Annual Progress Report (APR)

2020 Air Quality Annual Progress Report (APR) for
West Lothian Council

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

January 2021

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Executive Summary: Air Quality in Our Area

Air Quality in West Lothian

West Lothian Council routinely 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 particles (PM_{10} & $PM_{2.5}$), which are mainly associated with vehicle emissions and domestic fuel burning, are measured using a network of three continuous air quality monitoring stations located in Linlithgow, Broxburn and Newton.

There are also 23 NO_x passive diffusion tubes located throughout West Lothian. Three new NO_x tubes were added in April 2019. These were added in Winchburgh and East Calder due to new housing developments in these areas. All diffusion tube locations can be found on the Air Quality in Scotland website http://www.scottishairquality.scot/latest/diffusion-sites

The solar powered AQ Mesh mobile monitor was relocated at East Calder Primary School for the whole of 2019. Due to technical problems, the data from East Calder is only available from January 2019 to September 2019. The AQ Mesh was removed for repair in October 2019

The 2019 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. NO_2 at Linlithgow was up slightly from 2018. PM_{10} levels also increased for 2019, compared to the previous year. In Broxburn, NO_2 levels were exactly the same as in 2018 and PM_{10} levels did rise by 1 $\mu g/m^3$ in 2019. At the Newton Site, NO_2 levels were up by 1$\mu g/m^3$ from last year however the PM_{10} level stayed the same. With regard to the short term NO_2 and PM_{10} air quality objectives, there was one exceedance of the 1hour mean for NO_2 at Linlithgow during 2019. In addition, there were five exceedances of the 24hour PM_{10} mean at Linlithgow, four exceedances at Broxburn and two at the Newton site.

In Linlithgow, the $PM_{2.5}$ level rose by 1$\mu g/m^3$ from 2018 to 2019. In Broxburn, there was also a rise, of one. In Newton, PM2.5 was measured for the first time from October 2019, so no comparisons are available yet against the previous years data.

No NOx passive diffusion tubes located throughout West Lothian have shown any new exceedances in 2019.

As noted, the AQ Mesh instrument data is limited to January to September due to technical problems with this equipment. It was removed for repair during October 2019 and did not return to the site during 2019.

Further information on the location of the AQMA's can be found at https://www.westlothian.gov.uk/article/34729/Air-Pollution

Actions to Improve Air Quality

The actions to improve air quality within West Lothian include;

- During April 2019, West Lothian Council joined the Eco Stars fleet recognition scheme. To date, there are now 55 members within West Lothian which encompasses 1960 individual vehicles. The scheme aims to help fleet operators improve efficiency, reduce fuel consumption & emissions and make cost savings. There is a planned formal launch of the scheme during 2020.
- As noted in last years report, the Air Quality Supplementary Planning Guidance was adopted as planning guidance in April 2019. It can be found at the following link: https://www.westlothian.gov.uk/media/33857/PG-Planning-Guidance-Air-Quality-Adopted-April-2019-/pdf/Air_Quality_-_Planning_Guidance.pdf?m=637074440000830000

  This document introduced a requirement for electric vehicle charging points to be installed at most commercial/residential developments. The picture below shows one which was installed during 2019 at a new commercial development in Linlithgow.

- Within the Environmental Health and Trading Standards, four electric vehicles are utilised for carrying out routine visits. This is alongside other petrol and diesel vehicles. This is an increase of 1 further electric vehicle since the air quality report on 2018 activities.
- As a local authority, West Lothian Council has a total of 42 electric vehicles. 21 of these were procured during 2019. There are plans to continue to increase this electric vehicle fleet.
- West Lothian Council also continues to provide the management and administration support for the East Central Scotland Vehicle Emissions Partnership (VEP), which is in collaboration with several other local authorities. The remit of the VEP is to help reduce vehicle emissions by encouraging drivers to switch off their engine whenever possible, encourage good travel mode and vehicle choices and handling idling and emissions complaints.

  In addition the VEP uses a broad variety of advertising media to encourage change in driving habits across the councils' areas. Media used includes local TV, radio, public transport networks such as buses and social media.

- A Bikeability Officer was again employed during 2019, with match funding support provided through air quality grant funding. This officer delivers cycle training to children and adults throughout West Lothian.

Local Priorities and Challenges

In West Lothian, the main priority is to carry out detailed assessments to determine whether the three Air Quality Management Areas (AQMAs) need to be revoked due to air pollution levels meeting the target air quality objectives for the previous 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 scenario 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 the future of the existing AQMAs.

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

How to Get Involved

If you would like to find out more about air quality within West Lothian, please visit the Air Pollution pages of our website at https://www.westlothian.gov.uk/article/34729/Air-Pollution.

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1. Local Air Quality Management

This report provides an overview of air quality in West Lothian Council during 2019. 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 the 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://uk-air.defra.gov.uk/aqma/local-authorities?la_id=390 see the full list of Air Quality Management areas at https://uk-air.defra.gov.uk/aqma/list

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
AQMA Linlithgow	• NO_2 annual mean • PM_{10} annual mean	Linlithgow	Includes Linlithgow, Linlithgow Bridge & land allocated for development	Draft Action Plan
AQMA Broxburn	• NO_2 annual mean • PM_{10} annual mean	Broxburn	West Main Street eastwards to western boundary of service station, Broxburn	Broxburn Air Quality Action Plan – see link Action Plan
AQMA Newton	• PM_{10} annual mean	Newton	The whole of Newton village	Draft Action Plan

2.2 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.

2.2.1 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 at the following link - 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, found at this link - 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?m=635981217631570000. Local Active Travel Network plans are being developed as part of this plan, including in Linlithgow and Broxburn. This will aim to encourage cycling, walking and scooting opportunities for 'to school' and for shorter journeys in to town centres and villages.

2.2.2 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-2015-202/pdf/West_Lothian_Council_Climate_Change_Strategy_2015-202.pdf

West Lothian Council also has a Renewable Energy Strategy, which is found at the following link; https://www.westlothian.gov.uk/media/2612/Renewable-Energy-Strategy-in-2012/pdf/renewable-energy-strat.pdf?m=635318565999230000

2.3 National Low Emission Framework (NLEF) Stage 1 Screening Appraisal for West Lothian Council

The NLEF[1], which is now part of the review and assessment process for LAQM reporting in Scotland, contributes to the Cleaner Air for Scotland strategy by aiming to improve local air quality in areas where air quality objectives are exceeded, or likely to be exceeded, primarily due to emissions from transport.

The NLEF is directly linked to Air Quality Action Planning (AQAP) for local authorities with Air Quality Management Areas (AQMAs), and will help to identify actions to improve local air quality within AQMAs. The NLEF appraisal takes the form of a two-stage process, as summarised in Table 2.2:

Table 2.2 – NLEF Appraisal Process

Stage		Outcome	Actions Required
1	Screening	• decision on whether to proceed to stage two assessment	• screening process to identify actions that will benefit air quality within the AQMA • screening evidence should form part of the Annual Progress Report, with the decision agreed by Scottish Government and SEPA
2	Assessment	• decision to proceed with introduction of LEZ or identification of alternative transport-related measures required to improve air quality • Stage two assessment report agreed by Scottish Government and SEPA	• NMF approach to support assessment of sources of pollution and options • quantitative impact assessment (based on predicted change in pollutant concentrations) • consideration of consequential impacts (e.g. congestion, export

[1] https://www.gov.scot/publications/national-low-emission-framework/pages/2/

Stage		Outcome	Actions Required
			of pollution)

The NLEF Stage 1 Screening Appraisal for West Lothian Council is detailed in Table 2.3, 2.4 and Table 2.5. It is the opinion of West Lothian Council that proposed measures are sufficient and there is therefore no need to proceed to a Stage 2 Assessment. As is highlighted below, the levels of pollutants for which the AQMA's are declared for are all below the statutory limits and have been for several years. The focus will now be moving towards revoking these AQMA's, whilst keeping a close watch on the effect of any new development in the area. It appears that the measures implemented over the last few years have continued to have a positive effect on pollutant levels within the designated Air Quality Management Areas. Adoption of the Air Quality Supplementary Planning Guidance also sets out how we will look at proposed development and implement measures to help minimise any effects at the initial stages of that development.

Table 2.3 – NLEF Stage 1 Screening Appraisal – AQMA Broxburn

No.	NLEF Stage 1 Screening Appraisal Question	Appraisal Response
1	What is the name of the declared AQMA(s)?	AQMA Broxburn
2	What pollutants are the AQMA(s) declared for?	NO_2 & PM_{10} Annual Mean
3	What are the main sources of air pollution, or other factors, contributing to the declaration of the AQMA? *(If the main source is not transport–related no further screening is required).*	NO_2 source = transport PM_{10} source = primarily background levels
4	Are the declared AQMA(s) (and therefore area(s) of exceedance) restricted in nature geographically to a small area for which a Low Emission Zone (LEZ) would not be appropriate or proportionate (e.g. single streets, road junctions, small town centre)?	Yes
5	Do the monitored concentrations within the AQMA(s) meet the air quality objective(s)? If yes, for how long has compliance been achieved? If not, what are the extent of the exceedances?	Yes. For NO_2 the air quality objectives have been met since 2013, when the NO_2 annual mean has been consistently below the objective of 40µg/m^3. For PM_{10} the AQ objectives have been met since 2012 when the level has been consistently below the objective of 18µg/m^3
6	What is the current trend for pollutant concentrations within the AQMA(s) (state the trend for each pollutant declared)?	NO_2 – the measured figures reveal that annual mean levels have been relatively stable around 27 to 30 µg/m^3, since 2014. PM_{10}- these have been gradually falling from 15 a few years ago to 13 and 14 µg/m^3 in the last couple of years.

No.	NLEF Stage 1 Screening Appraisal Question	Appraisal Response
7	Are there any major planned developments which could impact air quality within or surrounding the AQMA(s)?	There are no major planned developments within the AQMA, however there are several large housing developments planned in the surrounding area, as part of the Local Development Plan. These are likely to directly impact traffic levels within the AQMA.
8	What are the current trends for vehicle movements within the AQMA and surrounding areas?	An ANPR based traffic survey was carried out in association with formulating the Local Development Plan. Microsimulations were run using this data to examine current traffic flows. The timing of permitted housing developments is economically led. This has created significant uncertainty as to the order in which anticipated developments will arise and therefore multiple potential scenarios for build-out and associated effects on traffic. Development in the absence of anticipated west-north and north – east distributor roads will increase traffic at junction within the AQMA. Foreseeable scenarios continue to change.
9	Provide evidence showing how the AQAP (and associated plans, programmes and strategies) will deliver significant improvements towards achieving the air quality objective(s) in as short a timescale as possible?	Ongoing integration of Air Quality with other Council Policies Ongoing liaison with the Scottish Government regarding national air quality policy Ongoing review in conjunction with LDP and individual planning applications: • Broxburn Distributor Road Phasing – North to West • Broxburn Distributor Road Phasing – North to East • Broxburn Distributor Road Phasing – Winchburgh M9 junction (anticipated 2021 onwards)

No.	NLEF Stage 1 Screening Appraisal Question	Appraisal Response
9.	Cont.	• Winchburgh rail station Medium-term (anticipated 2022) • ECO Stars Scheme for HGV and Bus Operators implemented • New and ongoing provision of Electric Vehicle charging points to tie in with Climate change • Ongoing encouragement of Private and Public Operators to pursue cleaner vehicles and abatement • Idling Campaign and Enforcement of Idling with Fixed Penalty Notices. Policy in place • Provision of Air Quality Information is ongoing via the council's web site and www.scottishairquality.scot • Ongoing provision of travel information and Promotion of alternative modes (cycling + walking) and Infrastructure • Ongoing encouragement of developers to put cycle paths walkways in to link up together to encourage walking, cyclingOngoing home energy efficiency adviceSupplementary Planning Guidance for Air Quality in place. • Install Electric Vehicle Charging Park Places ongoing. Progress is continuing on the installation of electric vehicle charging points – a new supply is being installed at the Strathbrock Partnership Centre which will provide power to 1x rapid charger and 1x fast charger (both dual outlet so capacity for 4 vehicles at any time). We are also planning to significantly add to capacity in the area in 2021/22 by including a mix of publicly available charge points at the new Winchburgh Schools Development.

Table 2.4 – NLEF Stage 1 Screening Appraisal – AQMA Linlithgow

No.	NLEF Stage 1 Screening Appraisal Question	Appraisal Response
1	What is the name of the declared AQMA(s)?	AQMA Linlithgow
2	What pollutants are the AQMA(s) declared for?	NO_2 & PM_{10} Annual Mean
3	What are the main sources of air pollution, or other factors, contributing to the declaration of the AQMA? *(If the main source is not transport–related no further screening is required).*	NO_2 source = transport PM_{10} source = primarily background levels
4	Are the declared AQMA(s) (and therefore area(s) of exceedance) restricted in nature geographically to a small area for which a Low Emission Zone (LEZ) would not be appropriate or proportionate (e.g. single streets, road junctions, small town centre)?	Yes
5	Do the monitored concentrations within the AQMA(s) meet the air quality objective(s)? If yes, for how long has compliance been achieved? If not, what are the extent of the exceedances?	Yes. For NO_2 the air quality objectives have been met since 2014, when the NO2 annual mean has been consistently below the objective of 40µg/m^3. For PM_{10} the AQ objectives have been met since 2015 when the level has been consistently below the objective of 18µg/m^3.
6	What is the current trend for pollutant concentrations within the AQMA(s) (state the trend for each pollutant declared)?	For NO_2, the levels have been stable between 28-31 µg/m^3 for the past 3 years. For PM_{10}, the levels have been between 9 and 12 µg/m^3 for the past 3 years, so well within the limit.

No.	NLEF Stage 1 Screening Appraisal Question	Appraisal Response
7	Are there any major planned developments which could impact air quality within or surrounding the AQMA(s)?	A number of currently unused sites have been allocated for housing in the 2018 Local Development Plan, the largest of which is on Edinburgh Road, east of the town centre. Due to the town layout, all housing development is likely to have an effect on traffic levels through Linlithgow High Street. The AQMA boundary closely follows the boundary of the existing settlement, plus LDP allocated development sites.
8	What are the current trends for vehicle movements within the AQMA and surrounding areas?	An ANPR based traffic survey was carried out in in association with formulating the Local Development Plan. Microsimulations were run using this data to examine current and potential future traffic flows. The timing of permitted housing developments is economically led, but all peripheral development will affect traffic in Linlithgow High Street.

No.	NLEF Stage 1 Screening Appraisal Question	Appraisal Response
9	Provide evidence showing how the AQAP (and associated plans, programmes and strategies) will deliver significant improvements towards achieving the air quality objective(s) in as short a timescale as possible?	The Air Quality Action Plan for Linlithgow is in draft and has not been completed. Of the measures currently listed, a number relate to investigation viability or feasibility for measures. Highlights of the draft AQAP are: • Supplementary Planning Guidance for Air Quality in place. • Edinburgh Road to Manse Road Link Road will be considered as part of the LDP process • Investigate West Access Slip Road at M9 Junction 3 is being investigated as part of the LDP process • NLEF stage one screening for Low Emission Zone on High Street completed • Idling Campaign and Enforcement of Idling with Fixed Penalty Notices. Policy in place • Local Bus/Fleet Improvements. Market led competition has seen considerable improvement in bus service frequency and emissions standards of the vehicles used. • ECO Stars Scheme for HGV and Bus Operators implemented • Install Electric Vehicle Charging Park Places ongoing • Active Travel and Cycling Infrastructure provision is ongoing • Provision of Air Quality Information is ongoing via the council's web site and www.scottishairquality.scot

Table 2.5 – NLEF Stage 1 Screening Appraisal – AQMA Newton

No.	NLEF Stage 1 Screening Appraisal Question	Appraisal Response
1	What is the name of the declared AQMA(s)?	AQMA Newton
2	What pollutants are the AQMA(s) declared for?	PM_{10}
3	What are the main sources of air pollution, or other factors, contributing to the declaration of the AQMA? *(If the main source is not transport–related no further screening is required).*	Background and domestic fuel consumption, therefore **no further screening is required.**
4	Are the declared AQMA(s) (and therefore area(s) of exceedance) restricted in nature geographically to a small area for which a Low Emission Zone (LEZ) would not be appropriate or proportionate (e.g. single streets, road junctions, small town centre)?	**No further screening required**
5	Do the monitored concentrations within the AQMA(s) meet the air quality objective(s)? If yes, for how long has compliance been achieved? If not, what are the extent of the exceedances?	**No further screening required**
6	What is the current trend for pollutant concentrations within the AQMA(s) (state the trend for each pollutant declared)?	**No further screening required**
7	Are there any major planned developments which could impact air quality within or surrounding the AQMA(s)?	**No further screening required**

No.	NLEF Stage 1 Screening Appraisal Question	Appraisal Response
8	What are the current trends for vehicle movements within the AQMA and surrounding areas?	**No further screening required**
9	Provide evidence showing how the AQAP (and associated plans, programmes and strategies) will deliver significant improvements towards achieving the air quality objective(s) in as short a timescale as possible?	**No further screening required**

2.4 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 2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.4. Key completed measures are:

- Introduction of Air Quality Supplementary Planning Guidance which sets out how we will consider new development and its potential air quality impacts;
- Progress with the EcoStars fleet management scheme within West Lothian made during 2019, and hopefully implemented during 2020;
- Further uptake and use of electric vehicles within the Council's fleet management scheme.

Progress on the following measures has been slower than expected due to:

- Progress with the detailed assessments to work towards revocation of our Air Quality Management Areas. This has been down to staff workload pressures both in Environmental Health and in other departments that provide information to Environmental Health to allow us to begin the revocation process.

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

- Work towards detailed assessments for the two draft AQAP and one finalised AQAP, so that we can start to consider revocation of the designated air quality management areas. Any such assessments will consider land allocated for development in the local development plan and will set out whether any future exceedances of pollutants at relevant receptors are likely.
- We may also look to carry out upgrades and improvements on our continuous monitoring stations where required;
- Potentially carry out traffic modelling to assist with the revocation of our AQMA's

Table 2.6 – 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	Bikeability 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 – official launch during 2020	2019	Fulfils action plan measure 8 of draft Newton AQAP

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
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

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 2019. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at http://www.scottishairquality.scot/

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.

In addition, an AQ Mesh pod continuous monitor was installed at East Calder Primary School following concerns raised about traffic around the school. As noted, only partial data is available for this site.

3.1.2 Non-Automatic Monitoring Sites

West Lothian Council undertook non- automatic (passive) monitoring of NO_2 at 23 sites during 2019. 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 (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. As the table shows, the annual mean objective was comfortably met at all three continuous monitoring sites. There were no indications of a large, upward trend in

the results obtained – they were generally comparable to last years figures, with only a slight increase at Linlithgow of 2µg/m^3 and Newton of 1µg/m^3.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. There was one exceedence of this objective in 2019, at the continuous monitoring station in Linlithgow. Therefore well within statutory limits.

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. There were no exceedences of the NO_2 annual mean found in the diffusion tube monitoring.

3.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 18µg/m^3. It is shown that all three continuous monitoring sites have remained well within the 18µg/m^3 limit. The results compare favourably with what we have found over the past couple of years and there are no signs of a large upward trend of PM_{10} levels within West Lothian.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than seven times per year. At Linlithgow during 2019, there were five exceedances of this 24hour mean, four at Broxburn and two at Newton. These are still well within the permitted seven exceedances per year.

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 since 2017 when we started monitoring $PM_{2.5}$ at two of our sites (monitoring at Newton for $PM_{2.5}$ only started in 2019), with the air quality objective of 10µg/m^3. It is noted that the levels at both Linlithgow and Broxburn have crept up over the last three years, however, these sites are still showing levels within the objective of 10µg/m^3. At Newton, $PM_{2.5}$ was measured for the first time during 2019 and the annualised result was 9.4µg/m^3 – which is within the permitted objective.

3.2.4 Sulphur Dioxide (SO_2)

SO_2 was monitored by an AQmesh monitor during 2019. It was moved to a school gate in East Calder for 2019, after concerns were raised there about traffic and exposure. The SO_2 results for last year all show negative numbers. This was chased up with the equipment supplier on more than one occasion and it appears that these erroneous readings are due to a faulty sensor. The equipment was removed in October 2019 for repair and was not reutnred to the site during 2019.

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

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

4. New Local Developments

4.1 Road Traffic Sources

There were no new road traffic sources in 2019.

4.2 Other Transport Sources

There were no new other transport sources in 2019.

4.2 Industrial Sources

There were the following new industrial sources during 2019;

- 1140/FUL/19 – Almondvale South, Livingston – New petrol station

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. There were also the following larger scale developments;

- 1121/FUL/19 – West Park Farm, Linlithgow – Installation of a biomass boiler and fuel store
- 0113/FUL/19 – Erection of a combined heat and power plant

4.5 New Developments with Fugitive or Uncontrolled Sources

There were no new fugitive or uncontrolled sources in 2019.

5. Planning Applications

West Lothian has been subject to the following planning applications in 2019 which may affect air quality;

1. 0340/P/19 – Planning permission in principle for residential development on the outskirts of Linlithgow (within AQMA). Still to be decided;
2. 0657/FUL/19 – Gaviside Farm, Livingston – 502 homes proposed & 8 commercial units – AQ assessment carried out – still to be decided

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

All long-term air quality objective levels were met in 2019 at all monitoring sites. There was one short term exceedance of NO_2 hourly mean at Linlithgow. In addition, there were exceedances of the PM_{10} 24hr mean – five at Linlithgow, four at Broxburn and two at Newton. Although there were these short term 24 hour exceedances, there would need to be seven 24 hour short term exceedances at one site alone, in the year, for the air quality objective to not be met.

As in 2018, 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 consider 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 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), as and when they arise. These will be considered in line with our newly adopted Air Quality Supplementary Planning Guidance.

6.3 Proposed Actions

Monitoring data for 2019 has not highlighted the need for any additional monitoring to take place. There are no new exceedances of the objectives for any pollutant measured. Monitoring has also shown that there are no changes required to the existing three AQMAs at this time. As per last years report, the draft Linlithgow and Newton Air Quality Action Plans and the Broxburn Air Quality Action Plan may be superseded by Detailed Assessments. Any such assessments will consider land

allocated for development in the local development plan and will set out whether any future exceedances of pollutants at relevant receptors are likely. West Lothian Council will aim to work towards assessing whether the current AQMA's should be revoked with the use of detailed assessments and further modelling as required.

West Lothian Council will continue to apply to the Scottish Government for funding to assist with monitoring equipment 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	2.32
CM2	Broxburn CNC	Roadside	308314	672231	NO_2;PM_{10}; $PM_{2.5}$	Y	FIDAS; NOX Analyser	3.5	2.20	2.36
CM3	Newton CNC	Roadside	309258	677728	NO_2; PM_{10}: $PM_{2.5}$	Y	FDMS; NOX Analyser	1.8	1.92	2.41

(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	NO2	N	2	2	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?
DT8	Whitburn	Roadside	294687	665030	NO2	N	2	3	N
DT9	Armadale Cross	Roadside	293842	668588	NO2	N	2	2	N
DT10	Bathgate South Bridge St.	Roadside	297401	668772	NO2	N	2	3	N
DT11	Bathgate Steelyard	Roadside	297467	668734	NO2	N	12	4	N
DT12	Bathgate King Street	Roadside	297570	668586	NO2	N	5	4	N
DT13	Bathgate High Street	Urban Background	297656	669298	NO2	N	3	10	N
DT14	Linlithgow Romon	Roadside	300426	677172	NO2	Y	4	1.36	Y
DT15	Linlithgow H ST NW	Roadside	299930	677070	NO2	Y	2	1.4	N
DT16	Linlithgow H ST SW	Roadside	299911	677052	NO2	Y	2	2.9	N
DT17	Linlithgow H ST NE	Roadside	300479	677148	NO2	Y	3.4	2	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?
DT18	Linlithgow H ST SE	Roadside	300485	677125	NO2	Y	7.5	2.2	N
DT19	Linlithgow H ST N	Roadside	300398	677132	NO2	Y	Façade	2.4	N
DT20	Linlithgow H ST S	Roadside	300405	677118	NO2	Y	Façade	3	N
DT21	Main Street, East Calder	Roadside	308641	667912	NO2	N	2.0	1.8	N
DT22	Butchers, Winchburgh	Roadside	308957	675025	NO2	N	Façade	1.8	N
DT23	Main Street, Winchburgh	Roadside	308205	676988	NO2	N	Façade	1.5	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 2019 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2015	2016	2017	2018	2019
CM1	Roadside	Automatic	N/A	100	33	38	31	28	30
CM2	Roadside	Automatic	N/A	92	27	32	30	27	27
CM3	Roadside	Automatic	N/A	95	21	23$_{(17.6)(3)}$	19	17	18

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 2019 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2015	2016	2017	2018	2019
CM1	Roadside	Automatic	N/A	100	0	0	0	0	**1**
CM2	Roadside	Automatic	N/A	92	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 2019 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2015	2016	2017	2018	2019
CM1	Roadside	N/A	100	15	14	9	11	12
CM2	Roadside	N/A	100	15	15	14	13	14
CM3	Roadside	N/A	92	16	15	**15(17) (3)**	14	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 2019 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2015	2016	2017	2018	2019
CM1	Roadside	N/A	100	**2**	0	0	0	**5**
CM2	Roadside	N/A	100	**2**	0	0	0	**4**
CM3	Roadside	N/A	92	0	0	0	**1**	**2**

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 2019 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2015	2016	2017	2018	2019
CM1	Roadside	N/A	100	n/a	n/a	5	6	7
CM2	Roadside	N/A	100	n/a	n/a	6	7	8
CM3	Roadside	18	18	n/a	n/a	n/a	n/a	10(9.4) (3)

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.

Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 – NO_2 Monthly Diffusion Tube Results for 2019

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT1	39.6	25	28.9	30.1	13.2	23.6	21.1	21.9	24.3	27.6	44.4	23.1	**26.9**	**20.7**
DT2	39.1	32.1	22.9	39.4	29.9	27.5	23.9	23	13.7	32.2	46.5	30.8	**30.1**	**23.2**
DT3	42.2	29.2	23.6	30.6	20.1	23.2	20.5	22	27.6	30.9	46.1	29.6	**28.8**	**22.2**
DT4	50	35.4	29.9	48.5	36.3	35.7	28.5	28.9	35.7	39	55.8	No data	**35.3**	**27.2**
DT5	37.3	26.1	21.1	36.2	21.6	29.4	24.7	21.6	26.4	29.2	50.6	28.8	**29.4**	**22.6**
DT6	24.6	14.5	11.9	14.8	11.6	11	9.7	10.2	6.9	16.8	31.5	17.4	**15.1**	**11.6**
DT7	31.9	23	23.3	37.1	19.9	25.8	22.7	20	24.2	29.4	41.9	24.4	**27**	**20.8**
DT8	38.9	25.5	24.7	29.9	No data	30.8	26.3	25.5	23.2	34.1	51.8	38	**30.9**	**23.8**
DT9	46.8	36.4	30.2	24.2	28.2	26.6	23.2	29.3	28	30.7	42.1	57.3	**31.4**	**24.2**
DT10	34.7	No data	20.7	22.5	17.1	18.1	16.9	16.8	15.2	24.3	37.5	15.9	**21.8**	**16.8**
DT11	45.8	32.5	30.7	33.8	27	26.8	25.5	26.3	29.9	37	49.3	38	**34.5**	**26.6**
DT12	48.6	34	26.5	40.1	16.6	27.7	27.8	26.2	28.9	30.8	39.6	57.3	**34.2**	**26.3**

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)
DT13	22.2	13.1	11.1	9.9	7.5	8.4	7.8	7.8	5.1	12.4	25.8	15.9	**12.3**	**9.5**
DT14	48	37.5	30.1	30.2	26.6	28	22.9	26.1	26.5	33.5	45.7	38.5	**32.8**	**25.3**
DT15	41.2	27.1	26.9	36.4	31.6	26.4	22.5	No data	25.8	33.3	51.2	29.7	**32**	**24.6**
DT16	50.1	38.7	34.8	41.8	33.3	30.9	17.5	No data	31.4	34.1	50.1	41.8	**38.2**	**29.4**
DT17	41.7	27.5	26.5	20.7	21	17.7	16.5	19.2	21.4	26.9	41.3	27.7	**25.9**	**26.7**
DT18	41.9	26.7	25.8	31.1	26.1	22.3	19.9	21.8	22.8	No data	44.9	31.4	**28.6**	**22**
DT19	38.6	26.8	25.8	36.7	27.5	23.7	19.9	21.2	23.9	30.6	47	27.3	**29.1**	**22.4**
DT20	44.9	37.4	31.5	33.1	25.7	25.9	24.3	26.5	28.3	32.3	43.8	36.8	**32.6**	**25.1**
DT21	No data	No data	No data	17	16	16.4	14.5	13.7	16.2	21	35.6	No data	**16.7**	**12.9**
DT22	No data	No data	No data	18.2	16.7	16.8	16	17.2	18.1	22.5	36.1	28.1	**21.1**	**16.2**
DT23	No data	No data	No data	24.1	15.9	No data	13.7	19.2	17.3	22.7	39	No data	**16.9**	**13.0**

(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 11% and 50%. Average = 31% = 0.31+1=1.3. Inverse of this is 1/1.3 = 0.77
Therefore we have a Bias adjustment factor of 0.77 for 2019.

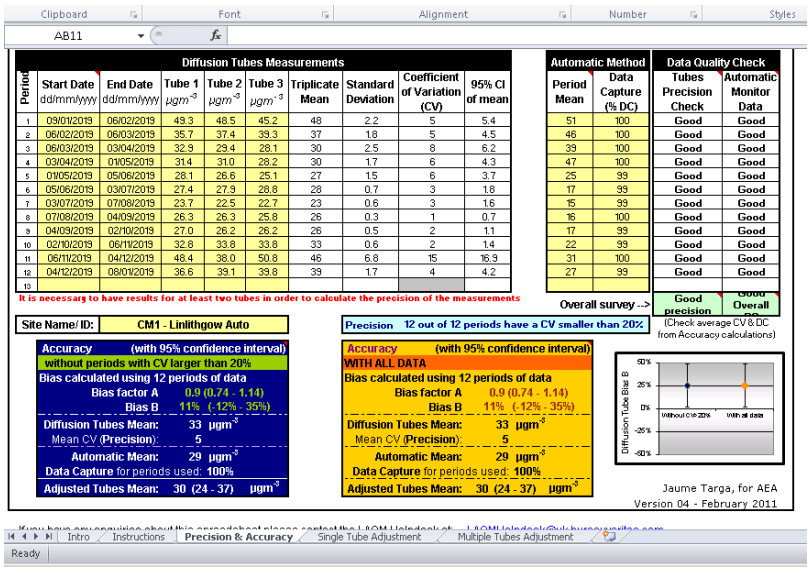
AQ Mesh Data - 2019

Date	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	SO_2 (µg/m3)	NO_2 (µg/m^3)
January 2019	34.9	16.7	-1.19	18.9
February 2019	43.2	18.7	-1.5	21
March 2019	21.3	8.1	-2.24	24.5
April 2019	33.1	13.1	-1.74	27.8
May 2019	8.9	3.8	-1.2	19.4
June 2019	9.3	3.9	-1.11	17.7
July 2019	9.5	4.3	-0.39	13.4
August 2019	11.6	4.3	-1.02	15.7
September 2019	11.2	3.3	-0.14	3.6

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

Bias adjustment factors

Linlithgow AQ Station



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	09/01/2019	06/02/2019	49.3	48.5	45.2	48	2.2	5	5.4
2	06/02/2019	06/03/2019	35.7	37.4	33.3	37	1.8	5	4.5
3	06/03/2019	03/04/2019	32.9	29.4	28.1	30	2.5	8	6.2
4	03/04/2019	01/05/2019	31.4	31.0	28.2	30	1.7	6	4.3
5	01/05/2019	05/06/2019	28.1	26.6	25.1	27	1.5	6	3.7
6	05/06/2019	03/07/2019	27.4	27.9	28.8	28	0.7	3	1.8
7	03/07/2019	07/08/2019	23.7	22.5	22.7	23	0.6	3	1.6
8	07/08/2019	04/09/2019	26.3	26.3	25.8	26	0.3	1	0.7
9	04/09/2019	02/10/2019	27.0	26.2	26.2	26	0.5	2	1.1
10	02/10/2019	06/11/2019	32.8	33.8	33.8	33	0.6	2	1.4
11	06/11/2019	04/12/2019	48.4	38.0	50.8	46	6.8	15	16.9
12	04/12/2019	08/01/2019	36.6	39.1	39.8	39	1.7	4	4.2
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
51	100	Good	Good
46	100	Good	Good
39	100	Good	Good
47	100	Good	Good
25	99	Good	Good
17	99	Good	Good
15	99	Good	Good
16	100	Good	Good
17	99	Good	Good
22	99	Good	Good
31	100	Good	Good
27	99	Good	Good
		Good precision	Good Overall

Overall survey -->

Site Name/ ID: CM1 - Linlithgow Auto

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

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 12 periods of data
Bias factor A 0.9 (0.74 - 1.14)
Bias B 11% (-12% - 35%)
Diffusion Tubes Mean: 33 µgm-3
Mean CV (Precision): 5
Automatic Mean: 29 µgm-3
Data Capture for periods used: 100%
Adjusted Tubes Mean: 30 (24 - 37) µgm-3

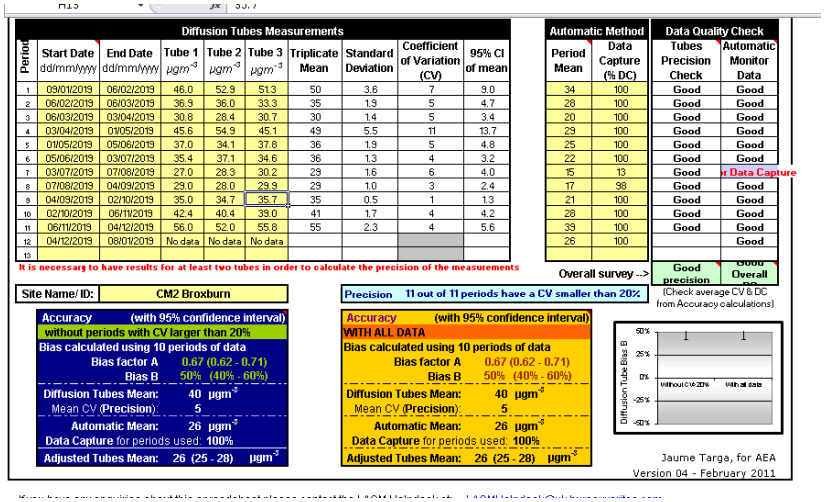
Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A 0.9 (0.74 - 1.14)
Bias B 11% (-12% - 35%)
Diffusion Tubes Mean: 33 µgm-3
Mean CV (Precision): 5
Automatic Mean: 29 µgm-3
Data Capture for periods used: 100%
Adjusted Tubes Mean: 30 (24 - 37) µgm-3

Jaume Targa, for AEA
Version 04 - February 2011

Intro | Instructions | Precision & Accuracy | Single Tube Adjustment | Multiple Tubes Adjustment

Ready

Broxburn AQ Station



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	09/01/2019	06/02/2019	46.0	52.9	51.3	50	3.6	7	9.0
2	06/02/2019	06/03/2019	36.9	36.0	33.3	35	1.9	5	4.7
3	06/03/2019	03/04/2019	30.8	28.4	30.7	30	1.4	5	3.4
4	03/04/2019	01/05/2019	45.6	54.9	45.1	49	5.5	11	13.7
5	01/05/2019	05/06/2019	37.0	34.1	37.8	36	1.9	5	4.8
6	05/06/2019	03/07/2019	35.4	37.1	34.6	36	1.3	4	3.2
7	03/07/2019	07/08/2019	27.0	28.3	30.2	29	1.6	6	4.0
8	07/08/2019	04/09/2019	29.0	28.0	29.3	29	1.0	3	2.4
9	04/09/2019	02/10/2019	35.0	34.7	35.7	35	0.5	1	1.3
10	02/10/2019	06/11/2019	42.4	40.4	39.0	41	1.7	4	4.2
11	06/11/2019	04/12/2019	56.0	52.0	55.8	55	2.3	4	5.6
12	04/12/2019	08/01/2019	No data	No data	No data				
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
34	100	Good	Good
28	100	Good	Good
20	100	Good	Good
29	100	Good	Good
25	100	Good	Good
22	100	Good	Good
15	13	Good	Data Capture
17	98	Good	Good
21	100	Good	Good
28	100	Good	Good
39	100	Good	Good
26	100		Good
		Good precision	Good Overall

Overall survey -->

Site Name/ ID: CM2 Broxburn

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

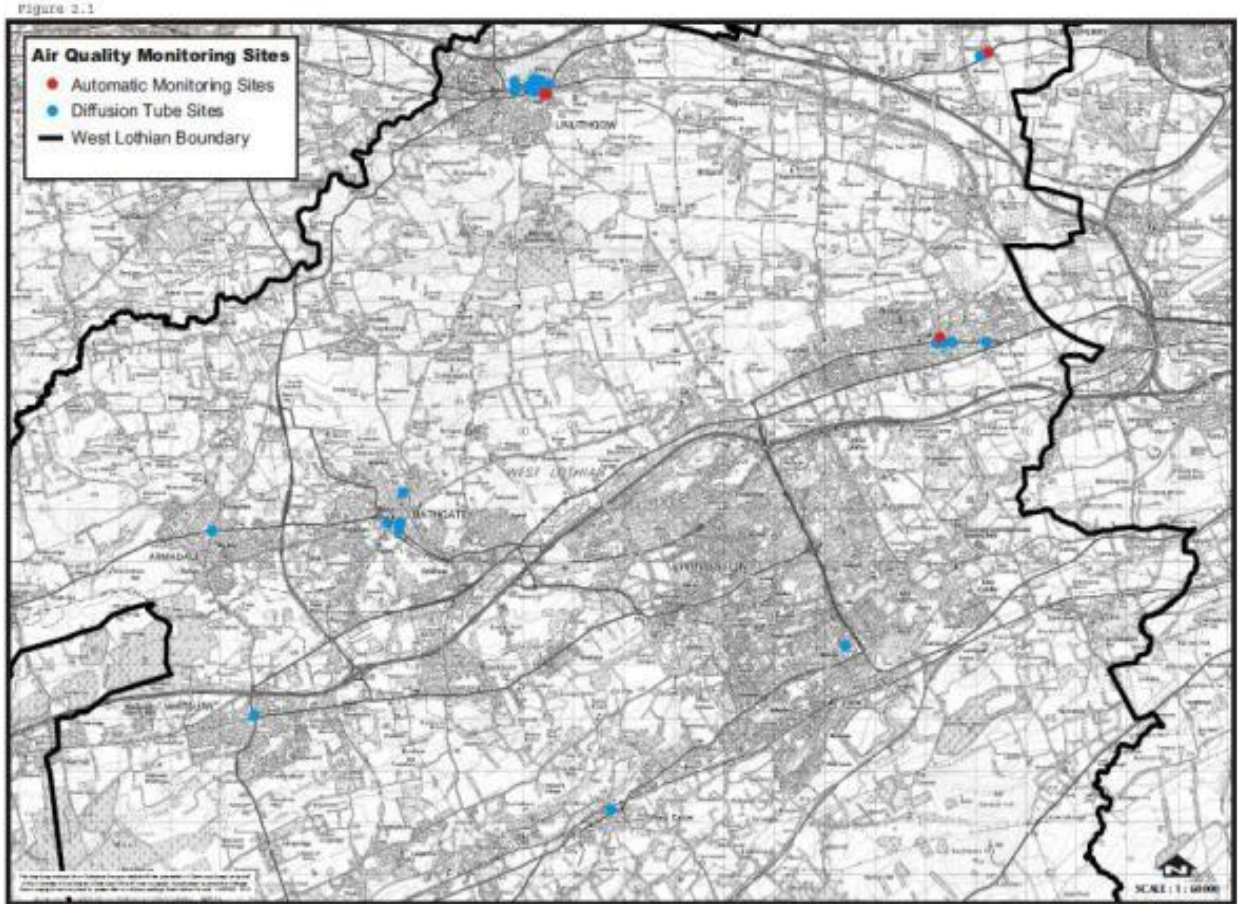
(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 10 periods of data
Bias factor A 0.67 (0.62 - 0.71)
Bias B 50% (40% - 60%)
Diffusion Tubes Mean: 40 µgm-3
Mean CV (Precision): 5
Automatic Mean: 26 µgm-3
Data Capture for periods used: 100%
Adjusted Tubes Mean: 26 (25 - 28) µgm-3

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 10 periods of data
Bias factor A 0.67 (0.62 - 0.71)
Bias B 50% (40% - 60%)
Diffusion Tubes Mean: 40 µgm-3
Mean CV (Precision): 5
Automatic Mean: 26 µgm-3
Data Capture for periods used: 100%
Adjusted Tubes Mean: 26 (25 - 28) µgm-3

Jaume Targa, for AEA
Version 04 - February 2011

Figure 2.1



Air Pollution Report

1st January to 31st December 2019

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	-	360	364
Number Days Moderate	-	1	-	3	1
Number Days High	-	0	-	2	0
Number Days Very High	-	0	-	0	0
Max Daily Mean	171	98	346	85	39
Annual Max	506	206	981	691	128
Annual Mean	31	30	77	12	7
98th Percentile of daily mean	-	-	-	43	-
90th Percentile of daily mean	-	-	-	22	-

99.8th Percentile of hourly mean	-	137	-	-	-
98th Percentile of hourly mean	164	102	350	46	27
95th Percentile of hourly mean	111	80	243	32	20
50th Percentile of hourly mean	19	22	52	9	5
% Annual data capture	**99.63%**	**99.51%**	**99.51%**	**99.82%**	**99.85%**

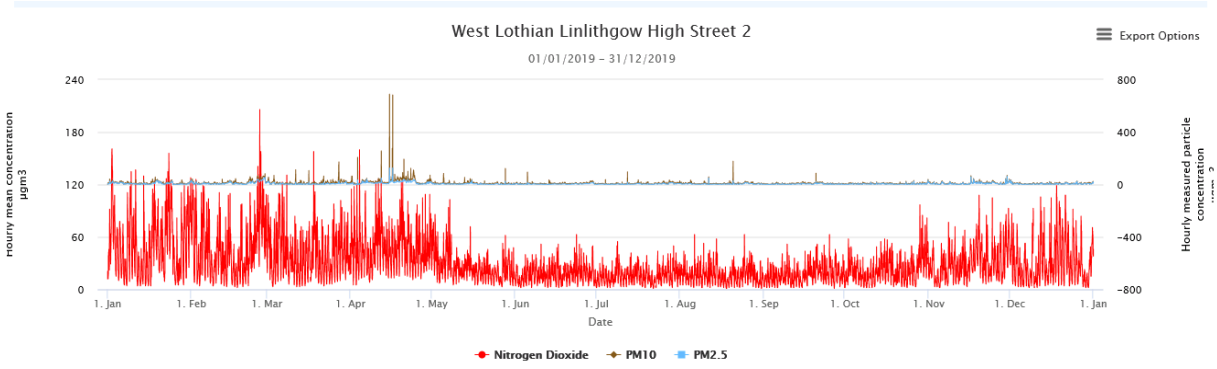
Instruments: PM_{10}: FIDAS

PM_{25}: 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	5	5
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	1	1
Nitrogen dioxide	Annual Mean > 40 microgrammes per metre cubed	0	-



Air Pollution Report

1st January to 31st December 2019

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	-	339	-	361	362
Number Days Moderate	-	0	-	3	3
Number Days High	-	0	-	1	0
Number Days Very High	-	0	-	0	0
Max Daily Mean	144	67	288	85	39
Annual Max	435	116	769	135	116
Annual Mean	33	27	77	14	8
98th Percentile of daily mean	-	-	-	42	-
90th Percentile of daily mean	-	-	-	26	-
99.8th Percentile of hourly mean	-	94	-	-	-
98th Percentile of hourly mean	172	76	333	51	32
95th Percentile of hourly mean	114	65	235	38	24
50th Percentile of hourly mean	18	22	50	11	6
% Annual data capture	**92.32%**	**92.31%**	**92.31%**	**99.87%**	**99.87%**

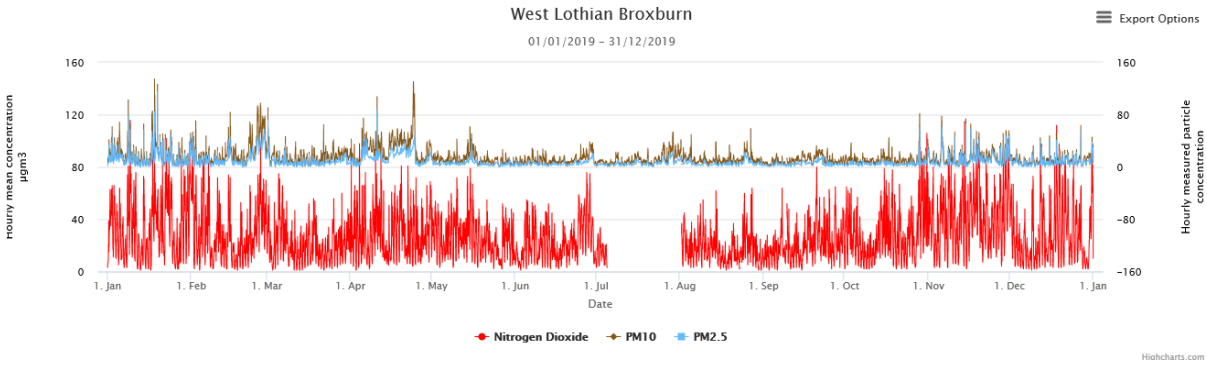
Instruments: PM_{10}: FIDAS

PM_{25}: 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	4	4
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 2019

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	PM_{25} µg/m³
Number Days Low	-	356	-	338	64
Number Days Moderate	-	0	-	2	0
Number Days High	-	0	-	0	0
Number Days Very High	-	0	-	0	0
Max Daily Mean	54	63	141	70	23
Annual Max	183	118	381	479	152
Annual Mean	12	19	37	14	10
98th Percentile of daily mean	-	-	-	38	-
90th Percentile of daily mean	-	-	-	23	-

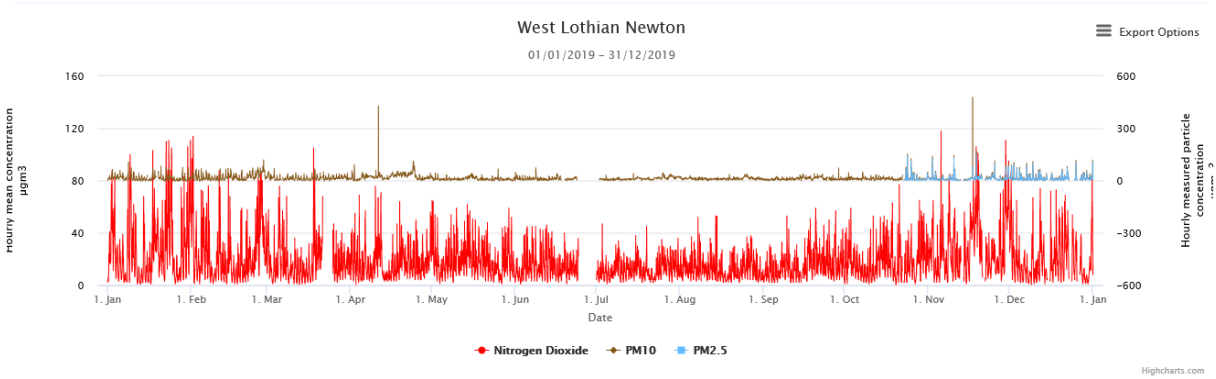
99.8th Percentile of hourly mean	-	100	-	-	-
98th Percentile of hourly mean	59	66	153	52	54
95th Percentile of hourly mean	41	51	112	39	34
50th Percentile of hourly mean	8	14	27	10	6
% Annual data capture	**95.56%**	**95.11%**	**95.11%**	**92.02%**	**17.56%**

Instruments: PM_{10}: FDMS TEOM (no correction) (01/01/2019 to 22/10/2019), FIDAS (22/10/2019 to 31/12/2019)
PM_{25}: FIDAS

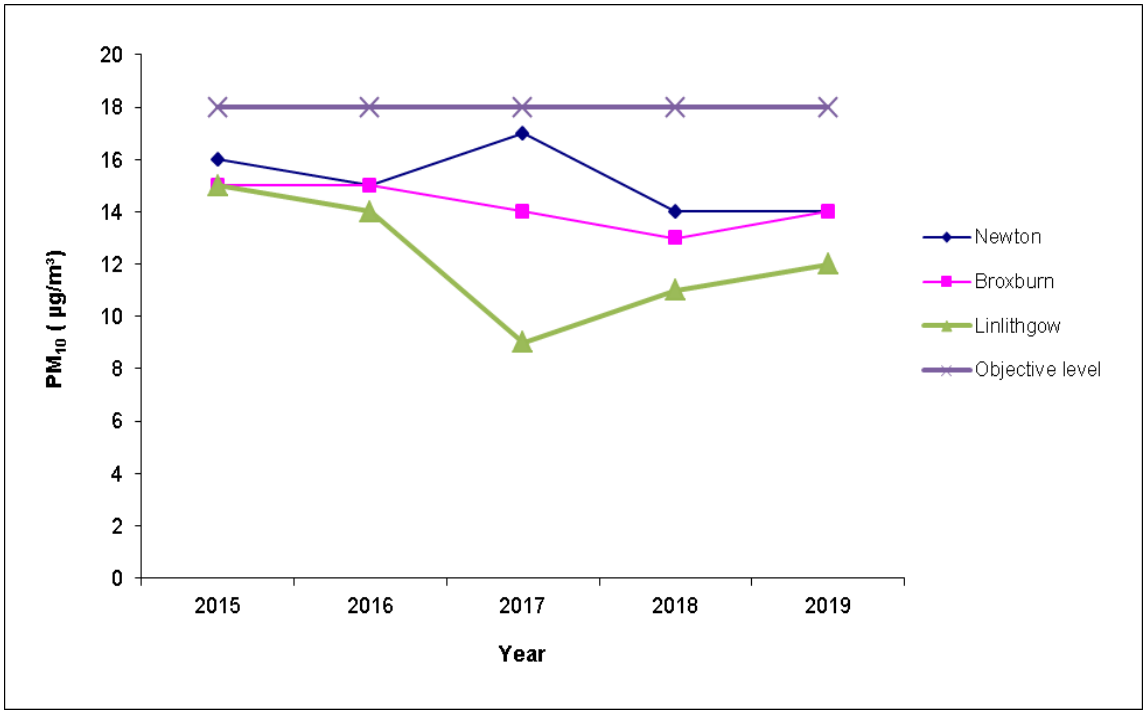
All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

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

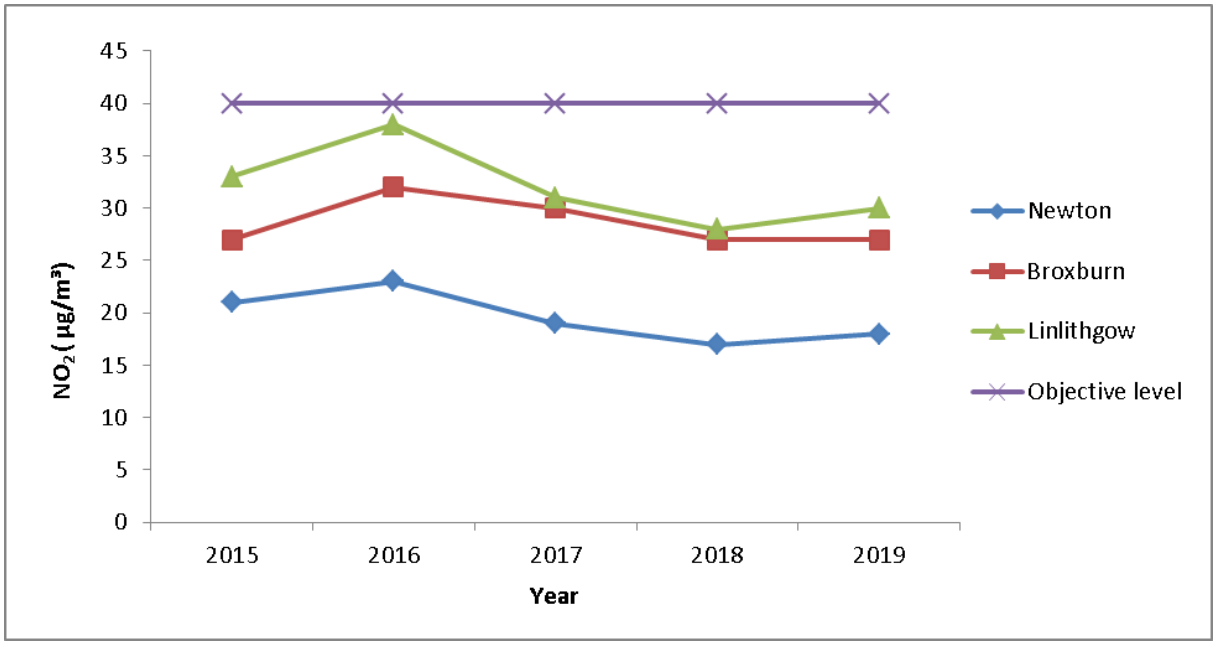
Pollutant	Air Quality Standards (Scotland) Regulations 2010	Exceedances	Days
PM10 particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	2	2
PM10 particulate matter (Hourly measured)	Annual mean > 18 microgrammes per metre cubed	0	-
PM2.5 particulate matter (Hourly measured)	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	-



PM10 Annual Trend Data Graph



NO2 Annual Trend Data 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 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, **Am**, for the calendar year for these sites.
Work out the period means, **Pm**, for the period of interest, in this case November and December 2019.
Calculate the ratio, **R**, of the annual mean to the period mean (**Am/Pm**) for each of the sites.
Calculate the average of these ratios, **Ra**. This is then the annualisation factor.
Multiply the measured period mean concentration **M** by this annualisation factor **Ra** to give the estimate of the annual mean for 2019. For $PM_{2.5}$ at Newton we only had data capture of 18%, annualisation was calculated as below:

Annualisation for $PM_{2.5}$ Newton

	Annual mean(Am)	Period mean(Pm)	Ratio(Am/Pm)
Lin Site A	7	7	1
Brox Site B	8	9	0.888

Ratio 0.944

Annualisation for Newton ($PM_{2.5}$): 0.944 x 10 (Newton Period mean) = 9.4

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:
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/

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

National Low Emissions Framework Stage 1 Screening – Guidance Note

NLEF Screening Flowchart

NLEF Questions for APR Template Update