

Annual Progress Report (APR)



2018 Air Quality Annual Progress Report (APR) for
West Lothian Council

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

30 June 2018

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Executive Summary: Air Quality in Our Area

Air Quality in West Lothian

West Lothian Council regularly reviews and assesses air quality throughout the district to determine whether or not air quality objectives are likely to be achieved. Air pollutants such as Nitrogen Dioxide (NO₂) and fine particulates (PM₁₀ & PM_{2.5}) which are mainly associated with vehicle emissions and domestic fuel burning, are measured using a network of 3 continuous air quality monitoring stations located in Linlithgow, Broxburn, and Newton. There are 20 NO_x passive diffusion tubes located throughout West Lothian as well as a solar powered AQmesh monitor located in Newton that monitors a mixture of pollutants.

The 2017 monitoring data at all three continuous air quality monitoring stations has shown that the NO₂ and PM₁₀ short and long term air quality objectives have been met. Levels of PM₁₀ in Linlithgow decreased significantly in 2017 compared with 2016 while NO₂ dropped to a 5 year low. Levels of PM₁₀ and NO₂ in Broxburn on average showed a slight decrease compared to 2016 and have met objective levels for the last 5 years. Newton's PM₁₀ and NO₂ annual average levels increased in 2017 compared to 2016 but still met the objective levels for each pollutant. All NO_x passive diffusion tubes located throughout West Lothian have shown no new exceedances in 2017. The AQmesh has had poor data capture in 2017 and is therefore not included in this report.

West Lothian Council approved and finalised the Broxburn Air Quality Action Plan (AQAP). It can be viewed here: https://www.westlothian.gov.uk/media/17039/2017-Broxburn-Air-Quality-Action-Plan-Approved/pdf/2017_Broxburn_Air_Quality_Action_Plan_final_for_consultation.pdf

Draft Linlithgow and Newton AQAPs have been in development and consulted upon but may be superseded by Detailed Assessments for Linlithgow and Newton to potentially remove the AQMAs due to a reduction in pollution levels. There have been no new AQMAs declared in 2017.

Actions to Improve Air Quality

The actions taken in 2017 to improve air quality within West Lothian include the following:

- Traffic modelling for potential changes to the Greendykes Road Junction in Broxburn.
- Provided a Bikeability Officer Post located in West Lothian Leisure and will provide cycle training in Schools in Linlithgow and Broxburn and then rolled out to the whole of West Lothian.
- Funding has been secured for the ECOstars fleet recognition scheme in West Lothian which will be taken forward as a project through the vehicle emission partnership.
- Air Quality Supplementary Planning Guidance has been finalised following public consultation and is awaiting committee approval.

Local Priorities and Challenges

The main priority for West Lothian Council is to carry out Detailed Assessments to determine if all three AQMAs need to be revoked due to air pollution levels meeting the 'target' air quality objectives for the last three years. The detailed assessments will include land allocated for development and will detail whether there will be any potential future exceedances of pollutants at relevant receptors.

Funding applications will still be made to Scottish Government for monitoring apparatus and action plan measures.

How to Get Involved

If you would like to find out more about air quality in West Lothian please visit our Air Quality website <http://www.westlothian.gov.uk/article/2216/Air-Pollution>

Table of Contents

Executive Summary: Air Quality in Our Area	i
Air Quality in West Lothian.....	i
Actions to Improve Air Quality.....	ii
Local Priorities and Challenges.....	ii
How to Get Involved.....	ii
1. Local Air Quality Management	1
2. Actions to Improve Air Quality	3
2.1 Air Quality Management Areas.....	3
2.2 Progress and Impact of Measures to address Air Quality in West Lothian.....	3
2.3 Cleaner Air for Scotland.....	6
2.3.1 Transport – Avoiding travel – T1.....	6
2.3.2 Climate Change – Effective co-ordination of climate change and air quality policies to deliver co-benefits – CC2.....	6
3. Air Quality Monitoring Data and Comparison with Air Quality Objectives	7
3.1 Summary of Monitoring Undertaken.....	7
3.1.1 Automatic Monitoring Sites.....	7
3.1.2 Non-Automatic Monitoring Sites.....	7
3.2 Individual pollutants.....	7
3.2.1 Nitrogen Dioxide (NO ₂).....	7
3.2.2 Particulate Matter (PM ₁₀).....	8
3.2.3 Particulate Matter (PM _{2.5}).....	8
3.2.4 Sulphur Dioxide (SO ₂).....	8
3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene.....	8
There was no monitoring of Carbon Monoxide or 1,3-Butadiene in 2016.	8
4. New Local Developments	9
4.1 Road Traffic Sources.....	9
4.2 Other Transport Sources.....	9
4.3 Industrial Sources.....	9
4.4 Commercial and Domestic Sources.....	9
4.5 New Developments with Fugitive or Uncontrolled Sources.....	9
5. Planning Applications	10
6. Conclusions and Proposed Actions	11
6.1 Conclusions from New Monitoring Data.....	11
6.2 Conclusions relating to New Local Developments.....	11

6.3	Proposed Actions	11
Appendix A: Monitoring Results		13
Appendix B: Full Monthly Diffusion Tube Results for 2017		23
Appendix C: Supporting Technical Information / Air Quality Monitoring		
Data QA/QC		25
Annualisation		34
Ratio	1.11	34
Glossary of Terms		36
References		37

List of Tables

Table 1.1 – Summary of Air Quality Objectives in Scotland	1
Table 2.1 – Declared Air Quality Management Areas.....	3
Table 2.2 – Progress on Measures to Improve Air Quality	5

1. Local Air Quality Management

This report provides an overview of air quality in West Lothian Council during 2017. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Progress Report (APR) summarises the work being undertaken by West Lothian Council to improve air quality and any progress that has been made.

Table 1.1 – Summary of Air Quality Objectives in Scotland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Nitrogen dioxide (NO ₂)	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)	50 µg/m ³ , not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m ³	Annual mean	31.12.2010
Particulate Matter (PM _{2.5})	10 µg/m ³	Annual mean	31.12.2020
Sulphur dioxide (SO ₂)	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
Benzene	3.25 µg/m ³	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m ³	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m ³	Running 8-Hour mean	31.12.2003

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Lead	0.25 µg/m ³	Annual Mean	31.12.2008

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 months, setting out measures it intends to put in place in pursuit of the objectives.

A summary of AQMAs declared by West Lothian Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at <https://www.westlothian.gov.uk/article/2216/Air-Pollution> see full list at <https://uk-air.defra.gov.uk/aqma/maps>

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
AQMA Linlithgow	NO ₂ & PM ₁₀ annual mean	Linlithgow	Includes Linlithgow, Linlithgow Bridge and land allocated for development	In development
AQMA Broxburn	NO ₂ & PM ₁₀ annual mean	Broxburn	West Main Street eastwards to western boundary of service station, Broxburn	Published
AQMA Newton	PM ₁₀ annual mean	Newton	Whole of Newton	In development

2.2 Progress and Impact of Measures to address Air Quality in West Lothian

West Lothian Council has taken forward a number of measures during the current reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in the air quality action plan relating to each AQMA. Key completed measures are:

- Traffic modelling for potential changes to the Greendykes Road Junction in Broxburn.
- Provided a Bikeability Officer post located in West Lothian Leisure and will provide cycle training in Schools.
- Funding secured for ECOstars fleet recognition scheme in West Lothian.
- An Air Quality Supplementary Planning Guidance has been finalised following public consultation and is awaiting approval

West Lothian Council expects the following measures to be completed over the course of the next reporting year:

- Further Traffic Modelling in Broxburn to inform an air quality model for Greendykes Junction in Broxburn;
- The Bikeability Officer post filled and training carried out at schools in Linlithgow and Broxburn;
- ECOstars fleet recognition scheme agreement secured;
- Air Quality Supplementary Planning Guidance finalised and published.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Electric Vehicle charging points	Promoting low emission transport	Building a network for low emission vehicles	Environmental Health	June 2016	2017	EV point installed	Reduction in Air Pollution	EV point installed but not operational yet	2017	Fulfils action measure 15 of Broxburn AQAP
2	Improving links with Local Planning and Development framework	Policy guidance and development control	Air Quality Planning Guidance	Environmental Health	November 2016	2019	Air Quality Planning Guidance approved by council executive	Reduction in Air Pollution	Air Quality Planning guidance out to public consultation	2019	Fulfils action plan measure 2 of Broxburn AQAP
3	Traffic signal phasing and junction modification	Traffic Management	Changes to Greendykes Junction Broxburn	Roads and Transportation	August 2017 – August 2019	2020	Junction has been changed	Reduction in stop start traffic	Traffic microsimulation modelling carried out	2021	Fulfils action plan measure 5 of Broxburn AQAP
4	Active Travel and Cycling Infrastructure	Promoting Travel Alternatives	Active Travel Officer post jointly funded with Cycling Scotland	West Lothian Leisure/Environmental Health	2017/2018	2019	Post filled and training delivered to schools	Reduction in car journeys	Post has been advertised and interviews scheduled	2019	Fulfils action plan measure 20 of draft Linlithgow AQAP
5	Ecostars fleet recognition scheme	Promoting low emission transport	Taken forward by vehicle emissions partnership	Vehicle emissions partnership	2018/2019	2019	Businesses being visited by the scheme	Reduction in high emission journeys and vehicle	Agreement being discussed between parties	2019	Fulfils action plan measure 8 of draft Newton AQAP

2.3 Cleaner Air for Scotland

Cleaner Air for Scotland – The Road to a Healthier Future (CAFS) is a national cross-government strategy that sets out how the Scottish Government and its partner organisations propose to reduce air pollution further to protect human health and fulfil Scotland's legal responsibilities as soon as possible. A series of actions across a range of policy areas are outlined, a summary of which is available at <http://www.gov.scot/Publications/2015/11/5671/17>. Progress by West Lothian Council against relevant actions within this strategy is demonstrated below.

2.3.1 Transport – Avoiding travel – T1

All local authorities should ensure that they have a corporate travel plan (perhaps within a carbon management plan) which is consistent with any local air quality action plan. West Lothian Council has a Carbon Management Plan which can be found here: https://www.westlothian.gov.uk/media/10480/West-Lothian-Council-Carbon-Management-Plan-2015-20/pdf/Carbon_Management_Plan_2015-2020.pdf

West Lothian Council also has an Active Travel Plan which can be found here: https://www.westlothian.gov.uk/media/12492/West-Lothian-Active-Travel-Plan-2016-21-Making-Active-Connections/pdf/West_Lothian_Active_Travel_Plan_2016-212.pdf

West Lothian is developing Local Active Travel Network Plans for Broxburn and Linlithgow which is a commitment in the Active Travel Plan.

2.3.2 Climate Change – Effective co-ordination of climate change and air quality policies to deliver co-benefits – CC2

Scottish Government expects any Scottish local authority which has or is currently developing a Sustainable Energy Action Plan to ensure that air quality considerations are covered. West Lothian Council has a Climate Change Strategy which can be found here: https://www.westlothian.gov.uk/media/10479/West-Lothian-Council-Climate-Change-Strategy-2015-2020/pdf/West_Lothian_Council_Climate_Change_Strategy_2015-2020.pdf

West Lothian also has a Renewable Energy Strategy which can be found here: <https://www.westlothian.gov.uk/media/2612/Renewable-Energy-Strategy-in-2012/pdf/renewable-energy-strat.pdf>

3. Air Quality Monitoring Data and Comparison with Air Quality Objectives

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how local concentrations of the main air pollutants compare with the objectives.

West Lothian Council undertook automatic (continuous) monitoring at three sites during 2017. Table A.1 in [Appendix A](#) shows the details of the sites. National monitoring results are available at <http://www.scottishairquality.co.uk/>

Maps showing the location of the monitoring sites are provided in [Appendix C](#). 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

West Lothian Council undertook non- automatic (passive) monitoring of NO₂ at 20 sites during 2017. Table A.2 in [Appendix A](#) shows the details of the sites.

Maps showing the location of the monitoring sites are provided in [Appendix C](#). 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, adjusted for annualisation and bias. Further details on adjustments are provided in [Appendix C](#).

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 in [Appendix A](#) compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in [Appendix B](#).

Table A.4 in [Appendix A](#) compares the ratified continuous monitored NO₂ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year.

There were no exceedances of the NO₂ annual mean or hourly mean in West Lothian in 2017.

3.2.2 Particulate Matter (PM₁₀)

Table A.5 in [Appendix A](#) compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of 18µg/m³.

Table A.6 in [Appendix A](#) compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 5 years with the air quality objective of 50µg/m³, not to be exceeded more than 7 times per year.

There were no exceedances of the PM₁₀ annual mean or 24 hour mean in West Lothian in 2017.

3.2.3 Particulate Matter (PM_{2.5})

Table A.7 in [Appendix A](#) compares the ratified and adjusted monitored PM_{2.5} annual mean concentrations for the past year with the air quality objective of 10µg/m³. There were no exceedances of the PM_{2.5} annual mean in West Lothian in 2017.

3.2.4 Sulphur Dioxide (SO₂)

SO₂ is monitored by an AQmesh in Newton and started in 2017. Most of the 2017 data has been unreliable due to faults with the equipment. It is hoped that there will be sufficient SO₂ data available in 2018 for reporting purposes.

3.2.5 Carbon Monoxide, Lead and 1, 3-Butadiene

There was no monitoring of Carbon Monoxide or 1, 3-Butadiene in 2016.

4. New Local Developments

4.1 Road Traffic Sources

There were no new road traffic sources in 2017.

4.2 Other Transport Sources

There were no new other traffic sources in 2017.

4.3 Industrial Sources

There were no new industrial sources in 2017.

4.4 Commercial and Domestic Sources

Domestic fuel burning through the use of wood burning stoves continues to grow in West Lothian. There have been many planning applications received within and out-with AQMAs. They are generally given consent subject to flue height.

4.5 New Developments with Fugitive or Uncontrolled Sources

There were no new fugitive or uncontrolled sources in 2017.

5. Planning Applications

West Lothian has been subject to a number of planning applications in 2017 which may affect air quality. They are listed below:

- Planning permission in principle for residential development with associated public open space and infrastructure - 0411/P/17.
- Construction of an energy reserve facility (gas peaking plant) generating 19.9MW with associated fencing, access and parking - 0749/FUL/17.
- Application for Erection of a 1,481sqm business/ light industrial (class 4) development and associated access, parking and landscaping - 1008/FUL/17.

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

There were no exceedances of any air quality objectives at any monitoring sites (automatic or passive) within and outside West Lothian AQMAs in 2017. Linlithgow's PM₁₀ annual average data decreased significantly in 2017 compared with 2016 while NO₂ decreased to a 5 year low. Broxburn PM₁₀ and NO₂ annual average data showed a slight decrease compared to 2016 and both have met objective levels for the last 5 years. Newton PM₁₀ and NO₂ annual average data increased in 2017 compared to 2016 but still met the objective levels for each pollutant. All NO_x passive diffusion tubes located throughout West Lothian have shown no new exceedances in 2017.

The main priority for West Lothian Council is to carry out Detailed Assessments to determine if all three AQMAs need to be revoked due to air pollution levels meeting the 'target' air quality objectives for the last three years. The detailed assessments will include land allocated for development and will detail whether there will be any potential future exceedances of pollutants at relevant receptors.

6.2 Conclusions relating to New Local Developments

There have been no new local developments that have the potential to introduce new exceedances of relevant air quality objectives in West Lothian. The new Local Development Plan for West Lothian identifies various residential sites in and around the AQMAs. It's likely that these will introduce further traffic related emissions and may be subject to Air Quality Impact Assessments (AQIAs).

6.3 Proposed Actions

Monitoring data has identified no new additional monitoring or changes to existing monitoring programme. Furthermore, there are no changes required to any of the existing AQMAs.

Draft Linlithgow and Newton AQAPs have been in development and consulted upon but may be superseded by Detailed Assessments for Linlithgow and Newton to potentially remove the AQMAs due to a reduction in pollution levels. The detailed assessments will include land allocated for development and will detail whether there will be any potential future exceedances of pollutants at relevant receptors.

An application will still be made for air quality funding to Scottish Government for monitoring apparatus and action plan measures.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
CM1	Linlithgow High St	Roadside	300426	677172	NO ₂ ; PM ₁₀ ;PM _{2.5}	Y	FIDAS; NOX Analyser	4	1.36	1.5
CM2	Broxburn CNC	Roadside	308314	672231	NO ₂ ; PM ₁₀ ;PM _{2.5}	Y	FIDAS; NOX Analyser	3.5	2	1.5
CM3	Newton CNC	Roadside	309258	677728	NO ₂ ; PM ₁₀	Y	FDMS; NOX Analyser	2.0	2.4	1.5

(1) 0 if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?
DT1	Newton	Roadside	309223	677711	NO ₂	Y	3	2	N
DT2	Broxburn WMS	Roadside	308165	672222	NO ₂	Y	Facade	3	N
DT3	Broxburn EMS	Roadside	308426	672233	NO ₂	Y	1.5	4	N
DT4	Broxburn CNC	Roadside	308314	672231	NO ₂	Y	3	2	Y
DT5	Broxburn E Mains	Roadside	309368	672213	NO ₂	Y	4	2	N

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Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?
DT6	Dedridge Cedric Rise	Urban Background	306403	666341	NO ₂	N	4	3	N
DT7	West Calder	Roadside	301758	663158	NO ₂	N	2	2	N
DT8	Whitburn Cross	Roadside	294687	665030	NO ₂	N	2	3	N
DT9	Armadale Cross	Roadside	293842	668588	NO ₂	N	2	2	N
DT10	Bathgate South Bridge St.	Roadside	297401	668772	NO ₂	N	2	3	N
DT11	Bathgate Steelyard	Roadside	297467	668734	NO ₂	N	12	4	N
DT12	Bathgate King Street	Roadside	297570	668586	NO ₂	N	5	4	N

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Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?
DT13	Bathgate High Street	Urban Background	297656	669298	NO ₂	N	3	10	N
DT14	Linlithgow Romon	Roadside	299989	677090	NO ₂	Y	-5.5	7	Y
DT15	Linlithgow H ST NW	Roadside	299930	677070	NO ₂	Y	2	1.4	N
DT16	Linlithgow H ST SW	Roadside	299911	677052	NO ₂	Y	2	2.9	N
DT17	Linlithgow H ST NE	Roadside	300479	677148	NO ₂	Y	3.4	2	N
DT18	Linlithgow H ST SE	Roadside	300485	677125	NO ₂	Y	7.5	2.2	N
DT19	Linlithgow H ST N	Roadside	300398	677132	NO ₂	Y	Façade	2.4	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?
DT20	Linlithgow H ST S	Roadside	300405	677118	NO ₂	Y	Façade	3	N

0 if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(1) N/A if not applicable.

Table A.3 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2013	2014	2015	2016	2017
CM1	Roadside	Automatic	n/a	100	44.5 ₍₃₆₎ ⁽³⁾	32.4	33	38	31
CM2	Roadside	Automatic	n/a	100	39	28	27	32	30
CM3	Roadside	Automatic	n/a	98	24	21	21	<u>23</u> _(17.6) ⁽³⁾	19

Notes: Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(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 LAQM.TG(16) if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.4 – 1-Hour Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
					2013	2014	2015	2016	2017
CM1	Roadside	Automatic	n/a	100	0	0	0	0	0
CM2	Roadside	Automatic	n/a	100	0	0	0	0	0
CM3	Roadside	Automatic	n/a	98	0	0	0	0	0

Notes: Exceedances of the NO₂ 1-hour mean objective (200µg/m³ 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 85%, the 99.8th percentile of 1-hour means is provided in brackets.

Table A.5 – Annual Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2013	2014	2015	2016	2017
CM1	Roadside	N/A	83	13.9	18	15	14	9
CM2	Roadside	N/A	98	16	17	15	15	14
CM3	Roadside	N/A	49	19	22	16	15	15(17) (3)

Notes: Exceedances of the PM₁₀ annual mean objective of 18µg/m³ 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 LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.6 – 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM ₁₀ 24-Hour Means > 50µg/m ³ (3)				
				2013	2014	2015	2016	2017
CM1	Roadside	n/a	83	0	1	2	0	0
CM2	Roadside	n/a	98	0	2	2	0	0
CM3	Roadside	n/a	49	4	1	0	0	0

Notes: Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 7 times/year) are shown in **bold**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 85%, the 98.1st percentile of 24-hour means is provided in brackets.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	PM _{2.5} Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2013	2014	2015	2016	2017
CM1	Roadside	n/a	83	n/a	n/a	n/a	n/a	5
CM2	Roadside	n/a	30	n/a	n/a	n/a	n/a	6

Notes: Exceedances of the PM₁₀ annual mean objective of 10µg/m³ 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 LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details

Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO₂ Monthly Diffusion Tube Results for 2017

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted ⁽¹⁾
DT1	25.8	23.5	26.8	18.4	23.4	19.7	18.7	20.2	22.3	26.7	29	28	24	23.3
DT2	30.6	35.3	34.8	22.3	24.7	19.7	19.6	11.1	25.8	24	35.3	32	27	26.2
DT3	38.8	27.3	26.2	20.1	22.7	18.6	20.2	20.3	24.1	26.4	35.8	34.7	26.3	25.5
DT4	36.4	21.7	39.0	27.0	24.9	23.0	22.6	28.6	29.5	29.6	40.6	28.9	29.3	28.4
DT5	31.5	28.6	33.1	19.8	29.7	1.3	39.7	20.3	22.3	23.5	33.2	32.7	27.5	26.7
DT6	21.7	13.7	16	8.3	8.6	7	6.8	10.1	10.4	12	17.6	18	12.5	12.1
DT7	24	23.2	25.8	19	24	17.7	18.6	23.3	25	21.9	27	25	22.8	22.1
DT8	35.2	24.9	27.2	23.6	22.3	18.5	17.3	18	24.4	21.8	30	28.2	24.6	23.9
DT9	39.1	27.3	27	19.8	22.5	23	17.6	24.6	22	25.6	27.6	35.2	26	25.2
DT10	1.0	45.3	20.1	13.1	13.6	10.8	10.5	15.3	15.8	17.3	26.8	26.3	19.5	18.9
DT11	35.4	31.6	35.5	25	25.1	20.4	20.2	23.6	24.2	28.6	40.5	37	28.9	28.0
DT12	39.1	31.3	28.8	22	23.3	19.7	20	23.6	27.3	24	37	37.4	28	27.2
DT13	18.7	14	12.7	7.6	6.5	5	5.4	6.2	9.6	10.5	20.1	17	11	10.7
DT14	42.1	39.5	33.3	28.4	31.8	25.2	20.2	27.6	30.7	32.9	41.1	37.8	32.6	31.6

Site ID	NO ₂ Mean Concentrations (µg/m ³)												Annual Mean	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted ⁽¹⁾
	DT15	37.8	35.5	35.8	22.6	28.5	20.2	19.4	24.5	25.8	34.6	32.3		
DT16	43.5	43.3	34.7	27	32.1	29.6	-	31	33.4	34.5	34.1	37.4	34.9	33.9
DT17	39	30.3	26.6	20.7	24.6	18.8	14.1	23.6	25.5	25.5	38.4	34.6	26.5	25.7
DT18	42.6	37.6	27.7	29.8	28.2	24.1	20.7	24.3	29.2	30.3	41.6	41.4	31.5	30.6
DT19	35.8	30	30	24.1	26.9	19.9	19.3	23.1	25.8	24.6	35.3	34	27.3	26.5
DT20	37.1	43.1	32.1	23.1	27.2	27.1	20.9	29.2	29.4	33.3	40.6	38.2	31.8	30.8

(1) See Appendix C for details on bias adjustment

As described in the Technical Guidance LAQM-TG-16 if there is more than one collocation study then the A factors should not be averaged but an approximation should be derived by averaging the B values. For example if there are two studies of 22% and 28% the average would be 25%. This is expressed as a factor, e.g. 0.25, then 1 is added to this, $0.25+1.00 = 1.25$. Finally take the inverse to give the bias adjustment factor $1/1.25=0.80$.

We had 2 B values of 0% and 5%. Average = 2.5% = $0.03+1=1.03$. Inverse of this is $1/1.03 = 0.97$

Therefore we have a Bias adjustment factor of 0.9 for 2017.

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

Bias Adjustment Factors

AEA Energy & Environment
From the AEA group

Checking Precision and Accuracy of Triplicate Tubes

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{g m}^{-3}$	Tube 2 $\mu\text{g m}^{-3}$	Tube 3 $\mu\text{g m}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	04/01/2017	01/02/2017	45.0	45.8	35.5	42	5.7	14	14.2
2	01/02/2017	01/03/2017	41.9	42.2	34.5	40	4.4	11	10.8
3	01/03/2017	29/03/2017	32.3	30.8	36.9	33	3.2	10	7.9
4	29/03/2017	26/04/2017	27.7	25.9	31.5	28	2.9	10	7.1
5	26/04/2017	31/05/2017	32.2	28.0	35.2	32	3.6	11	9.0
6	31/05/2017	28/06/2017	26.2	25.4	24.1	25	1.1	4	2.6
7	28/06/2017	02/08/2017	21.3	21.4	17.9	20	2.0	10	4.9
8	02/08/2017	30/08/2017	28.6	25.8	28.5	28	1.6	6	3.9
9	30/08/2017	27/09/2017	28.8	28.6	34.7	31	3.5	11	8.6
10	27/09/2017	01/11/2017	31.9	33.0	33.7	33	0.9	3	2.3
11	01/11/2017	06/12/2017	41.9	44.9	36.4	41	4.3	10	10.7
12	06/12/2017	03/01/2017	35.7	37.3	40.4	38	2.4	6	5.9
13									

Automatic Method

Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
44.0	100	Good	Good
42.0	100	Good	Good
40.0	100	Good	Good
30.0	100	Good	Good
29.0	100	Good	Good
20.0	100	Good	Good
17.0	100	Good	Good
20.0	99	Good	Good
28.0	100	Good	Good
25.0	100	Good	Good
36.0	99	Good	Good
40.0	99	Good	Good

Overall survey -> **Good precision** **Good Overall**
(Check average CV & DC from Accuracy calculations)

Site Name/ID: DT14 Liniithgow AQ Station

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 12 periods of data
Bias factor A 0.95 (0.86 - 1.06)
Bias B 5% (-6% - 16%)

Diffusion Tubes Mean: 33 $\mu\text{g m}^{-3}$
Mean CV (Precision): 9
Automatic Mean: 31 $\mu\text{g m}^{-3}$
Data Capture for periods used: 100%

Adjusted Tubes Mean: 31 (28 - 35) $\mu\text{g m}^{-3}$

Accuracy (with 95% confidence interval)
WITH ALL DATA

Bias calculated using 12 periods of data
Bias factor A 0.95 (0.86 - 1.06)
Bias B 5% (-6% - 16%)

Diffusion Tubes Mean: 33 $\mu\text{g m}^{-3}$
Mean CV (Precision): 9
Automatic Mean: 31 $\mu\text{g m}^{-3}$
Data Capture for periods used: 100%

Adjusted Tubes Mean: 31 (28 - 35) $\mu\text{g m}^{-3}$

Jaume Targa, for AEA
Version 04 - February 2011

AEA Energy & Environment
From the AEA group

Checking Precision and Accuracy of Triplicate Tubes

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{g m}^{-3}$	Tube 2 $\mu\text{g m}^{-3}$	Tube 3 $\mu\text{g m}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	04/01/2017	01/02/2017	30.4	41.5	37.2	36	5.6	15	13.9
2	01/02/2017	01/03/2017	28.1	37.1		33	6.4	20	57.2
3	01/03/2017	29/03/2017	38.7	38.5	39.9	39	0.8	2	1.9
4	29/03/2017	26/04/2017	28.9	23.7	28.5	27	2.9	11	7.2
5	26/04/2017	31/05/2017	27.5	24.4	22.9	25	2.3	9	5.8
6	31/05/2017	28/06/2017	20.0	25.4	23.6	23	2.7	12	6.8
7	28/06/2017	02/08/2017	23.8	21.8	22.2	23	1.1	5	2.6
8	02/08/2017	30/08/2017	28.0	28.0	30.0	29	1.2	4	2.9
9	30/08/2017	27/09/2017	31.7	29.5	27.5	30	2.1	7	5.2
10	27/09/2017	01/11/2017	33.1	28.4	29.2	30	3.4	11	8.4
11	01/11/2017	06/12/2017	41.5	36.9	43.5	41	3.4	8	8.4
12	06/12/2017	03/01/2017	32.9	13.1	40.6	29	14.2	49	35.2
13									

Automatic Method

Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
38	100	Good	Good
33	100	Poor Precision	Good
36	99	Good	Good
35	100	Good	Good
27	100	Good	Good
21	100	Good	Good
20	100	Good	Good
21	100	Good	Good
23	99	Good	Good
29	100	Good	Good
43	99	Good	Good
38	99	Poor Precision	Good

Overall survey -> **Good precision** **Good Overall**
(Check average CV & DC from Accuracy calculations)

Site Name/ID: DT4 Broxburn AQ Station

Precision: 10 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 0.97 (0.87 - 1.11)
Bias B 3% (-10% - 15%)

Diffusion Tubes Mean: 30 $\mu\text{g m}^{-3}$
Mean CV (Precision): 8
Automatic Mean: 29 $\mu\text{g m}^{-3}$
Data Capture for periods used: 100%

Adjusted Tubes Mean: 29 (26 - 33) $\mu\text{g m}^{-3}$

Accuracy (with 95% confidence interval)
WITH ALL DATA

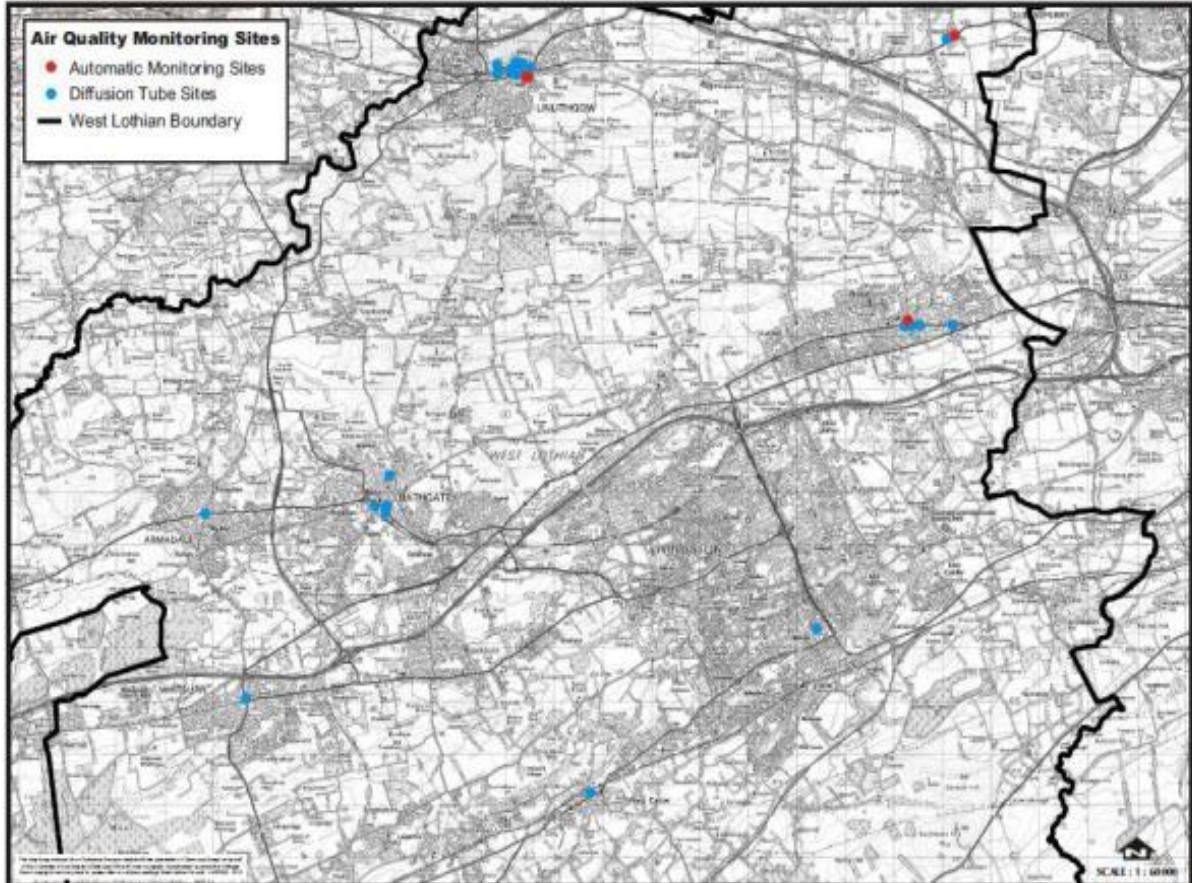
Bias calculated using 12 periods of data
Bias factor A 1 (0.9 - 1.14)
Bias B 0% (-12% - 11%)

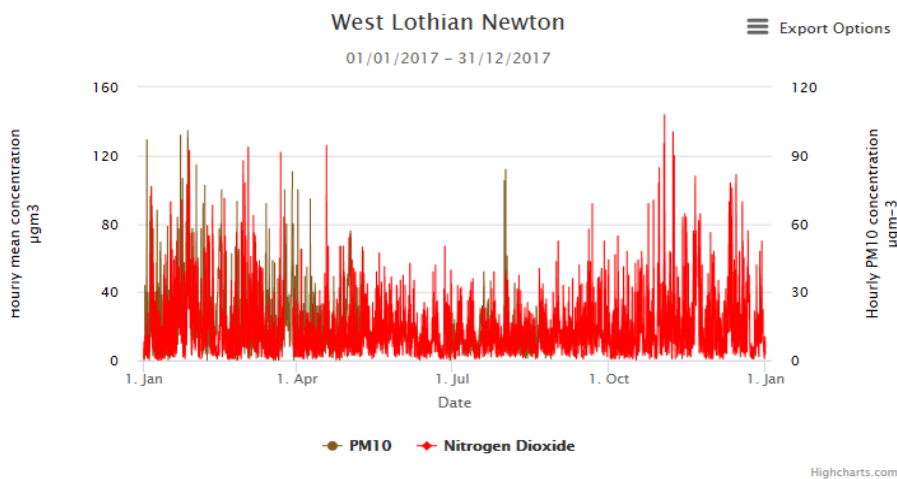
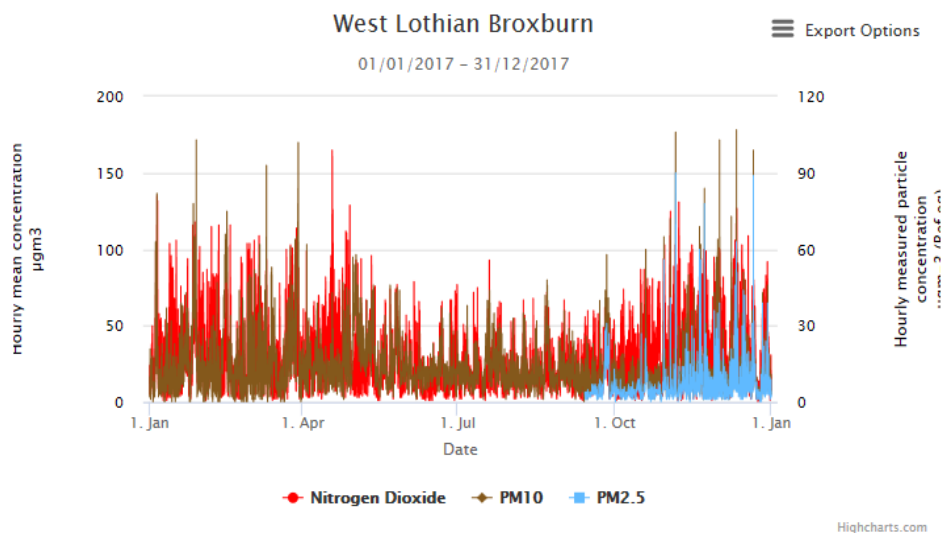
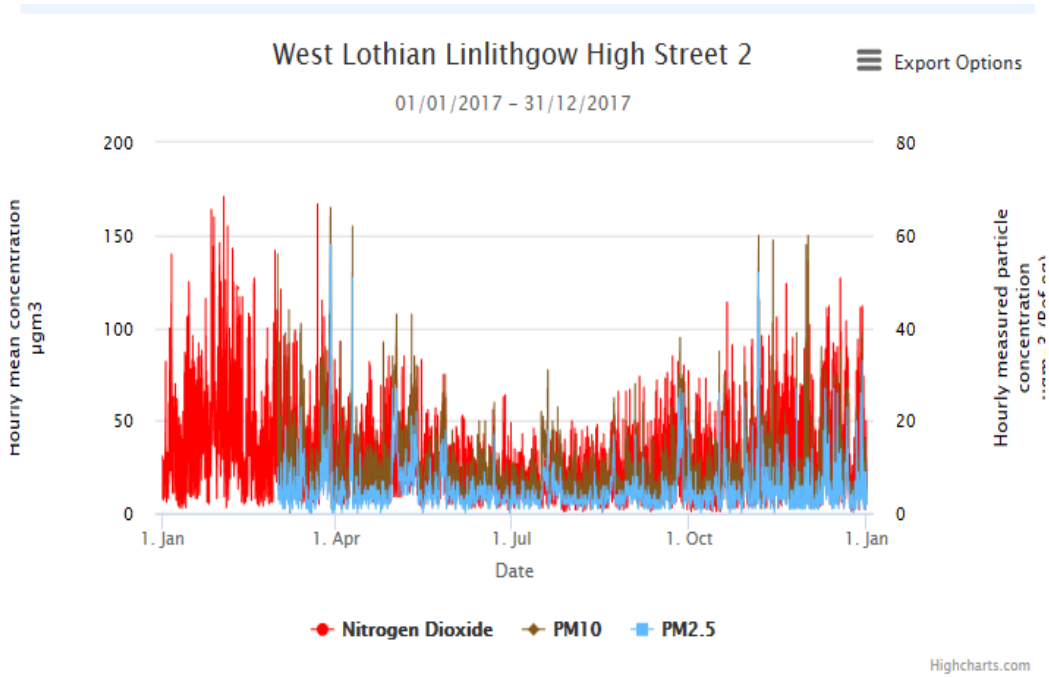
Diffusion Tubes Mean: 30 $\mu\text{g m}^{-3}$
Mean CV (Precision): 13 **caution**
Automatic Mean: 30 $\mu\text{g m}^{-3}$
Data Capture for periods used: 100%

Adjusted Tubes Mean: 30 (27 - 34) $\mu\text{g m}^{-3}$

Jaume Targa, for AEA
Version 04 - February 2011

Figure 2.1





Air Pollution Report

1st January to 31st December 2017



West Lothian Linlithgow High Street 2 (Site ID: WLC1)

These data have been **fully ratified**

Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m ³	NO ₂ µg/m ³	NO _x asNO ₂ µg/m ³	PM ₁₀ µg/m ³	PM _{2.5} µg/m ³
Number Days Low	-	365	-	305	305
Number Days Moderate	-	0	-	0	0
Number Days High	-	0	-	0	0
Number Days Very High	-	0	-	0	0
Max Daily Mean	191	87	381	33	28
Annual Max	538	171	996	66	58
Annual Mean	33	31	81	9	5
98th Percentile of daily mean	-	-	-	23	-
90th Percentile of daily mean	-	-	-	15	-

99.8th Percentile of hourly mean	-	130	-	-	-
98th Percentile of hourly mean	168	88	339	30	19
95th Percentile of hourly mean	112	74	243	22	13
50th Percentile of hourly mean	21	26	58	8	4
% Annual data capture	99.68%	99.67%	99.67%	83.49%	83.49%

Instruments: PM₁₀: FIDAS

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_x mass units are NO_x as NO₂ µg m⁻³

Note: For a strict comparison against the objectives there must be a data capture of 85% or greater throughout the calendar year.

Pollutant	Air Quality Standards (Scotland) Regulations 2010	Exceedances	Days
PM10 particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	0	0
PM10 particulate matter (Hourly measured)	Annual mean > 18 microgrammes per metre cubed	0	-
PM2.5 particulate matter (Hourly measured)	Annual mean > 12 microgrammes per metre cubed	0	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	Annual Mean > 40 microgrammes per metre cubed	0	-

Air Pollution Report

1st January to 31st December 2017



West Lothian Broxburn (Site ID: BRX)

These data have been **fully ratified**

Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m ³	NO ₂ µg/m ³	NO _x asNO ₂ µg/m ³	PM ₁₀ µg/m ³	PM _{2.5} µg/m ³
Number Days Low	-	365	-	362	109
Number Days Moderate	-	0	-	1	0
Number Days High	-	0	-	0	0
Number Days Very High	-	0	-	0	0
Max Daily Mean	154	82	317	52	20
Annual Max	480	165	867	107	90
Annual Mean	33	30	82	14	6
98th Percentile of daily mean	-	-	-	38	-

West Lothian Council

90th Percentile of daily mean	-	-	-	24	-
99.8th Percentile of hourly mean	-	116	-	-	-
98th Percentile of hourly mean	159	90	328	46	26
95th Percentile of hourly mean	114	76	246	35	19
50th Percentile of hourly mean	20	25	56	11	4
% Annual data capture	99.62%	99.62%	99.62%	98.42%	29.93%

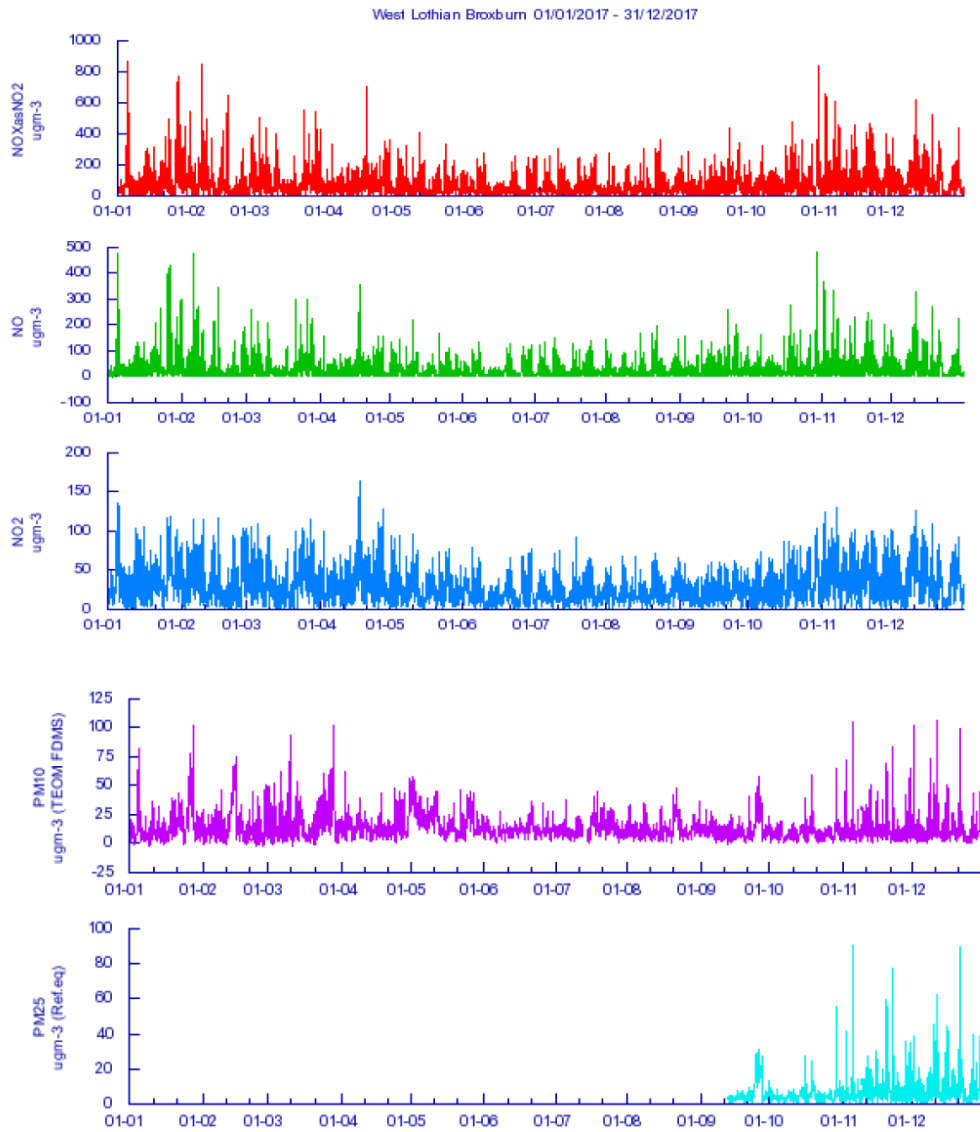
Instruments: PM₁₀: FDMS TEOM (no correction) (01/01/2017 to 13/09/2017), FIDAS (13/09/2017 to 31/12/2017)

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_x mass units are NO_x as NO₂ µg m⁻³

Note: For a strict comparison against the objectives there must be a data capture of 85% or greater throughout the calendar year.

Pollutant	Air Quality Standards (Scotland) Regulations 2010	Exceedances	Days
PM10 particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	1	1
PM10 particulate matter (Hourly measured)	Annual mean > 18 microgrammes per metre cubed	0	-
PM2.5 particulate matter (Hourly measured)	Annual mean > 12 microgrammes per metre cubed	0	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	Annual Mean > 40 microgrammes per metre cubed	0	-

Annual Graph



Air Pollution Report

1st January to 31st December 2017



West Lothian Newton (Site ID: WLN4)

These data have been fully ratified

Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m ³	NO ₂ µg/m ³	NO _x asNO ₂ µg/m ³	PM ₁₀ µg/m ³
Number Days Low	-	361	-	175
Number Days Moderate	-	0	-	0
Number Days High	-	0	-	0
Number Days Very High	-	0	-	0
Max Daily Mean	43	60	123	49
Annual Max	163	144	369	101
Annual Mean	12	19	36	15
98th Percentile of daily mean	-	-	-	44

99.8th Percentile of hourly mean	-	104	-	-
98th Percentile of hourly mean	56	67	149	54
95th Percentile of hourly mean	38	50	106	42
50th Percentile of hourly mean	7	14	25	11
% Annual data capture	97.97%	97.79%	97.79%	49.21%

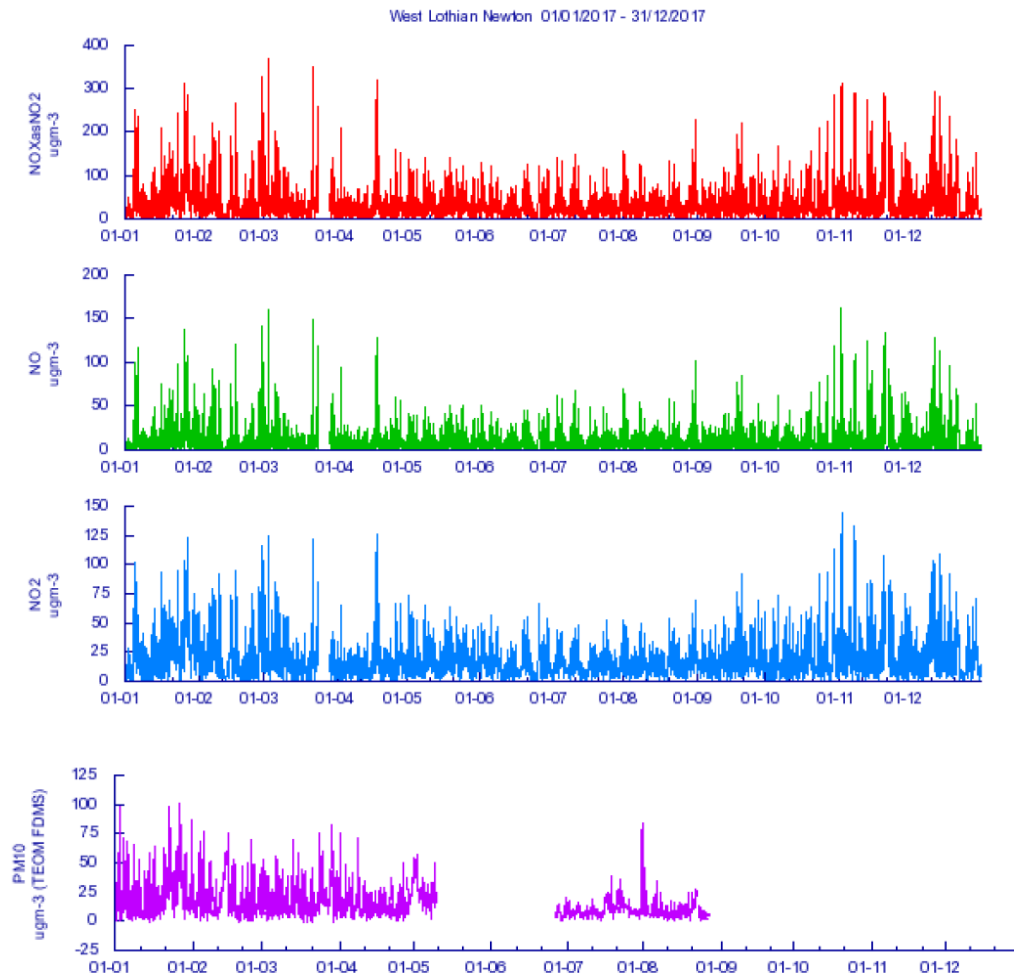
Instruments: PM₁₀: FDMS TEOM (no correction)

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_x mass units are NO_x as NO₂ µg m⁻³

Note: For a strict comparison against the objectives there must be a data capture of 85% or greater throughout the calendar year.

Pollutant	Air Quality Standards (Scotland) Regulations 2010	Exceedances	Days
PM10 particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	0	0
PM10 particulate matter (Hourly measured)	Annual mean > 18 microgrammes per metre cubed	0	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	Annual Mean > 40 microgrammes per metre cubed	0	-

Annual Graph



Annualisation

As described in the Technical Guidance LAQM-TG-16 annualisation is carried out when data capture is less than 75%. To do this first identify two to four nearby, long-term, continuous monitoring sites, ideally those forming part of the national network. The data capture for each of these sites should ideally be at least 85%. These sites should be background (Urban Background, Suburban, or Rural) sites to avoid any very local effects that may occur at Urban Centre, Roadside or Kerbside sites, and should wherever possible lie within a radius of about 50 miles. If no background sites are available and the site is to be annualised is itself a Urban Centre, Roadside or Kerbside site, then it is permissible to annualise using roadside or kerbside sites rather than background sites, though this should be clearly stated in the annual report.

Obtain the annual means, A_m , for the calendar year for these sites.

Work out the period means, P_m , for the period of interest.

Calculate the ratio, R , of the annual mean to the period mean (A_m/P_m) for each of the sites.

Calculate the average of these ratios, R_a . This is then the annualisation factor.

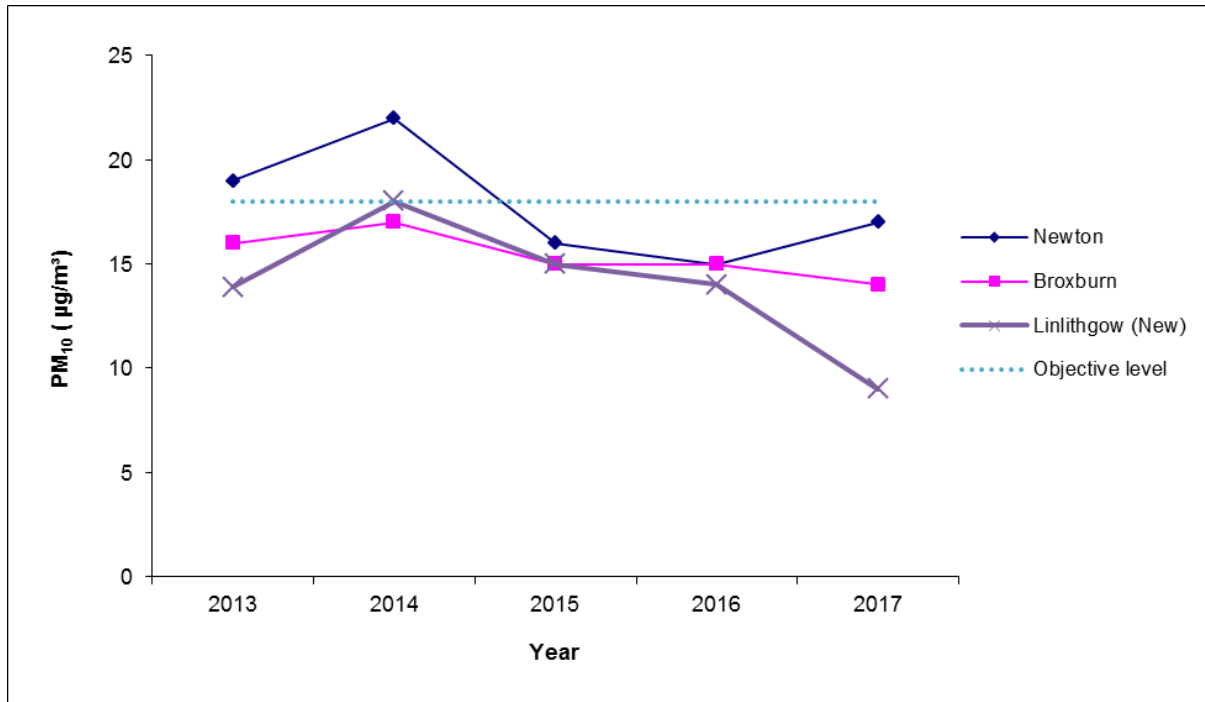
Multiply the measured period mean concentration M by this annualisation factor R_a to give the estimate of the annual mean. For PM10 at Newton we only had data capture of 49%, annualisation was calculated as below:

Annualisation for PM10 Newton

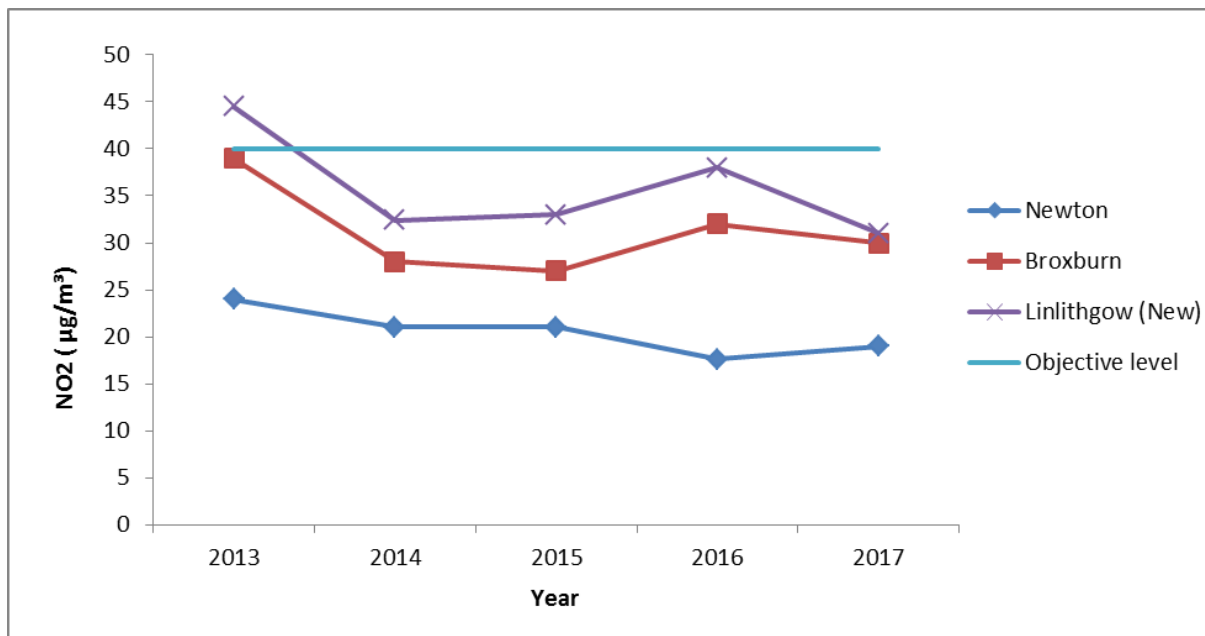
	Annual mean(A_m)	Period mean(P_m)	Ratio(A_m/P_m)
Lin Site A	9	7	1.29
Brox Site B	14	15	0.93
Ratio			1.11

Annualisation for Newton: 1.11×15 (Newton Period mean) = $17\mu\text{g}/\text{m}^3$

PM10 Trend Data Graph



NO2 Trend Data Graph



Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA 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
APR	Air quality Annual Progress Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
CAFS	Cleaner Air for Scotland
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide

References

Broxburn AQAP:

https://www.westlothian.gov.uk/media/17039/2017-Broxburn-Air-Quality-Action-Plan-Approved/pdf/2017_Broxburn_Air_Quality_Action_Plan_final_for_consultation.pdf

West Lothian Council Air Pollution Webpage:

<http://www.westlothian.gov.uk/article/2216/Air-Pollution>

DEFRA AQMA map webpage:

<https://uk-air.defra.gov.uk/aqma/maps>

CAFS Webpage:

<http://www.gov.scot/Publications/2015/11/5671/17>

West Lothian Council Carbon Management Plan:

https://www.westlothian.gov.uk/media/10480/West-Lothian-Council-Carbon-Management-Plan-2015-20/pdf/Carbon_Management_Plan_2015-2020.pdf

West Lothian Council Active Travel Plan:

https://www.westlothian.gov.uk/media/12492/West-Lothian-Active-Travel-Plan-2016-21-Making-Active-Connections/pdf/West_Lothian_Active_Travel_Plan_2016-212.pdf

West Lothian Council Climate Change Strategy:

https://www.westlothian.gov.uk/media/10479/West-Lothian-Council-Climate-Change-Strategy-2015-2020/pdf/West_Lothian_Council_Climate_Change_Strategy_2015-2020.pdf

West Lothian Council Renewable Energy Strategy:

<https://www.westlothian.gov.uk/media/2612/Renewable-Energy-Strategy-in-2012/pdf/renewable-energy-strat.pdf>

Air Quality in Scotland webpage:

<http://www.scottishairquality.co.uk/>

