Annual Progress Report (APR)

2019 Air Quality Annual Progress Report (APR) for
West Lothian Council

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

June 2019

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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 (NO_2) and fine particulates (PM_{10} & $PM_{2.5}$) 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 24 NO_x passive diffusion tubes located throughout West Lothian. Four NO_x tubes have been added in 2019 in Winchburgh and East Calder to the existing 20 NO_x tubes. All diffusion tube locations can be found on the Air Quality Scotland Website: http://www.scottishairquality.scot/latest/diffusion-sites The solar powered AQmesh monitor is now located in East Calder and monitors a mixture of pollutants at a school gate.

The 2018 monitoring data at all three continuous air quality monitoring stations has shown that the NO_2 and PM_{10} long term average air quality objectives have been met. Levels of PM_{10} in Linlithgow increased slightly in 2018 compared with 2017 while NO_2 decreased slightly. 2018 levels of PM_{10} and NO_2 in Broxburn on average showed a slight decrease compared to 2017 and have met objective levels for many years. Newton's PM_{10} and NO_2 annual average levels decreased in 2018 compared to 2017 for each pollutant. The short term PM_{10} and NO_2 air quality objectives were met during 2018.

The Linlithgow and Broxburn 2018 annual average $PM_{2.5}$ monitoring data shows that levels of $PM_{2.5}$ have met objective levels for a second year. It's likely that $PM_{2.5}$ monitoring will start in Newton this financial year.

All NO_x passive diffusion tubes located throughout West Lothian have shown no new exceedances in 2018. The AQmesh has had poor data capture in 2018 and is therefore not included in this report.

Further information on the location of the AQMA's can be found here: https://www.westlothian.gov.uk/media/33857/Air-Quality-PG/pdf/Air_Quality_-_Planning_Guidance.pdf

Actions to Improve Air Quality

The actions taken to improve air quality within West Lothian include employing a Bikeability Officer who has delivered cycle training to children and adults throughout West Lothian. In 2018, 11 schools delivered level 1 Bikability training with 6 planning to deliver level 1 Bikability training over the 2019 summer. 9 schools delivered level 2 Bikability training with a further 8 planning to deliver level 2 training over the 2019 summer. 203 level 1 certificates and 133 level 2 certificates have been issued in 2018.

A contract has been set up to deliver the ECOstars fleet recognition scheme in West Lothian which will be taken forward as a project through the vehicle emission partnership.

The Air Quality Supplementary Planning Guidance was adopted as planning guidance in April 2019. The planning guidance can be found here: https://www.westlothian.gov.uk/media/33857/Air-Quality-PG/pdf/Air_Quality_-_Planning_Guidance.pdf It has introduced a requirement for Electric Vehicle charging points to be installed at most commercial/residential premises. An example can be found at a new commercial development in Linlithgow.

Electric Vehicle Charging Point with two spaces available

A reduction and replacement of West Lothian Council petrol pool cars for electric pool cars has taken place at Linlithgow. Linlithgow partnership centre now has three dedicated fully electric Nissan Leaf's available for Council use.

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. Detailed traffic modelling is still being carried out to inform the detailed assessments. Once this is complete the detailed assessments can then be finalised and a decision can be made on revoking the AQMA's. It is envisaged that will happen this year.

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

Local Air Quality Management

This report provides an overview of air quality in West Lothian Council during 2018. 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) is summarises the work being undertaken by West Lothian Council to improve air quality and any progress that has been made.

Table 0.1 – 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

1. Actions to Improve Air Quality

1.1 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 1.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online https://www.westlothian.gov.uk/article/2216/Air-Pollution – see full list at https://uk-air.defra.gov.uk/aqma/list.

Table 1.1 – 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

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

West Lothian Council has taken forward a number of measures during the current reporting year of 2018 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:

- Securing a Bikeability Officer who has delivered cycle training schools throughout West Lothian.
- A contract has been set up to deliver the ECOstars fleet recognition scheme in West Lothian which will be taken forward as a project through the vehicle emissions partnership.
- The Air Quality Supplementary Planning Guidance was adopted as planning guidance in April 2019. The planning guidance can be found here: https://www.westlothian.gov.uk/media/33857/Air-Quality-PG/pdf/Air_Quality_-_Planning_Guidance.pdf
- Removal and replacement of petrol pool cars to electric pool cars for council staff in Linlithgow.

Progress on traffic modelling for potential changes to the Greendykes Road Junction in Broxburn has been slower than expected due to competing priorities in departments out-with Environmental Health.

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

- The Bikability Officer post to continue for a further year securing further training in schools within West Lothians AQMA's.
- The ECOstars fleet recognition scheme to be implemented by the vehicle emissions partnership
- Vehicle charging points shall be installed in new residential and commercial developments in West Lothian from the use of the AQ SPG in the planning system.
- Further replacement of petrol cars and diesel vans with electric vehicles

Table 1.2 – 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 Brox 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 approved but non-statutory	2019	Fulfils action plan measure 2 of Brox 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 Brox AQAP
4	Active Travel and Cycling Infrastructure	Promoting Travel Alternatives	Bikability 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 filled and training is being delivered	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	Contract agreed and signed	2019	Fulfils action plan measure 8 of draft Newton AQAP
6	Electric Pool Cars for council staff in an AQMA	Promoting low emission transport	Replacing petrol pool cars with electric pool cars	Fleet and Transportation	2019/2020	2019/2020	Pool cars available for use in Linlithgow	Reduction in high emission journeys and air pollution	Three electric pool cars ins use. Removal of petrol cars.	2020	Fulfils action plan measure 20 of Linlithgow AQAP

1.3 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 https://www.gov.scot/Publications/2015/11/5671/17. Progress by West Lothian Council against relevant actions within this strategy is demonstrated below.

1.3.1 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.

1.3.2 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

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

2.1 Summary of Monitoring Undertaken

2.1.1 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 2018. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at http://www.scottishairquality.co.uk/

A map 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.

2.1.2 Non-Automatic Monitoring Sites

West Lothian Council undertook non - automatic (passive) monitoring of NO_2 at 20 sites during 2018. 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. Please note that the four additional diffusion tubes have recently been installed so do not appear in the map. They will be added to the next progress report. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

2.2 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.

2.2.1 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

There were no exceedances of the NO_2 annual mean or hourly mean in West Lothian in 2018.

2.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 18µg/m^3.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 7 times per year.

There were no exceedances of the PM_{10} annual mean. The 24 hour mean was only exceeded once in Newton in 2018.

2.2.3 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/m^3.

There were no exceedances of the $PM_{2.5}$ annual mean in West Lothian in 2018.

2.2.4 Sulphur Dioxide (SO_2)

SO_2 was monitored by an AQmesh in Newton and started in 2017. Most of the 2018 data was unreliable due to faults with the equipment. The AQmesh has now been moved to East Calder and will be used at a school gate.

2.2.5 Carbon Monoxide, Lead and 1, 3-Butadiene

There was no monitoring of Carbon Monoxide or 1, 3-Butadiene in 2018.

3. New Local Developments

3.1 Road Traffic Sources

There were no new road traffic sources in 2018.

4.2 Other Transport Sources

There were no new other traffic sources in 2018.

4.3 Industrial Sources

There have been four new industrial sources given planning consent in 2018. These include (with planning reference):

- An electricity and heat generating station– 0199/FUL/18
- A 10 megawatt standby electricity generating facility – 1010/FUL/18
- A 19.9 megawatt standby electricity generating facility – 1048/FUL/18
- A 2,520sqm poultry shed – 0603/FUL/18

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 outwith 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 2018.

4. Planning Applications

West Lothian has been subject to two approved planning applications in 2018 which may affect air quality. They're the following:

- 0201/FUL/18 – Erection of residential development in Linlithgow
- 1110/FUL/18 – Erection of residential development in Linlithgow

In addition to the two planning applications, Falkirk Council has been subject to a planning application (P/17/0792/PPP) in 2018 which may affect air quality in Linlithgow.

5. Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

All long term air quality objective levels were met in 2018 at all monitoring sites. There was only one short term 24 hour exceedance of air quality objectives at any monitoring sites (automatic and passive) within and outside West Lothian AQMAs in 2018. That was at Newton and related to PM_{10} levels. Although there was a short term 24 hour exceedance, there would need to be seven 24 hour short term exceedances in the year for the air quality objective to not be met.

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 many 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.

Due to new housing developments in Winchburgh and East Calder passive diffusion tubes have been installed in each town. Data should be available for 2019 and the results included in the next progress report.

5.2 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).

5.3 Proposed Actions

Monitoring data has identified no new additional monitoring to the existing monitoring programme. However, new housing developments in Winchburgh and East Calder have meant that new monitoring will take place in each location. There are no changes required to any of the existing AQMAs at this point. The draft Linlithgow/Newton AQAP's and the Broxburn AQAP may be superseded by Detailed Assessments. 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
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	Roadside	294687	665030	NO_2	N	2	3	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?
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
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
DT20	Linlithgow H ST S	Roadside	300405	677118	NO_2	Y	Façade	3	N

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2014	2015	2016	2017	2018
CM1	Roadside	Automatic	n/a	100	32.4	33	38	31	28
CM2	Roadside	Automatic	n/a	100	28	27	32	30	27
CM3	Roadside	Automatic	n/a	95	21	21	23(17.6) (3)	19	17

Notes: Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per 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 NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2014	2015	2016	2017	2018
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	95	0	0	0	0	0

Notes: Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold.**

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

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

(3) If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
CM1	Roadside	N/A	100	18	15	14	9	11
CM2	Roadside	N/A	100	17	15	15	14	13
CM3	Roadside	N/A	90	22	16	15	**15(17) (3)**	14

Notes: Exceedances of the PM_{10} annual mean objective of 18µg/m^3 are shown in **bold.**

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

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

(3) All means have been "annualised" as per 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 PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2014	2015	2016	2017	2018
CM1	Roadside	n/a	100	1	2	0	0	0
CM2	Roadside	n/a	100	2	2	0	0	0
CM3	Roadside	n/a	90	1	0	0	0	**1**

Notes: Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 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 2018 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
CM1	Roadside	n/a	100	n/a	n/a	n/a	5	6
CM2	Roadside	n/a	100	n/a	n/a	n/a	6	7

Notes: Exceedances of the PM_{10} annual mean objective of 10µg/m^3 are shown in **bold.**

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

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

(3) All means have been "annualised" as per LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.8 – SO_2 Monitoring Results

Site ID	Site Type	Valid Data Capture for monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	Number of Exceedances (percentile in bracket) (3)		
				15-minute Objective (266 µg/m^3)	1-hour Objective (350 µg/m^3)	24-hour Objective (125 µg/m^3)
CM1	Roadside	98	94	4	1	0
	Urban Background					

Notes: Exceedances of the SO_2 objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year)

(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 relevant percentiles are provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results for 2018

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	28.2	27.7	28.6	23.4	-	23.7	21.9	22.7	21.6	25.6	34.1	33.2	26.4	**21.1**
DT2	27.6	34.4	38.1	-	-	34.3	25.3	-	23.8	-	41	35.3	33.1	**26.5**
DT3	24	38.6	30.3	21	-	25.4	22.8	21.2	23.9	30	32.9	34.9	27.7	**22.2**
DT4	28.7	39	28.5	37.5	-	37.5	31.7	27.7	27.7	33.8	50.6	40.8	35.0	**28.0**
DT5	26.5	32.5	32.3	22.5	-	32.3	24.4	21.8	20.8	27.5	34.8	33.6	28.1	**22.5**
DT6	17.5	21.3	15.9	10.7	-	11.7	9.4	9.4	11.3	16.3	22.3	21.1	15.1	**12.1**
DT7	16.3	30.7	31.8	23	-	26.5	24.6	20.5	21.3	23.9	36.7	27.8	25.9	**20.7**
DT8	23.5	27.3	27.8	21	-	26.1	21.3	19.8	19.2	29.4	32.6	29.8	25.6	**20.5**
DT9	22.6	31.9	30.1	20.6	-	24.6	25.8	28.9	29.7	33.3	33.1	36.6	28.9	**23.1**
DT10	21.4	21.5	20.9	13.4	-	16.5	16.4	15.8	16.2	23.5	31.1	29.0	20.5	**16.4**
DT11	22.1	34.9	32.6	21.6	-	26.5	23.9	24.5	25	31.4	38	42.4	30.6	**24.5**
DT12	28.4	31.3	33.5	25.4	-	24.2	-	-	25.8	32.9	51.8	45.1	33.2	**26.6**
DT13	16.6	16.4	12.8	8	-	8.5	8.3	8.4	9	13.5	17.2	19.7	12.4	**9.9**
DT14	27.6	41.8	34.7	27.2	-	31.2	29.3	27.8	26.5	34.8	45.6	42.7	33.6	**26.9**

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)
DT15	25.7	38.9	36.9	26.6	-	33.4	26.8	23.2	24	28.6	39.5	36.3	30.9	**24.7**
DT16	34.9	44.5	-	30.9	-	32.1	31.7	32.2	32.2	36.9	41.7	40.7	36.5	**29.2**
DT17	24.7	36	29.4	-	-	21.4	20.2	21.8	19.8	24.1	29.6	36.1	27.2	**21.8**
DT18	28.8	39.1	27.2	25.9	-	27.1	25.7	-	-	-	40.8	38.9	31.7	**25.4**
DT19	26.8	35.5	33.3	25	-	28.9	23.1	21.3	20.8	28.3	34.1	35	28.4	**22.7**
DT20	33.2	43.9	33.8	26.3	-	30.6	27.5	29.2	28.9	32.9	36.9	42.8	33.3	**26.6**

(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 20% and 15%. Average = 18% = 0.18+1=1.18. Inverse of this is 1/1.18 = 0.84
Therefore we have a Bias adjustment factor of 0.8 for 2018.

There is no diffusion tube data for any of the sites for May 2018 as we changed diffusion tube suppliers at this time.

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

Bias adjustment Factors

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

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	03/01/2018	30/01/2018	21.1	24.7	37.0	28	8.3	30	20.7
2	30/01/2018	27/02/2018	38.7	44.2	42.4	42	2.8	7	7.0
3	27/02/2018	27/03/2018	37.7	30.2	36.2	35	4.0	11	9.9
4	27/03/2018	01/05/2018	27.5	26.5	27.8	27	0.7	2	1.7
5	05/06/2018	03/07/2018	31.2	30.5	32.0	31	0.8	2	1.9
6	03/07/2018	31/07/2018	30.0	28.7	29.3	29	0.7	2	1.6
7	31/07/2018	04/09/2018	25.8	29.9	27.9	28	2.1	7	5.1
8	04/09/2018	02/10/2018	25.0	27.2	27.4	27	1.3	5	3.3
9	02/10/2018	30/10/2018	33.3	36.4	34.8	35	1.6	4	3.9
10	30/10/2018	04/12/2018	43.0	46.7	47.2	46	2.3	5	5.7
11	04/12/2018	08/01/2019	43.3	43.8	41.0	43	1.5	3	3.7
12									
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
37	100	Poor Precision	Good
39	100	Good	Good
32	100	Good	Good
29	99	Good	Good
23	99	Good	Good
20	100	Good	Good
16	100	Good	Good
18	99	Good	Good
26	100	Good	Good
32	100	Good	Good
37	99	Good	Good
Overall survey -->		Good precision	Good Overall

(Check average CV & DC from Accuracy calculations)

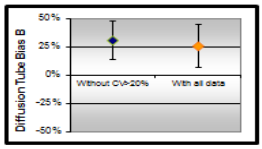
It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: CM1 - Linlithgow Auto

Precision: 10 out of 11 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: 0.8 (0.7 - 0.92)
Bias B: 26% (8% - 43%)
Diffusion Tubes Mean: 34 µgm⁻³
Mean CV (Precision): 5
Automatic Mean: 27 µgm⁻³
Data Capture for periods used: 100%
Adjusted Tubes Mean: 27 (24 - 31) µgm⁻³

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A: 0.84 (0.72 - 1)
Bias B: 20% (0% - 39%)
Diffusion Tubes Mean: 34 µgm⁻³
Mean CV (Precision): 7
Automatic Mean: 28 µgm⁻³
Data Capture for periods used: 100%
Adjusted Tubes Mean: 28 (24 - 34) µgm⁻³



Jaume Targa, for AEA
Version 04 - February 2011

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

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	03/01/2018	30/01/2018	25.9	28.2	32.0	29	3.1	11	7.7
2	30/01/2018	27/02/2018	40.0	34.1	43.0	39	4.5	12	11.2
3	27/02/2018	27/03/2018	34.4	41.8	41.3	39	4.1	11	10.3
4	27/03/2018	01/05/2018	29.0	28.5	28.1	29	0.5	2	1.1
5	05/06/2018	03/07/2018	39.4	33.6	39.4	37	3.3	9	8.3
6	03/07/2018	31/07/2018	31.8	31.2	32.1	32	0.5	1	1.1
7	31/07/2018	04/09/2018	27.7	25.5	29.9	28	2.2	8	5.5
8	04/09/2018	02/10/2018	28.6	25.5	28.9	28	1.9	7	4.7
9	02/10/2018	30/10/2018	30.1	38.4	32.9	34	4.2	12	10.5
10	30/10/2018	04/12/2018	49.4	54.9	47.4	51	3.9	8	9.6
11	04/12/2018	08/01/2019	36.6	43.5	42.4	41	3.7	9	9.2
12									
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
46	100	Good	Good
41	100	Good	Good
34	100	Good	Good
24	100	Good	Good
26	97	Good	Good
22	100	Good	Good
19	100	Good	Good
18	100	Good	Good
27	100	Good	Good
38	100	Good	Good
40	99	Good	Good
Overall survey -->		Good precision	Good Overall

(Check average CV & DC from Accuracy calculations)

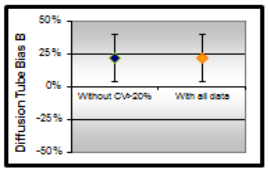
It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: CM2 - Broxburn

Precision: 11 out of 11 periods have a CV smaller than 20%

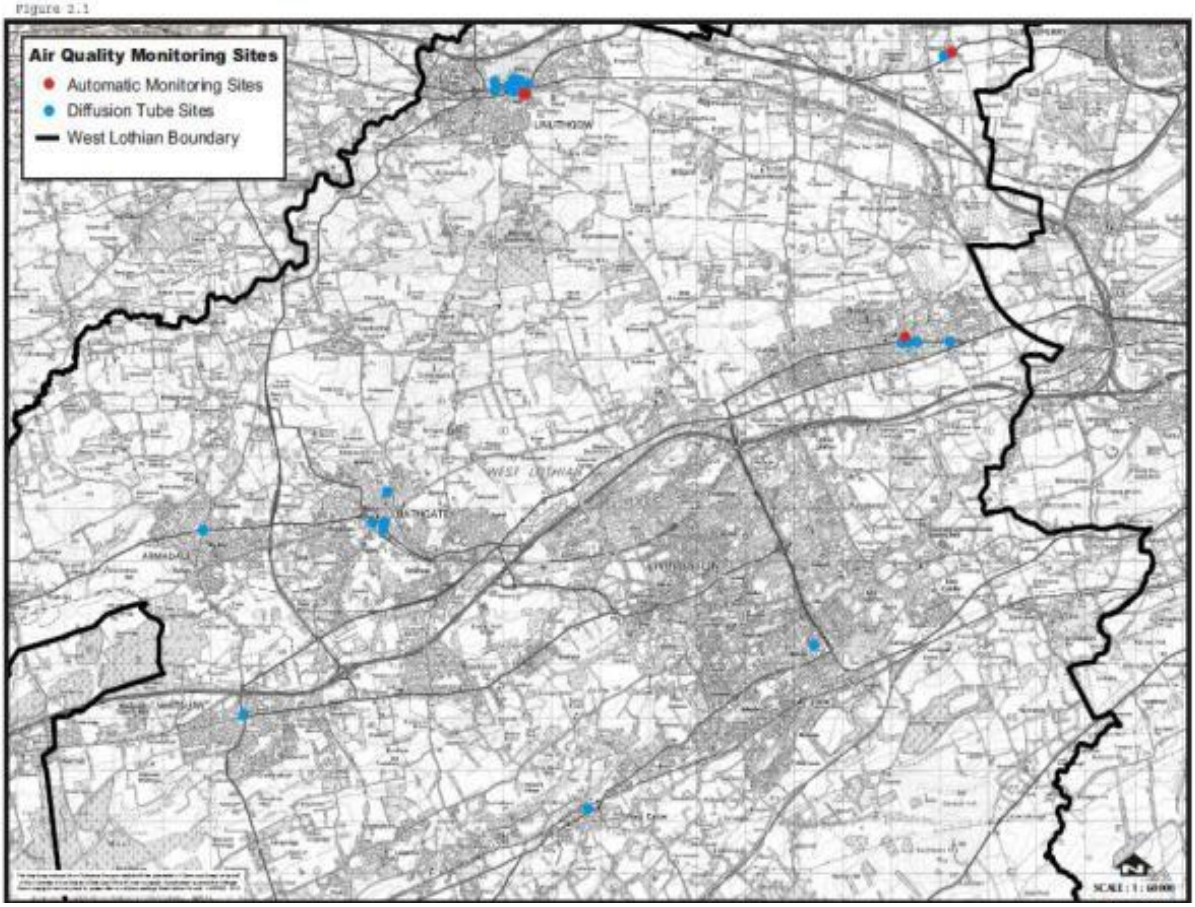
Accuracy (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 11 periods of data
Bias factor A: 0.87 (0.75 - 1.03)
Bias B: 15% (-3% - 33%)
Diffusion Tubes Mean: 35 µgm⁻³
Mean CV (Precision): 8
Automatic Mean: 30 µgm⁻³
Data Capture for periods used: 100%
Adjusted Tubes Mean: 30 (26 - 36) µgm⁻³

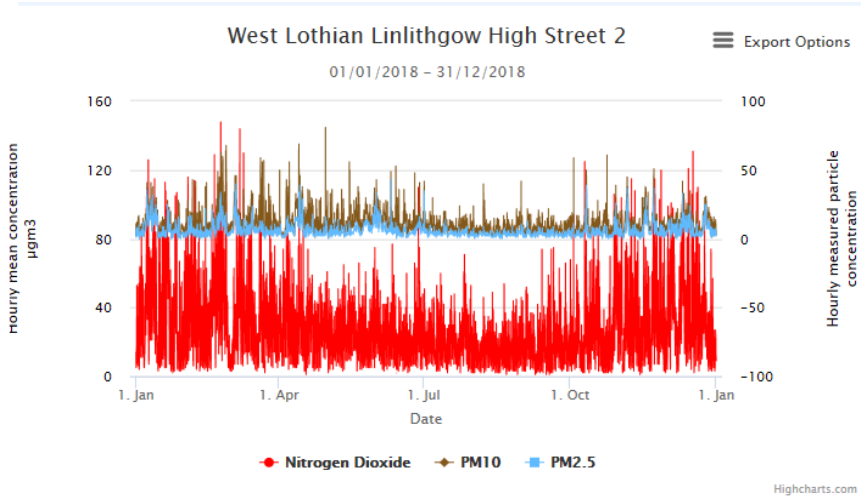
Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A: 0.87 (0.75 - 1.03)
Bias B: 15% (-3% - 33%)
Diffusion Tubes Mean: 35 µgm⁻³
Mean CV (Precision): 8
Automatic Mean: 30 µgm⁻³
Data Capture for periods used: 100%
Adjusted Tubes Mean: 30 (26 - 36) µgm⁻³

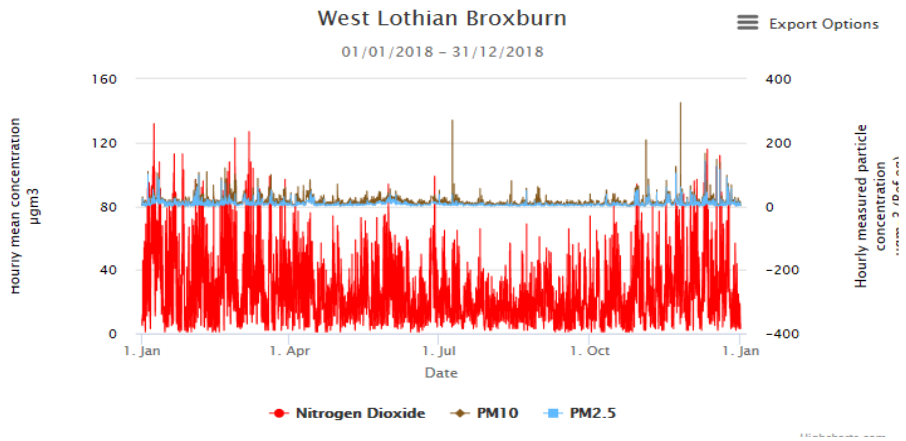


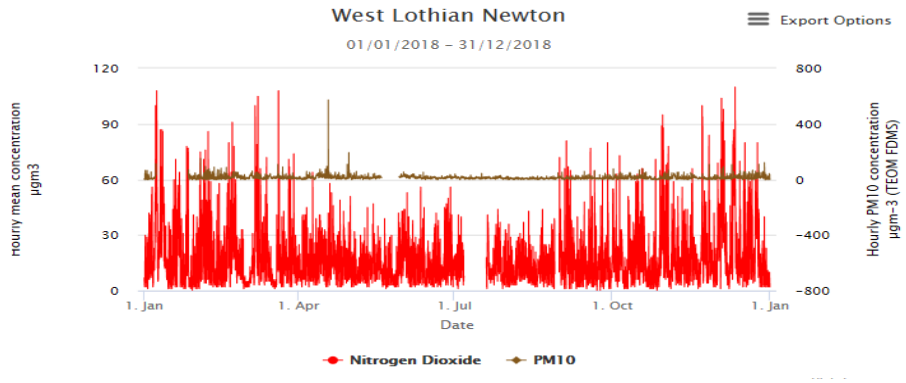
Jaume Targa, for AEA
Version 04 - February 2011

Figure 2.1


Air Quality Monitoring Sites
Automatic Monitoring Sites
Diffusion Tube Sites
West Lothian Boundary


West Lothian Linlithgow High Street 2
Export Options
01/01/2018 - 31/12/2018
Hourly mean concentration µgm3
Hourly measured particle concentration
160
120
80
40
0
100
50
0
-50
-100
1. Jan
1. Apr
1. Jul
1. Oct
1. Jan
Date
Nitrogen Dioxide
PM10
PM2.5
Highcharts.com


West Lothian Broxburn
Export Options
01/01/2018 – 31/12/2018
Hourly mean concentration µgm3
Hourly measured particle concentration
160
120
80
40
0
400
200
0
-200
-400
1. Jan
1. Apr
1. Jul
1. Oct
1. Jan
Date
Nitrogen Dioxide
PM10
PM2.5


West Lothian Newton
Export Options
01/01/2018 – 31/12/2018
Hourly mean concentration µgm3
Hourly PM10 concentration µgm-3 (TEOM FDMS)
120
90
60
30
0
800
400
0
-400
-800
1. Jan
1. Apr
1. Jul
1. Oct
1. Jan
Date
Nitrogen Dioxide
PM10

Air Pollution Report

1st January to 31st December 2018

Air Quality in Scotland

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/m³	NO_2 µg/m³	NO_x as NO_2 µg/m³	PM_{10} µg/m³	PM_{25} µg/m³
Number Days Low	-	365	-	365	365
Number Days Moderate	-	0	-	0	0
Number Days High	-	0	-	0	0
Number Days Very High	-	0	-	0	0
Max Daily Mean	171	67	330	35	25
Annual Max	436	148	778	81	43
Annual Mean	31	28	74	11	6
98th Percentile of daily mean	-	-	-	27	-
90th Percentile of daily mean	-	-	-	18	-
99.8th Percentile of hourly mean	-	113	-	-	-
98th Percentile of hourly mean	168	82	337	34	22
95th Percentile of hourly mean	110	69	232	26	16
50th Percentile of hourly mean	19	23	53	9	5
% Annual data capture	**99.78%**	**99.65%**	**99.65%**	**99.86%**	**99.86%**

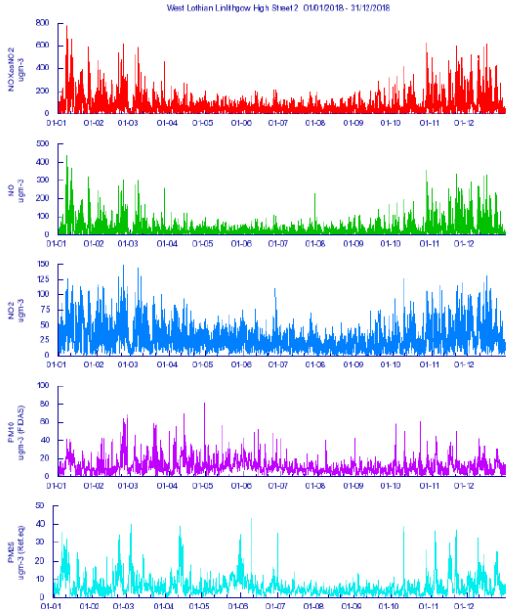
Instruments: PM_{10}: FIDAS

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 NO_2 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	-

Annual Graph



Air Pollution Report

1st January to 31st December 2018

Air Quality in Scotland

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/m³	NO_2 µg/m³	NO_x as NO_2 µg/m³	PM_{10} µg/m³	PM_{25} µg/m³
Number Days Low	-	365	-	363	363
Number Days Moderate	-	0	-	0	0
Number Days High	-	0	-	0	0
Number Days Very High	-	0	-	0	0
Max Daily Mean	152	78	302	43	29
Annual Max	427	132	786	326	143
Annual Mean	30	27	73	13	7
98th Percentile of daily mean	-	-	-	34	-
90th Percentile of daily mean	-	-	-	23	-
99.8th Percentile of hourly mean	-	107	-	-	-
98th Percentile of hourly mean	162	83	330	46	28
95th Percentile of hourly mean	110	68	237	33	20
50th Percentile of hourly mean	16	22	48	10	5
% Annual data capture	**99.66%**	**99.66%**	**99.66%**	**99.65%**	**99.65%**

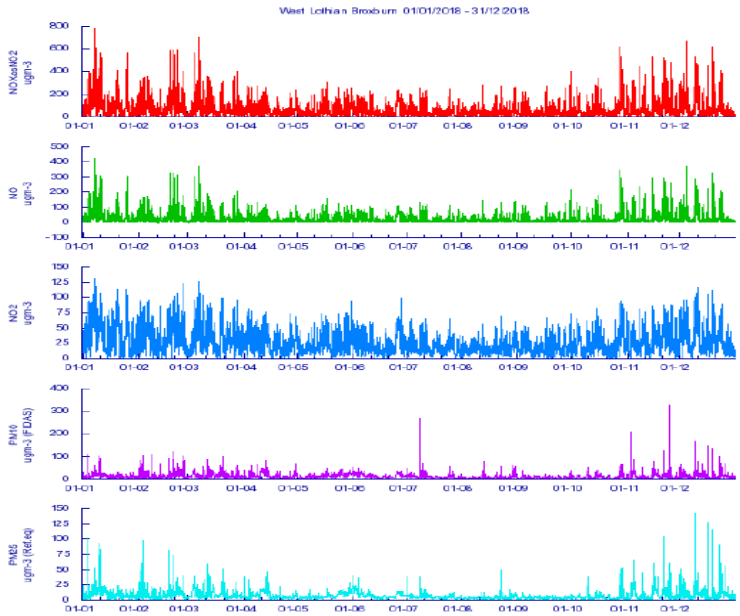
Instruments: PM_{10}: FIDAS

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 NO_2 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	-

Annual Graph



Air Pollution Report

1st January to 31st December 2018

Air Quality in Scotland

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/m³	NO_2 µg/m³	NO_x as NO_2 µg/m³	PM_{10} µg/m³
Number Days Low	-	351	-	332
Number Days Moderate	-	0	-	1
Number Days High	-	0	-	0
Number Days Very High	-	0	-	0
Max Daily Mean	64	60	149	60
Annual Max	172	110	372	57.4
Annual Mean	11	17	34	14
98th Percentile of daily mean	-	-	-	32
90th Percentile of daily mean	-	-	-	22
99.8th Percentile of hourly mean	-	91	-	-
98th Percentile of hourly mean	54	62	141	50
95th Percentile of hourly mean	35	47	98	37
50th Percentile of hourly mean	7	13	24	11
% Annual data capture	**95.62%**	**95.14%**	**95.14%**	**90.47%**

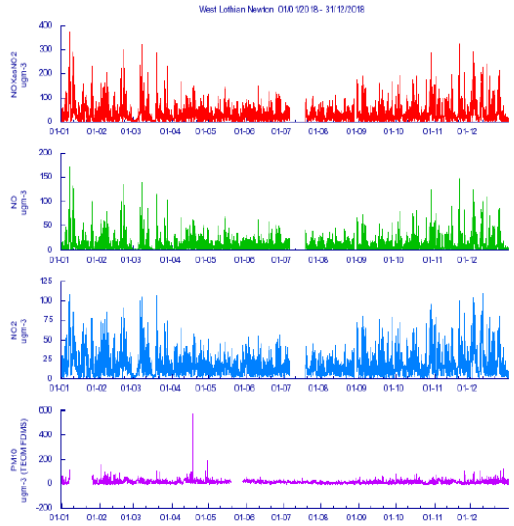
Instruments: PM_{10}: FDMS TEOM (no correction)

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 NO_2 µg m-3

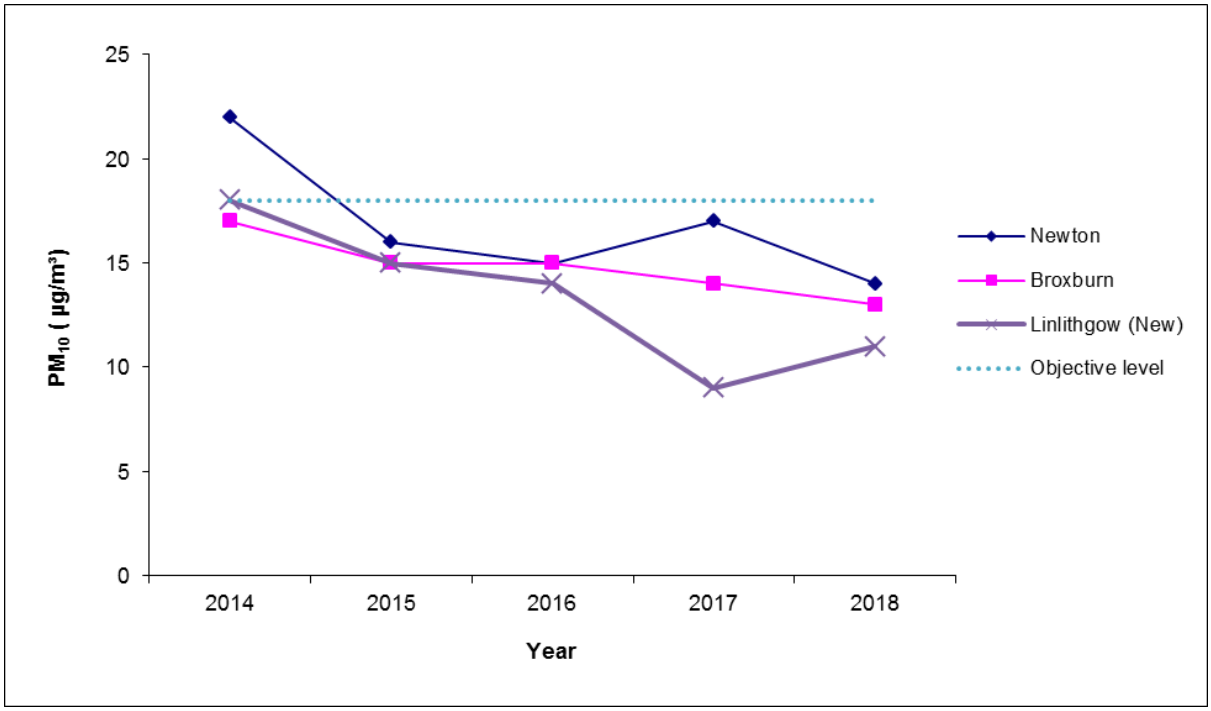
Note: For a strict comparison against the objectives there must be a data capture of 85% or greater throughout the calendar year.

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	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	Annual Mean > 40 microgrammes per metre cubed	0	-

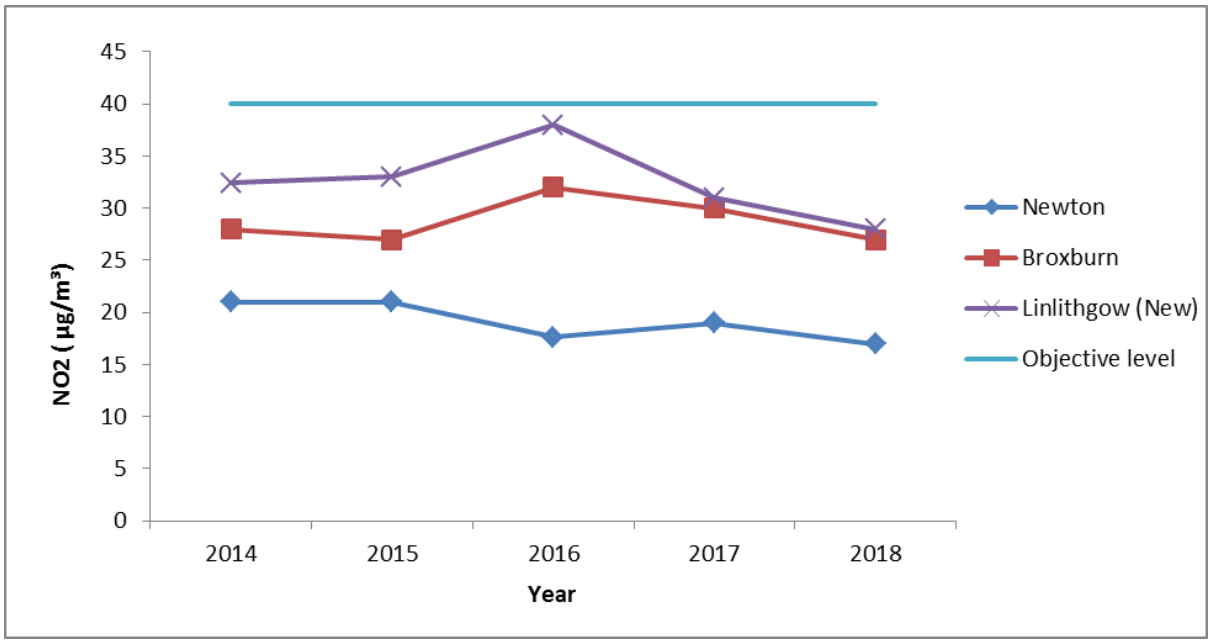
Annual Graph



PM10 Annual Trend Data Graph



NO2 Annual 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)
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 webpage:

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:

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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

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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/

Air Quality Scotland Diffusion tube map webpage:

http://www.scottishairquality.scot/latest/diffusion-sites

West Lothian Council Air Quality Supplementary Planning Guidance Webpage:

https://www.westlothian.gov.uk/media/33857/Air-Quality-PG/pdf/Air_Quality_-_Planning_Guidance.pdf