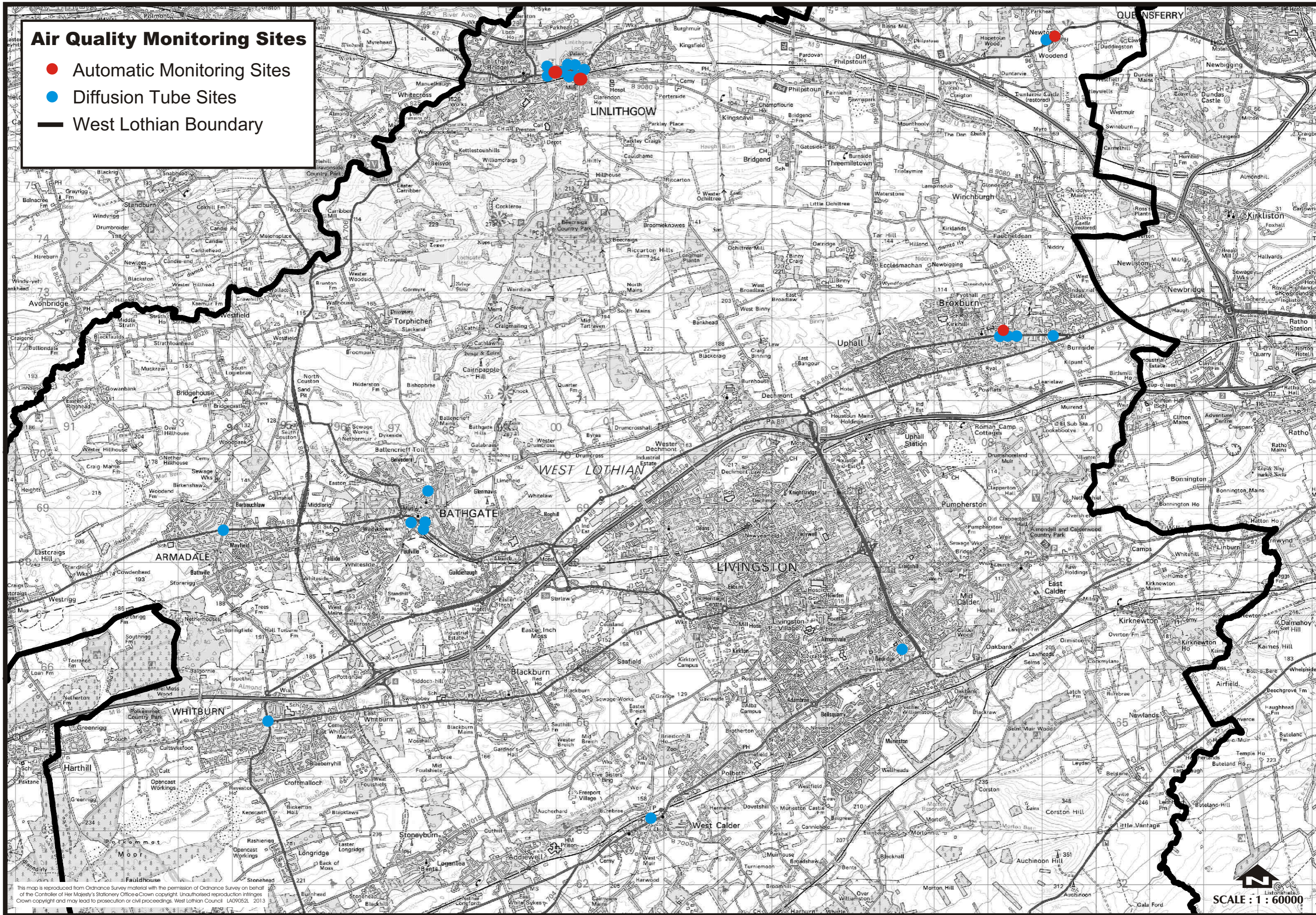


Figure 2.1



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Appendix C: Full Diffusion Tube Site Data

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	40.0	43.2		41.6	2.26	5.44	20.33
2	30/01/2013	27/02/2013	41.7	37.4		39.6	3.04	7.69	27.32
3	27/02/2013	26/03/2013	35.6	35.1		35.4	0.35	1.00	3.18
4	26/03/2103	24/04/2013	2.5	27.1		14.8	17.39	117.53	156.29
5	24/04/2013	31/05/2013	25.5	23.2		24.4	1.63	6.68	14.61
6	31/05/2013	28/06/2013	26.5	26.8		26.7	0.21	0.80	1.91
7	28/06/2013	31/07/2013	19.3	22.6		21.0	2.33	11.14	20.97
8	31/07/2013	04/09/2013	30.6	28.1		29.4	1.77	6.02	15.88
9	04/09/2013	02/10/2013	28.4	24.2		26.3	2.97	11.29	26.68
10	02/10/2013	30/10/2013	33.4	32.2		32.8	0.85	2.59	7.62
11	30/10/2013	04/12/2013	41.3	27.9		34.6	9.48	27.39	85.13
12	04/12/2013	08/01/2014	22.2	21.4		21.8	0.57	2.59	5.08
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID:	DT1 Newton
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Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Poor Precision
Good
Good
Good
Good
Good
Good
Good
Poor Precision
Good

Jaume Targa, for AEA
Version 04 - February 2011

<p>Adjusted measurement (95% confidence level) Without periods with CV larger than 20% Bias calculated using 10 periods of data Tube Precision: 3 Automatic DC: 100% Bias factor A: 1.02 (0.8 - 1.38) Bias B: -2% (-27% - 24%)</p> <hr/> <p><i>Information about tubes to be adjusted</i> Diffusion Tube average: 30 μgm^{-3} Average Precision (CV): 6 Adjusted Tube average: 30 +/- 10 μgm^{-3}</p>
--

<p>Adjusted measurement (95% confidence level) with all data Bias calculated using 10 periods of data Tube Precision: 3 Automatic DC: 100% Bias factor A: 1.02 (0.8 - 1.38) Bias B: -2% (-27% - 24%)</p> <hr/> <p><i>Information about tubes to be adjusted</i> Diffusion Tube average: 29 μgm^{-3} Average Precision (CV): 17 Adjusted Tube average: 30 +/- 9 μgm^{-3}</p>
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Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	40.7	47.3		44.0	4.67	10.61	41.93
2	30/01/2013	27/02/2013	49.9	55.5		52.7	3.96	7.51	35.58
3	27/02/2013	26/03/2013	49.1	49.8		49.5	0.49	1.00	4.45
4	26/03/2013	24/04/2013	Missing	Missing					
5	24/04/2013	31/05/2013	29.7	30.9		30.3	0.85	2.80	7.62
6	31/05/2013	28/06/2013	28.7	28.3		28.5	0.28	0.99	2.54
7	28/06/2013	31/07/2013	28.2	27.5		27.9	0.49	1.78	4.45
8	31/07/2013	04/09/2013	25.2	23.0		24.1	1.56	6.45	13.98
9	04/09/2013	02/10/2013	40.5	35.4		38.0	3.61	9.50	32.40
10	02/10/2013	30/10/2013	43.2	41.3		42.3	1.34	3.18	12.07
11	30/10/2013	04/12/2013	22.8	37.1		30.0	10.11	33.76	90.85
12	04/12/2013	08/01/2014	24.3	26.6		25.5	1.63	6.39	14.61
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Poor Precision
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: DT2 Broxburn WMS

Jaume Targa, for AEA
Version 04 - February 2011

Adjusted measurement (95% confidence level)
 Without periods with CV larger than 20%

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 36 μgm^{-3}
 Average Precision (CV): 5
 Adjusted Tube average: 37 +/- 12 μgm^{-3}

Adjusted measurement (95% confidence level)
 with all data

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 36 μgm^{-3}
 Average Precision (CV): 8
 Adjusted Tube average: 36 +/- 12 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	44.7	34.1		39.4	7.50	19.02	67.34
2	30/01/2013	27/02/2013	40.9	20.8		30.9	14.21	46.07	127.70
3	27/02/2013	26/03/2013	39.8	37.3		38.6	1.77	4.59	15.88
4	26/03/2013	24/04/2013	9.5	29.0		19.3	13.79	71.63	123.89
5	24/04/2013	31/05/2013	27.5	29.6		28.6	1.48	5.20	13.34
6	31/05/2013	28/06/2013	31.8	29.2		30.5	1.84	6.03	16.52
7	28/06/2013	31/07/2013	31.9	27.7		29.8	2.97	9.97	26.68
8	31/07/2013	04/09/2013	26.3	30.1		28.2	2.69	9.53	24.14
9	04/09/2013	02/10/2013	35.7	35.0		35.4	0.49	1.40	4.45
10	02/10/2013	30/10/2013	35.5	39.5		37.5	2.83	7.54	25.41
11	30/10/2013	04/12/2013	44.2	46.6		45.4	1.70	3.74	15.25
12	04/12/2013	08/01/2014	21.8	22.4		22.1	0.42	1.92	3.81
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Poor Precision
Good
Poor Precision
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: DT3 Broxburn EMS

Adjusted measurement (95% confidence level)
 Without periods with CV larger than 20%

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 34 μgm^{-3}
 Average Precision (CV): 7
 Adjusted Tube average: 34 +/- 11 μgm^{-3}

Adjusted measurement (95% confidence level)
 with all data

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 32 μgm^{-3}
 Average Precision (CV): 16
 Adjusted Tube average: 33 +/- 10 μgm^{-3}

Checking Precision and Accuracy of Triplicate Tubes

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	04/01/2013	30/01/2013	50.1	49.5	47.1	49	1.6	3	3.9
2	30/01/2013	27/02/2013	26.2	25.7	25.7	26	0.3	1	0.7
3	27/02/2013	26/03/2013	53.0	52.2	48.0	51	2.7	5	6.7
4	26/03/2013	24/04/2013	42.2	39.8	41.0	41	1.2	3	3.0
5	24/04/2013	31/05/2013	34.5	35.5	36.6	36	1.1	3	2.6
6	31/05/2013	28/06/2013	40.4	40.5	40.9	41	0.3	1	0.7
7	28/06/2013	31/07/2013	37.2	38.8	37.0	38	1.0	3	2.5
8	31/07/2013	04/09/2013	33.7	34.4	33.9	34	0.4	1	0.9
9	04/09/2013	02/10/2013	40.8	43.0	42.2	42	1.1	3	2.8
10	02/10/2013	30/10/2013	52.0	48.3	48.8	50	2.0	4	5.0
11	30/10/2013	04/12/2013	49.1	48.1	50.0	49	1.0	2	2.4
12	04/12/2013	08/01/2014	27.4	27.3	26.9	27	0.3	1	0.7
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
50.2	100	Good	Good
53.5	100	Good	Good
51.9	100	Good	Good
53.5	100	Good	Good
47	99.9	Good	Good
43	99.6	Good	Good
26	99.2	Good	Good
25	74	Good	or Data Capture
31	53.1	Good	or Data Capture
30	99.3	Good	Good
37.9	99.9	Good	Good
20.5	100	Good	Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey --> **Good precision** **Good Overall DC**

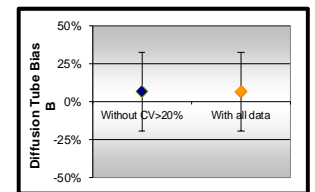
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: **DT4 Broxburn CNC**

Precision **12 out of 12 periods have a CV smaller than 20%**

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 10 periods of data	
Bias factor A	1.02 (0.8 - 1.38)
Bias B	-2% (-27% - 24%)
Diffusion Tubes Mean:	41 μgm^{-3}
Mean CV (Precision):	3
Automatic Mean:	41 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	41 (33 - 56) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 10 periods of data	
Bias factor A	1.02 (0.8 - 1.38)
Bias B	-2% (-27% - 24%)
Diffusion Tubes Mean:	41 μgm^{-3}
Mean CV (Precision):	3
Automatic Mean:	41 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	41 (33 - 56) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	43.4	49.3		46.4	4.17	9.00	37.48
2	30/01/2013	27/02/2013	22.8	23.7		23.3	0.64	2.74	5.72
3	27/02/2013	26/03/2013	45.2	44.3		44.8	0.64	1.42	5.72
4	26/03/2013	24/04/2013	35.7	37.3		36.5	1.13	3.10	10.16
5	24/04/2013	31/05/2013	27.6	29.8		28.7	1.56	5.42	13.98
6	31/05/2013	28/06/2013	33.5	missing					
7	28/06/2013	31/07/2013	30.4	31.5		31.0	0.78	2.51	6.99
8	31/07/2013	04/09/2013	26.7	28.3		27.5	1.13	4.11	10.16
9	04/09/2013	02/10/2013	38.7	39.2		39.0	0.35	0.91	3.18
10	02/10/2013	30/10/2013	41.0	44.7		42.9	2.62	6.11	23.51
11	30/10/2013	04/12/2013	37.6	40.1		38.9	1.77	4.55	15.88
12	04/12/2013	08/01/2014	18.9	Missing					
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: DT5 Broxburn East Mains Industrial Estate

Adjusted measurement (95% confidence level)
 Without periods with CV larger than 20%

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 36 μgm^{-3}
 Average Precision (CV): 4
 Adjusted Tube average: 37 +/- 12 μgm^{-3}

Adjusted measurement (95% confidence level)
 with all data

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 36 μgm^{-3}
 Average Precision (CV): 4
 Adjusted Tube average: 17 +/- 12 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	20.6	21.7		21.2	0.78	3.68	6.99
2	30/01/2013	27/02/2013	25.8	25.1		25.5	0.49	1.94	4.45
3	27/02/2013	26/03/2013	20.5	21.4		21.0	0.64	3.04	5.72
4	26/03/2013	24/04/2013	15.8	18.9		17.4	2.19	12.63	19.69
5	24/04/2013	31/05/2013	10.5	12.2		11.4	1.20	10.59	10.80
6	31/05/2013	28/06/2013	14.0	13.3		13.7	0.49	3.63	4.45
7	28/06/2013	31/07/2013	11.3	6.7		9.0	3.25	36.14	29.22
8	31/07/2013	04/09/2013	Missing	10.3					
9	04/09/2013	02/10/2013	15.6	16.6		16.1	0.71	4.39	6.35
10	02/10/2013	30/10/2013	19.0	15.9		17.5	2.19	12.56	19.69
11	30/10/2013	04/12/2013	22.8	20.2		21.5	1.84	8.55	16.52
12	04/12/2013	08/01/2014	11.0	10.5		10.8	0.35	3.29	3.18
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Poor Precision
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: DT6 Dedridge

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
 Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 18 μgm^{-3}
 Average Precision (CV): 6
 Adjusted Tube average: 18 +/- 6 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
 Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 17 μgm^{-3}
 Average Precision (CV): 9
 Adjusted Tube average: 17 +/- 5 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	36.3	2.9		19.6	23.62	120.50	212.19
2	30/01/2013	27/02/2013	44.6	45.9		45.3	0.92	2.03	8.26
3	27/02/2013	26/03/2013	45.8	44.3		45.1	1.06	2.35	9.53
4	26/03/2013	24/04/2013	35.3	35.1		35.2	0.14	0.40	1.27
5	24/04/2013	31/05/2013	Missing	Missing					
6	31/05/2013	28/06/2013	29.2	26.0		27.6	2.26	8.20	20.33
7	28/06/2013	31/07/2013	22.3	23.5		22.9	0.85	3.71	7.62
8	31/07/2013	04/09/2013	20.4	23.7		22.1	2.33	10.58	20.97
9	04/09/2013	02/10/2013	30.7	34.4		32.6	2.62	8.04	23.51
10	02/10/2013	30/10/2013	32.3	31.7		32.0	0.42	1.33	3.81
11	30/10/2013	04/12/2013	33.2	30.2		31.7	2.12	6.69	19.06
12	04/12/2013	08/01/2014	16.5	17.8		17.2	0.92	5.36	8.26
13									

Data Quality Check
Diffusion Tubes Precision Check
Poor Precision
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: DT7 West Calder

Jaume Targa, for AEA
Version 04 - February 2011

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 10 periods of data
Tube Precision: 3 Automatic DC: 100%
Bias factor A: 1.02 (0.8 - 1.38)
Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
Diffusion Tube average: 31 μgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 32 +/- 10 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 10 periods of data
Tube Precision: 3 Automatic DC: 100%
Bias factor A: 1.02 (0.8 - 1.38)
Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
Diffusion Tube average: 30 μgm^{-3}
Average Precision (CV): 15
Adjusted Tube average: 31 +/- 10 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	27.8	34.3		31.1	4.60	14.80	41.30
2	30/01/2013	27/02/2013	42.1	42.8		42.5	0.49	1.17	4.45
3	27/02/2013	26/03/2013	40.9	35.7		38.3	3.68	9.60	33.04
4	26/03/2013	24/04/2013	32.0	29.2		30.6	1.98	6.47	17.79
5	24/04/2013	31/05/2013	29.0	26.9		28.0	1.48	5.31	13.34
6	31/05/2013	28/06/2013	27.3	28.0		27.7	0.49	1.79	4.45
7	28/06/2013	31/07/2013	28.1	24.5		26.3	2.55	9.68	22.87
8	31/07/2013	04/09/2013	24.3	21.3		22.8	2.12	9.30	19.06
9	04/09/2013	02/10/2013	31.7	29.6		30.7	1.48	4.84	13.34
10	02/10/2013	30/10/2013	32.9	29.8		31.4	2.19	6.99	19.69
11	30/10/2013	04/12/2013	37.8	40.3		39.1	1.77	4.53	15.88
12	04/12/2013	08/01/2014	18.7	15.1		16.9	2.55	15.06	22.87
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: DT8 Whitburn Cross

Adjusted measurement (95% confidence level)
 Without periods with CV larger than 20%

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 30 μgm^{-3}
 Average Precision (CV): 7
 Adjusted Tube average: 31 +/- 10 μgm^{-3}

Adjusted measurement (95% confidence level)
 with all data

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 30 μgm^{-3}
 Average Precision (CV): 7
 Adjusted Tube average: 31 +/- 10 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	35.7	35.0		35.4	0.49	1.40	4.45
2	30/01/2013	27/02/2013	40.4	37.4		38.9	2.12	5.45	19.06
3	27/02/2013	26/03/2013	33.1	31.2		32.2	1.34	4.18	12.07
4	26/03/2013	24/04/2013	26.7	27.2		27.0	0.35	1.31	3.18
5	24/04/2013	31/05/2013	28.3	28.7		28.5	0.28	0.99	2.54
6	31/05/2013	28/06/2013	26.2	25.6		25.9	0.42	1.64	3.81
7	28/06/2013	31/07/2013	15.0	28.5		21.8	9.55	43.89	85.77
8	31/07/2013	04/09/2013	31.0	34.6		32.8	2.55	7.76	22.87
9	04/09/2013	02/10/2013	28.6	32.5		30.6	2.76	9.03	24.78
10	02/10/2013	30/10/2013	36.3	33.8		35.1	1.77	5.04	15.88
11	30/10/2013	04/12/2013	47.5	46.0		46.8	1.06	2.27	9.53
12	04/12/2013	08/01/2014	Missing	29.3					
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Poor Precision
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: DT9 Armadale Cross

Jaume Targa, for AEA

Version 04 - February 2011

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
 Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 33 μgm^{-3}
 Average Precision (CV): 4
 Adjusted Tube average: 34 +/- 11 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
 Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 32 μgm^{-3}
 Average Precision (CV): 8
 Adjusted Tube average: 33 +/- 10 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	38.6	22.1		30.4	11.67	38.44	104.83
2	30/01/2013	27/02/2013	30.6	33.7		32.2	2.19	6.82	19.69
3	27/02/2013	26/03/2013	30.2	29.9		30.1	0.21	0.71	1.91
4	26/03/2013	24/04/2013	20.0	19.3		19.7	0.49	2.52	4.45
5	24/04/2013	31/05/2013	17.2	18.2		17.7	0.71	3.99	6.35
6	31/05/2013	28/06/2013	18.3	19.7		19.0	0.99	5.21	8.89
7	28/06/2013	31/07/2013	14.6	15.6		15.1	0.71	4.68	6.35
8	31/07/2013	04/09/2013	17.1	16.8		17.0	0.21	1.25	1.91
9	04/09/2013	02/10/2013	24.0	24.3		24.2	0.21	0.88	1.91
10	02/10/2013	30/10/2013	25.2	26.3		25.8	0.78	3.02	6.99
11	30/10/2013	04/12/2013	31.5	32.7		32.1	0.85	2.64	7.62
12	04/12/2013	08/01/2014	15.2	15.0		15.1	0.14	0.94	1.27
13									

Data Quality Check
Diffusion Tubes Precision Check
Poor Precision
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: **DT10 Bathgate S Bridge Street**

Jaume Targa, for AEA

Version 04 - February 2011

Adjusted measurement (95% confidence level)
 Without periods with CV larger than 20%

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 23 μgm^{-3}
 Average Precision (CV): 3
 Adjusted Tube average: 23 +/- 7 μgm^{-3}

Adjusted measurement (95% confidence level)
 with all data

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 23 μgm^{-3}
 Average Precision (CV): 6
 Adjusted Tube average: 24 +/- 8 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	41.5	36.7		39.1	3.39	8.68	30.49
2	30/01/2013	27/02/2013	48.1	59.0		53.6	7.71	14.39	69.25
3	27/02/2013	26/03/2013	42.2	42.5		42.4	0.21	0.50	1.91
4	26/03/2013	24/04/2013	32.2	33.5		32.9	0.92	2.80	8.26
5	24/04/2013	31/05/2013	27.6	29.6		28.6	1.41	4.94	12.71
6	31/05/2013	28/06/2013	33.0	31.7		32.4	0.92	2.84	8.26
7	28/06/2013	31/07/2013	28.9	29.9		29.4	0.71	2.41	6.35
8	31/07/2013	04/09/2013	29.3	30.6		30.0	0.92	3.07	8.26
9	04/09/2013	02/10/2013	35.4	33.9		34.7	1.06	3.06	9.53
10	02/10/2013	30/10/2013	33.8	38.3		36.1	3.18	8.83	28.59
11	30/10/2013	04/12/2013	48.9	51.1		50.0	1.56	3.11	13.98
12	04/12/2013	08/01/2014	25.3	22.5		23.9	1.98	8.28	17.79
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: **DT11 Bathgate Steelyard**

Jaume Targa, for AEA

Version 04 - February 2011

Adjusted measurement (95% confidence level)
 Without periods with CV larger than 20%

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 36 μgm^{-3}
 Average Precision (CV): 5
 Adjusted Tube average: 37 +/- 12 μgm^{-3}

Adjusted measurement (95% confidence level)
 with all data

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 36 μgm^{-3}
 Average Precision (CV): 5
 Adjusted Tube average: 37 +/- 12 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm ⁻³	Tube 2 µgm ⁻³	Tube 3 µgm ⁻³	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	34.2	49.0		41.6	10.47	25.16	94.03
2	30/01/2013	27/02/2013	55.1	53.5		54.3	1.13	2.08	10.16
3	27/02/2013	26/03/2013	46.0	39.8		42.9	4.38	10.22	39.39
4	26/03/2013	24/04/2013	34.2	31.8		33.0	1.70	5.14	15.25
5	24/04/2013	31/05/2013	28.2	26.6		27.4	1.13	4.13	10.16
6	31/05/2013	28/06/2013	32.0	30.5		31.3	1.06	3.39	9.53
7	28/06/2013	31/07/2013	27.5	28.0		27.8	0.35	1.27	3.18
8	31/07/2013	04/09/2013	30.0	28.9		29.5	0.78	2.64	6.99
9	04/09/2013	02/10/2013	38.8	37.9		38.4	0.64	1.66	5.72
10	02/10/2013	30/10/2013	43.4	40.6		42.0	1.98	4.71	17.79
11	30/10/2013	04/12/2013	46.3	49.6		48.0	2.33	4.87	20.97
12	04/12/2013	08/01/2014	27.8	18.6		23.2	6.51	28.04	58.45
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Data Quality Check
Diffusion Tubes Precision Check
Poor Precision
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Poor Precision

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: DT12 Bathgate King Street

Adjusted measurement (95% confidence level)
 Without periods with CV larger than 20%

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 37 µgm⁻³
 Average Precision (CV): 4
 Adjusted Tube average: 38 +/- 12 µgm⁻³

Adjusted measurement (95% confidence level)
 with all data

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 37 µgm⁻³
 Average Precision (CV): 8
 Adjusted Tube average: 37 +/- 12 µgm⁻³

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm ⁻³	Tube 2 µgm ⁻³	Tube 3 µgm ⁻³	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	16.6	19.5		18.1	2.05	11.36	18.42
2	30/01/2013	27/02/2013	20.5	19.5		20.0	0.71	3.54	6.35
3	27/02/2013	26/03/2013	16.8	14.2		15.5	1.84	11.86	16.52
4	26/03/2013	24/04/2013	11.3	12.1		11.7	0.57	4.83	5.08
5	24/04/2013	31/05/2013	9.1	8.3		8.7	0.57	6.50	5.08
6	31/05/2013	28/06/2013	9.5	missing					
7	28/06/2013	31/07/2013	7.5	6.3		6.9	0.85	12.30	7.62
8	31/07/2013	04/09/2013	9.4	9.0		9.2	0.28	3.07	2.54
9	04/09/2013	02/10/2013	13.6	13.2		13.4	0.28	2.11	2.54
10	02/10/2013	30/10/2013	15.6	15.1		15.4	0.35	2.30	3.18
11	30/10/2013	04/12/2013	21.5	21.0		21.3	0.35	1.66	3.18
12	04/12/2013	08/01/2014	11.9	9.3		10.6	1.84	17.34	16.52
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: DT13 Bathgate High Street

Jaume Targa, for AEA

Version 04 - February 2011

Adjusted measurement (95% confidence level)
 Without periods with CV larger than 20%

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 14 µgm⁻³
 Average Precision (CV): 7
 Adjusted Tube average: 14 +/- 4 µgm⁻³

Adjusted measurement (95% confidence level)
 with all data

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 14 µgm⁻³
 Average Precision (CV): 7
 Adjusted Tube average: 14 +/- 4 µgm⁻³

Adjustment of DUPLICATE or TRIPLICATE Tubes

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	29.2	35.0	29.4	31.2	3.29	10.55	8.18
2	30/01/2013	27/02/2013	34.8	32.3	34.2	33.8	1.31	3.87	3.24
3	27/02/2013	26/03/2013	27.2	34.0	30.4	30.5	3.40	11.14	8.45
4	26/03/2013	24/04/2013		24.8	25.6	25.2	0.57	2.24	5.08
5	24/04/2013	31/05/2013	14.8	16.1	18.6	16.5	1.93	11.70	4.80
6	31/05/2013	28/06/2013	16.4	18.4	18.4	17.7	1.15	6.51	2.87
7	28/06/2013	31/07/2013	18.8	17.6	17.1	17.8	0.87	4.90	2.17
8	31/07/2013	04/09/2013	15.3	15.6	15.1	15.3	0.25	1.64	0.63
9	04/09/2013	02/10/2013	22.9	23.6	23.1	23.2	0.36	1.55	0.90
10	02/10/2013	30/10/2013							
11	30/10/2013	04/12/2013							
12	04/12/2013	08/01/2014							
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: DT 14 Linlithgow ROMON

Jaume Targa, for AEA
Version 04 - February 2011

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 10 periods of data
Tube Precision: 3 Automatic DC: 100%
Bias factor A: 1.02 (0.8 - 1.38)
Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
Diffusion Tube average: 23 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 24 +/- 8 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 10 periods of data
Tube Precision: 3 Automatic DC: 100%
Bias factor A: 1.02 (0.8 - 1.38)
Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
Diffusion Tube average: 23 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 24 +/- 8 μgm^{-3}

Adjustment of DUPLICATE or TRIPPLICATE Tubes

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013							
2	30/01/2013	27/02/2013							
3	27/02/2013	26/03/2013							
4	26/03/2013	24/04/2013							
5	24/04/2013	31/05/2013							
6	31/05/2013	28/06/2013							
7	28/06/2013	31/07/2013							
8	31/07/2013	04/09/2013							
9	04/09/2013	02/10/2013							
10	02/10/2013	30/10/2013							
11	30/10/2013	04/12/2013	56.1	48.7	62.5	55.8	6.91	12.38	17.16
12	04/12/2013	08/01/2014	31.1	34.1	37.1	34.1	3.00	8.80	7.45
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: DT14(2) Linlithgow High Street 2

Data Quality Check
Diffusion Tubes Precision Check
Good
Good

Jaume Targa, for AEA

Version 04 - February 2011

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 10 periods of data

Tube Precision: 3 Automatic DC: 100%

Bias factor A: 1.02 (0.8 - 1.38)

Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted

Diffusion Tube average: 45 μgm^{-3}

Average Precision (CV): 11

Adjusted Tube average: 46 +/- 16 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 10 periods of data

Tube Precision: 3 Automatic DC: 100%

Bias factor A: 1.02 (0.8 - 1.38)

Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted

Diffusion Tube average: 45 μgm^{-3}

Average Precision (CV): 11

Adjusted Tube average: 46 +/- 15 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	40.5	49.3		44.9	6.22	13.86	55.91
2	30/01/2013	27/02/2013	26.1	51.7		38.9	18.10	46.53	162.64
3	27/02/2013	26/03/2013	50.5	46.2		48.4	3.04	6.29	27.32
4	26/03/2013	24/04/2013	45.1	4.6		24.9	28.64	115.24	257.30
5	24/04/2013	31/05/2013	33.8	37.7		35.8	2.76	7.71	24.78
6	31/05/2013	28/06/2013	32.0	34.2		33.1	1.56	4.70	13.98
7	28/06/2013	31/07/2013	32.9	33.6		33.3	0.49	1.49	4.45
8	31/07/2013	04/09/2013	31.2	26.5		28.9	3.32	11.52	29.86
9	04/09/2013	02/10/2013	36.9	43.6		40.3	4.74	11.77	42.57
10	02/10/2013	30/10/2013	41.1	41.5		41.3	0.28	0.68	2.54
11	30/10/2013	04/12/2013	52.2	43.2		47.7	6.36	13.34	57.18
12	04/12/2013	08/01/2014	23.8	32.6		28.2	6.22	22.07	55.91
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Poor Precision
Good
Poor Precision
Good
Good
Good
Good
Good
Good
Good
Poor Precision

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: **DT15 Linlithgow High Street NW**

Jaume Targa, for AEA
Version 04 - February 2011

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
 Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 39 μgm^{-3}
 Average Precision (CV): 8
 Adjusted Tube average: 40 +/- 13 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
 Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 37 μgm^{-3}
 Average Precision (CV): 21
 Adjusted Tube average: 18 +/- 12 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm ⁻³	Tube 2 µgm ⁻³	Tube 3 µgm ⁻³	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	38.0	58.9		48.5	14.78	30.50	132.78
2	30/01/2013	27/02/2013	31.4	56.5		44.0	17.75	40.38	159.46
3	27/02/2013	26/03/2013	50.7	56.7		53.7	4.24	7.90	38.12
4	26/03/2013	24/04/2013	47.6	49.4		48.5	1.27	2.62	11.44
5	24/04/2013	31/05/2013	30.6	40.6		35.6	7.07	19.86	63.53
6	31/05/2013	28/06/2013	40.7	38.0		39.4	1.91	4.85	17.15
7	28/06/2013	31/07/2013	40.4	40.4		40.4	0.00	0.00	0.00
8	31/07/2013	04/09/2013	38.3	41.2		39.8	2.05	5.16	18.42
9	04/09/2013	02/10/2013	41.7	37.9		39.8	2.69	6.75	24.14
10	02/10/2013	30/10/2013	44.3	46.3		45.3	1.41	3.12	12.71
11	30/10/2013	04/12/2013	49.6	51.0		50.3	0.99	1.97	8.89
12	04/12/2013	08/01/2014	42.7	45.8		44.3	2.19	4.95	19.69
13									

Data Quality Check
Diffusion Tubes Precision Check
Poor Precision
Poor Precision
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: **DT16 Linlithgow High Street SW**

Jaume Targa, for AEA

Version 04 - February 2011

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
 Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 44 µgm⁻³
 Average Precision (CV): 6
 Adjusted Tube average: 45 +/- 14 µgm⁻³

Adjusted measurement (95% confidence level)
with all data
 Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 44 µgm⁻³
 Average Precision (CV): 11
 Adjusted Tube average: 45 +/- 14 µgm⁻³

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	40.4	36.6		38.5	2.69	6.98	24.14
2	30/01/2013	27/02/2013	47.6	41.1		44.4	4.60	10.36	41.30
3	27/02/2013	26/03/2013	36.4	36.9		36.7	0.35	0.96	3.18
4	26/03/2013	24/04/2013	25.4	25.4		25.4	0.00	0.00	0.00
5	24/04/2013	31/05/2013	27.3	27.8		27.6	0.35	1.28	3.18
6	31/05/2013	28/06/2013	25.8	28.7		27.3	2.05	7.53	18.42
7	28/06/2013	31/07/2013	23.4	22.5		23.0	0.64	2.77	5.72
8	31/07/2013	04/09/2013	25.0	25.0		25.0	0.00	0.00	0.00
9	04/09/2013	02/10/2013	27.5	29.3		28.4	1.27	4.48	11.44
10	02/10/2013	30/10/2013	35.1	34.0		34.6	0.78	2.25	6.99
11	30/10/2013	04/12/2013	43.4	48.2		45.8	3.39	7.41	30.49
12	04/12/2013	08/01/2014	26.7	26.8		26.8	0.07	0.26	0.64
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	DT17 Linlithgow High Street NE
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Adjusted measurement (95% confidence level) Without periods with CV larger than 20%
Bias calculated using 10 periods of data Tube Precision: 3 Automatic DC: 100% Bias factor A: 1.02 (0.8 - 1.38) Bias B: -2% (-27% - 24%)
Information about tubes to be adjusted Diffusion Tube average: 32 μgm^{-3} Average Precision (CV): 4 Adjusted Tube average: 33 +/- 10 μgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 10 periods of data Tube Precision: 3 Automatic DC: 100% Bias factor A: 1.02 (0.8 - 1.38) Bias B: -2% (-27% - 24%)
Information about tubes to be adjusted Diffusion Tube average: 32 μgm^{-3} Average Precision (CV): 4 Adjusted Tube average: 33 +/- 10 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	50.3	45.3		47.8	3.54	7.40	31.77
2	30/01/2013	27/02/2013	29.1	54.8		42.0	18.17	43.32	163.27
3	27/02/2013	26/03/2013	39.6	44.0		41.8	3.11	7.44	27.95
4	26/03/2013	24/04/2013	38.9	39.2		39.1	0.21	0.54	1.91
5	24/04/2013	31/05/2013	36.3	36.6		36.5	0.21	0.58	1.91
6	31/05/2013	28/06/2013	33.4	36.8		35.1	2.40	6.85	21.60
7	28/06/2013	31/07/2013	33.1	33.3		33.2	0.14	0.43	1.27
8	31/07/2013	04/09/2013	34.0	32.1		33.1	1.34	4.07	12.07
9	04/09/2013	02/10/2013	37.9	38.5		38.2	0.42	1.11	3.81
10	02/10/2013	30/10/2013	45.2	41.1		43.2	2.90	6.72	26.05
11	30/10/2013	04/12/2013	52.4	52.3		52.4	0.07	0.14	0.64
12	04/12/2013	08/01/2014	37.1	46.2		41.7	6.43	15.45	57.81
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Poor Precision
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: DT18 Linlithgow High Street SE

Jaume Targa, for AEA
Version 04 - February 2011

Adjusted measurement (95% confidence level)
 Without periods with CV larger than 20%

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 40 μgm^{-3}
 Average Precision (CV): 5
 Adjusted Tube average: 41 +/- 13 μgm^{-3}

Adjusted measurement (95% confidence level)
 with all data

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 40 μgm^{-3}
 Average Precision (CV): 8
 Adjusted Tube average: 41 +/- 13 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	41.6	38.7		40.2	2.05	5.11	18.42
2	30/01/2013	27/02/2013	45.3	54.6		50.0	6.58	13.17	59.08
3	27/02/2013	26/03/2013	50.9	49.7		50.3	0.85	1.69	7.62
4	26/03/2103	24/04/2013	39.7	41.5		40.6	1.27	3.13	11.44
5	24/04/2013	31/05/2013	30.9	30.5		30.7	0.28	0.92	2.54
6	31/05/2013	28/06/2013	32.3	32.4		32.4	0.07	0.22	0.64
7	28/06/2013	31/07/2013	29.4	29.4		29.4	0.00	0.00	0.00
8	31/07/2013	04/09/2013	29.4	28.2		28.8	0.85	2.95	7.62
9	04/09/2013	02/10/2013	38.4	39.8		39.1	0.99	2.53	8.89
10	02/10/2013	30/10/2013	43.6	43.1		43.4	0.35	0.82	3.18
11	30/10/2013	04/12/2013	48.3	54.9		51.6	4.67	9.04	41.93
12	04/12/2013	08/01/2014	35.7	26.1		30.9	6.79	21.97	60.99
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Poor Precision

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: **DT19 Linlithgow High Street N**

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%
Bias calculated using 10 periods of data Tube Precision: 3 Automatic DC: 100% Bias factor A: 1.02 (0.8 - 1.38) Bias B: -2% (-27% - 24%)
Information about tubes to be adjusted Diffusion Tube average: 40 μgm^{-3} Average Precision (CV): 4 Adjusted Tube average: 40 +/- 13 μgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 10 periods of data Tube Precision: 3 Automatic DC: 100% Bias factor A: 1.02 (0.8 - 1.38) Bias B: -2% (-27% - 24%)
Information about tubes to be adjusted Diffusion Tube average: 39 μgm^{-3} Average Precision (CV): 5 Adjusted Tube average: 40 +/- 13 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	30/01/2013	51.8	42.1		47.0	6.86	14.61	61.63
2	30/01/2013	27/02/2013	54.7	29.3		42.0	17.96	42.76	161.37
3	27/02/2013	26/03/2013	45.8	44.2		45.0	1.13	2.51	10.16
4	26/03/2013	24/04/2013	40.6	39.7		40.2	0.64	1.59	5.72
5	24/04/2013	31/05/2013	33.8	39.0		36.4	3.68	10.10	33.04
6	31/05/2013	28/06/2013	36.4	36.1		36.3	0.21	0.59	1.91
7	28/06/2013	31/07/2013	36.3	35.4		35.9	0.64	1.78	5.72
8	31/07/2013	04/09/2013	38.6	35.1		36.9	2.47	6.72	22.24
9	04/09/2013	02/10/2013	38.3	41.4		39.9	2.19	5.50	19.69
10	02/10/2013	30/10/2013	44.0	47.4		45.7	2.40	5.26	21.60
11	30/10/2013	04/12/2013	48.8	47.7		48.3	0.78	1.61	6.99
12	04/12/2013	08/01/2014	38.8	38.5		38.7	0.21	0.55	1.91
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Poor Precision
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: DT20 Linlithgow High Street S

Adjusted measurement (95% confidence level)
 Without periods with CV larger than 20%

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 41 μgm^{-3}
 Average Precision (CV): 5
 Adjusted Tube average: 42 +/- 13 μgm^{-3}

Adjusted measurement (95% confidence level)
 with all data

Bias calculated using 10 periods of data
 Tube Precision: 3 Automatic DC: 100%
 Bias factor A: 1.02 (0.8 - 1.38)
 Bias B: -2% (-27% - 24%)

Information about tubes to be adjusted
 Diffusion Tube average: 41 μgm^{-3}
 Average Precision (CV): 8
 Adjusted Tube average: 42 +/- 13 μgm^{-3}