Annual Progress Report (APR)

2016 Air Quality Annual Progress Report (APR) for
South Lanarkshire Council

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

Date (June, 2016)

Local Authority Officer	Bronah Byrne
Department	Fleet and Environmental Services
Address	Ground Floor, Montrose House, 154 Montrose Crescent, Hamilton, ML3 6LB
Telephone	01698 455373
E-mail	bronah.byrne@southlanarkshire.gsx.gov.uk
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Executive Summary: Air Quality in Our Area

Air Quality in South Lanarkshire

Air Quality is generally very good in most parts of South Lanarkshire; there are however some locations where local sources of pollution contribute to poor air quality and action is required. South Lanarkshire Council is committed to working towards achieving compliance with health based air quality objectives. The main sources of air pollutants in South Lanarkshire are road traffic emissions; and to a lesser extent, emission from industrial processes and commercial/domestic fuel combustion. The main pollutants of concern are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$).

This Annual Progress Report provides a summary of the 2015 measurements conducted across South Lanarkshire; it also considers any new potential sources of air pollution and if any further action is required to protect or improve air quality within our area.

No annual mean Nitrogen Dioxide (NO_2) concentrations in excess of the 40 $\mu g.m^{-3}$ objective were measured at the automatic monitoring sites in South Lanarkshire during 2015. The last five years' measurements indicate a downward trend in measured NO_2 concentrations at most of the automatic sites, with the exception of Uddingston where no distinct overall trend is apparent.

Exceedances of the NO_2 annual mean objective were measured at diffusion tube sites at Duke Street, Hamilton and at the nearby new site at 24 Low Patrick Street, Hamilton. A Detailed Assessment of NO_2 and PM_{10} conducted previously at this location based on 2013 measurements concluded that there were no exceedances of the 40 $\mu g.m^{-3}$ objective occurring at 1st floor height. Measured NO_2 concentrations at this location have reduced since 2013, it's therefore unlikely that the 40 $\mu g.m^{-3}$ objective is being exceeded where relevant exposure is present. No further action is required based on the 2015 diffusion tube measurements.

The PM_{10} annual mean objective was exceeded at one automatic site (Rutherglen) in 2015. Measured concentrations across the six PM_{10} analysers sites in South Lanarkshire ranged from 11 to 18 $\mu g.m^{-3}$.

Measured PM_{10} concentration were lower in 2015 when compared to 2014 at the Rutherglen and Whirlies site. Measured concentrations increased slightly at the

Hamilton analyser. There are no obvious trends at all sites, showing no overall change in PM_{10} concentrations year on year.

There were no measured exceedances of the permitted number of NO_2 hourly or PM_{10} daily short-term air quality objective during 2015.

South Lanarkshire Council measured $PM_{2.5}$ concentrations in Lanark and Uddingston during 2015. No exceedances of the Scottish $PM_{2.5}$ annual mean objective were measured.

The potential air quality impacts of new local developments have been considered including:

- The Cathkin Relief Road.
- Concrete batching plant at Ballochmill Road, Rutherglen.
- Mixed-use residential-led development located at Mavor Avenue in East Kilbride.

Based on the available information submitted with the planning applications for these developments; South Lanarkshire Council has not identified any locations where there may be a risk of the air quality objectives being exceeded. No additional air quality assessment is recommended at this time

Actions to Improve Air Quality

South Lanarkshire Council has taken forward a number of measures during the current reporting year of 2015 in pursuit of improving local air quality.

South Lanarkshire Council currently has a draft AQAP for the Whirlies AQMA; this plan has not been finalised/published as of yet. The Council has recently declared two further AQMAs in Rutherglen and Lanark. The Council has taken the decision to consolidate the Whirlies AQAP into a Council wide AQAP which will include all three AQMAs. Although the Whirlies draft AQAP has not been published, the Council has continued to make progress on introduction of all of the measures in the current draft plan. The Council expects to include a full update of the progress of the full council AQAP in next year's LAQM annual progress report (APR).

Local Priorities and Challenges

South Lanarkshire Council will now consolidate the Whirlies AQAP into a Council wide AQAP which will include the Rutherglen and Lanark AQMAs. The Council expects to include a full update of the progress of the full council AQAP in next year's LAQM annual progress report (APR).

As part of the Action Plan development, further dispersion modelling and source apportionment will be conducted for the Lanark and Rutherglen AQMA's during 2016.

How to Get Involved

The public can obtain further information relating to air quality in South Lanarkshire on the Council Website.

More information about air quality in Scotland and actions that members of the public can take to help reduce air pollution is available at http://www.scottishairquality.co.uk/

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1. Local Air Quality Management

This report provides an overview of air quality in South Lanarkshire during 2015. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

Table 1.1 – Summary of Air Quality Objectives in Scotland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m^3	Annual mean	31.12.2010
Particulate Matter ($PM_{2.5}$)	10 µg/m^3	Annual mean	31.12.2020
Sulphur dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 µg/m^3	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m^3	Running 8-Hour mean	31.12.2003
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 South Lanarkshire 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 http://www.southlanarkshire.gov.uk/downloads/download/815/air_quality_management_areas and at http://www.scottishairquality.co.uk/laqm/aqma?id=386

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
Air Quality Management Area, Whirlies Roundabout, East Kilbride	PM_{10} annual mean	East Kilbride	An area around the Whirlies Roundabout, East Kilbride between the A725, A749 and B783, and extending along all the roads leading in to the roundabout.	Action Plan is still in draft format
Air Quality Management Order No.2 (Rutherglen)	PM_{10} annual mean	Rutherglen	An Area encompassing all areas of Rutherglen is designated.	Draft action plan is being prepared this year
Air Quality Management Order No.3 (Lanark)	NO_2 annual mean	Lanark	An Area encompassing the whole of the town of Lanark is designated.	Draft action plan is being prepared this year

2.2 Progress and Impact of Measures to address Air Quality in South Lanarkshire Council

South Lanarkshire Council has taken forward a number of measures during the current reporting year of 2015 in pursuit of improving local air quality.

South Lanarkshire Council currently has a draft AQAP for the Whirlies AQMA; this plan has not been finalised/published as of yet. The Council has recently declared two further AQMAs in Rutherglen and Lanark. The Council has taken the decision to consolidate the Whirlies AQAP into a Council wide AQAP which will include all three AQMAs. The Council feel that this will allow them to update the action plan following the most recent LAQM guidance and the Clean Air for Scotland (CAFS) strategy. Although the Whirlies draft AQAP has not been published, the Council has continued to make progress on introduction of all of the measures in the current draft plan. The

Council expects to include a full update of the progress of the full council AQAP in next year's LAQM annual progress report (APR).

The Council has already had their 1st steering group meeting for the new AQMAs in Rutherglen and Lanark. In attendance at this meeting were:

- Colin McFarlane – Development Officer, SLC
- Lesley Hinshelwood – Sustainable Development Officer,SLC
- Andrei Martucci – Engineering Officer (Traffic and Transportation),SLC
- Maud McIntyre – Planning Officer,SLC
- Jennifer Simpson – Principal Consultant (Ricardo Energy and Environment)
- Bronah Byrne – Team Leader, Environmental Health, SLC
- David Duffy - Divisional Environmental Services, SLC
- Chris Connor- LAQM, SEPA

Other South Lanarkshire Council strategies and polices relating to air quality management are:

- Air Quality Strategy 2014 to 2019 Consultative Draft (March 2014)
- Supplementary Guidance 1: Sustainable Development and Climate Change

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.

South Lanarkshire Local Authority undertook automatic (continuous) monitoring at 6 sites during 2015. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at http://www.scottishairquality.co.uk/data/, and results discussed below are from data freely available on this website.

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

3.1.2 Non-Automatic Monitoring Sites

South Lanarkshire Council undertook non- automatic (passive) monitoring of NO_2 at 39 diffusion tube sites during 2015.

A review of the council's diffusion tube sites was conducted in September 2015. The outcome of the review was that diffusion tube monitoring was discontinued at 22 sites and 24 new sites became operational. Table A.2 in Appendix A shows the details of both the old and the new sites.

Maps showing the location of the monitoring sites are provided in Appendix X (submitted separately). 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 NO2 annual mean concentrations for the past 5 years with the air quality objective of 40 $\mu g.m^{-3}$

No annual mean NO2 concentrations in excess of the 40 µg.m^{-3} were measured at the automatic sites in South Lanarkshire during 2015. Measured annual mean concentrations across the six sites ranged from 21 to 37 µg.m^{-3}.

NO2 annual mean concentrations were lower than measured in 2014 at Rutherglen, Whirlies, Lanark and Hamilton. At Uddingston the measured annual mean was equal to the 2014 measurement. The last five years' measurements do indicate a downward trend at most sites, with the exception of Uddingston where no distinct overall trend was seen.

The Raith Interchange site ceased operation in 2015 as there are major roadworks underway while the interchange is being upgraded. The site has now been relocated to another site close to the Raith interchange and became operational again in June 2016.

A new automatic site became operational in Cambuslang on the 15th October 2015.

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B. Data capture was low at most diffusion tube sites due to the review of tube locations in September 2015 meaning sites either ceased or commenced measurements in the middle of the calendar year. Short term measurements were adjusted to annual means where required; details of the adjustments applied are presented in Appendix C. Adjustments were not applied where annual data capture was lower than 25% (3 months).

NO_2 annual mean concentrations in excess of the 40 µg.m^{-3} objective were measured at four diffusion tube sites during 2014. Where an exceedence was measured at a monitoring site which was not representative of public exposure, a distance correction calculation was used to estimate the annual mean concentration at the nearest receptor. Following distance correction, exceedances of the NO_2 annual mean objective were measured at:

- Duke Street , Hamilton (Old Site ID 8). Where the NO_2 annual mean at the nearest location of relevant public exposure was estimated at 44.2 µg.m^{-3} (annual data capture 42%)
- 24 Low Patrick Street, Hamilton (New site ID 26). Where the NO_2 annual mean at at the nearest public exposure was estimated at 40.8 µg.m^{-3} (annual

data capture 25%). This site is very close to the Duke Street , Hamilton (Old Site ID 8).

The low data capture at these sites introduces uncertainty into the estimated annual mean concentrations, the results should be considered in this context. It should also be considered that relevant exposure at these locations is at first floor height where NO_2 concentrations are likely to be lower than at ground level. The Detailed Assessment of NO_2 and PM_{10} in this area of Hamilton[1], which was based on the 2013 annual mean NO_2 measurements, concluded that there were no exceedances of the 40 $\mu g.m^{-3}$ objective occurring at 1st floor height. Measured NO_2 concentrations at this location have reduced since 2013, it's therefore unlikely that the 40 $\mu g.m^{-3}$ objective is being exceeded where relevant exposure is present. No further action is required based on the 2015 diffusion tube measurements.

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 200$\mu g/m^3$, not to be exceeded more than 18 times per year. No site exceeded the the air quality objective for 1-hour, with only East Kilbride Whirlies showing 5 exceedances. No annual means NO_2 concentrations greater than 60 $\mu g.m^{-3}$ were measured across the diffusion tube network during 2015, indicating it's unlikely that the 1-hour mean objective was exceeded at any of these monitoring sites.

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 5 years with the 18 $\mu g.m^{-3}$ Scottish objective.

The PM_{10} annual mean objective was exceeded at one automatic site (Rutherglen) in 2015. Measured concentrations across the six PM_{10} analysers sites in South Lanarkshire ranged from 11 to 18 $\mu g.m^{-3}$.

Measured PM_{10} concentrations were lower in 2015 when compared to 2014 at the Rutherglen and Whirlies site. Measured concentrations increased slightly at the Hamilton analyser. There are no obvious trends at all sites, showing no overall change in PM_{10} concentrations year on year.

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 50 $\mu g.m^{-3}$,

[1] Ricardo-AEA (2014) Detailed Assessment of Air Quality 2013 Quarry Street/Duke Street junction, Hamilton Town Centre; South Lanarkshire; Report for South Lanarkshire Council Ricardo-AEA/R/ED56927001-HamDA Issue Number 2 Date 09/06/2014

not to be exceeded more than 7 times per year. Although daily means for PM_{10} > 50 $\mu g.m^{-3}$ were measured at all sites, there were not more than 7 occurrences at any site.

South Lanarkshire Local Authority has two declared AQMAs for PM_{10}, one is an established AQMA at East Kilbride Whirlies, whilst a new AQMA was declared for Rutherglen within 2015, the area emcompassed is stated as being: "*An Area encompassing all areas of Rutherglen is designated in relation to breaches and likely breaches of the PM_{10} 24 hour and annual mean air quality objectives.*" As noted above, the automatic monitoring site within this AQMA in Rutherglen exceeded the annual mean for PM_{10}, whereas the annual concentration at the Whirlies AQMA was below the objective. Details of the council's declared AQMAs can be found at: http://www.scottishairquality.co.uk/laqm/aqma?id=386. An Air quality Action Plan is currently being developed for the Rutherglen AQMA.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.7 in Appendix A compares the available ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations with the air quality objective of 10 $\mu g.m^{-3}$. Annual mean concentrations of 5 and 6 $\mu g.m^{-3}$ were measured at the Lanark and Uddingston sites respectively, therefore no exceedances of the annual mean objective were measured during 2015. Neither site is within an AQMA for particulate matter.

3.2.4 Sulphur Dioxide (SO_2)

South Lanarkshire Council do not currently measure SO_2 concentrations.

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

South Lanarkshire Council do not currently measure any other pollutants.

4. New Local Developments

4.1 Road Traffic Sources

One proposed road with significantly changed traffic flows has been identified within the South Lanarkshire Council boundary. This is the construction of the Cathkin Relief Road comprising a single carriageway road, which links the western end of Cathkin Bypass with Fernhill Road.

An environmental impact assessment (EIA) was required for the development (AECOM 2015). The air quality impact assessment used dispersion modelling to assess the impact of changes to road traffic emissions when the proposed road becomes operational.

The assessment concluded that the Cathkin Relief Road would cause a change of medium magnitude at a number of receptors within the study area, and changes of a small to minor magnitude at the majority of receptors. An increase in pollutants was predicted at some locations and a decrease at others. Overall the impact of the development was described as neutral; and the effect of such an impact described as not significant.

Closer examination of the dispersion modelling results air quality chapter and model results indicates that predicted NO_2 and PM_{10} annual mean concentrations for the '2017 with development' scenario will be well below the respective annual mean objectives for each pollutant. Further assessment and monitoring is being undertaken to determine the air quality impact over a wider area.

4.2 Other Transport Sources

No other transport sources have been identified that require screening or consideration at this time.

4.3 Industrial Sources

One new Concrete batching plant at Ballochmill Road, Rutherglen. This activity will be regulated as a PPC installation and the operator will be permitted by SEPA with a PPC Part B Permit. The operator will therefore be required to demonstrate to SEPA that the new plant meets the requirements of Best Available Techniques (BAT) as explained in the DEFRA Process Guidance.

Assuming that all dust control measures comply with BAT it is unlikely that there is a risk of the PM_{10} objectives being exceeded at nearby receptor locations. No further screening of fugitive emissions has been conducted at this time.

4.4 Commercial and Domestic Sources

No new commercial or domestic combustion sources were identified in 2015 that require screening or detailed assessment for LAQM purposes.

4.5 New Developments with Fugitive or Uncontrolled Sources

No new developments with potential for fugitive or uncontrolled sources, other than the concrete batching plant described in Section 4.3 have been identified during 2015.

5. Planning Applications

A planning application for a major mixed-use residential-led development located at Mavor Avenue in East Kilbride is currently registered. The proposals comprise of 354 residential units, 8.41Ha of employment area and 1.56Ha of retail area. An air quality impact for the proposed development was prepared in December 2015 (WSP 2015). The air quality impact assessment considered both the construction and operational phases.

For the construction phase the impact assessment identified that the proposed development is considered to be a High Risk Site for dust soiling effects and particulate matter effects. Through good site practice, the production and implementation of a Construction Logistics Plan, and the implementation of suitable mitigation measures, these effects would be reduced; the residual effects are therefore considered to be negligible.

For the operational phase, a quantitative assessment of the potential impacts from development generated traffic on concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been assessed for a number of existing properties using dispersion modelling. The assessment concluded that the Proposed Development would cause a negligible change in concentrations. Predicted concentrations for future residents are below the relevant objectives, and therefore air quality is judged to be acceptable for future residents, without the need for mitigation.

South Lanarkshire Council will continue to measure NO_2 and PM_{10} concentrations within the Whirlies AQMA to monitor the impact of any additional traffic at this location.

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

No annual mean NO_2 concentrations in excess of the 40 µg.m^{-3} objective were measured at the automatic monitoring sites in South Lanarkshire during 2015. The last five years' measurements indicate a downward trend in measured NO_2 concentrations at most of the automatic sites, with the exception of Uddingston where no distinct overall trend is apparent.

Following distance correction, exceedances of the NO_2 annual mean objective were measured at Duke Street, Hamilton and at the nearby new diffusion tube site at 24 Low Patrick Street, Hamilton. A Detailed Assessment of NO_2 and PM_{10} conducted previously at this location, based on 2013 measurements, concluded that there were no exceedances of the 40 µg.m^{-3} objective occurring at 1st floor height. Measured NO_2 concentrations at this location have reduced since 2013, it's therefore unlikely that the 40 µg.m^{-3} objective is being exceeded where relevant exposure is present. No further action is required based on the 2015 diffusion tube measurements.

The PM_{10} annual mean objective was exceeded at one automatic site (Rutherglen) in 2015. Measured concentrations across the six PM_{10} analysers sites in South Lanarkshire ranged from 11 to 18 µg.m^{-3}.

Measured PM_{10} concentrations were lower in 2015 when compared to 2014 at the Rutherglen and Whirlies site. Measured concentrations increased slightly at the Hamilton analyser. There are no obvious trends at all sites, showing no overall change in PM_{10} concentrations year on year.

There were no measured exceedances of the permitted number of NO_2 hourly or PM_{10} daily short-term air quality objective during 2015.

South Lanarkshire Council measured $PM_{2.5}$ concentrations in Lanark and Uddingston during 2015. No exceedances of the Scottish $PM_{2.5}$ annual mean objective were measured.

The 2015 monitoring data has not identified any new exceedances of the air quality objectives at locations out with the existing AQMAs in South Lanarkshire. Data capture was however low at all NO_2 diffusion tube sites during 2015 due to many tube sites being relocated in August/September. Low data capture has meant that

annual mean concentrations have been estimated at most locations, which adds uncertainty to the 2015 measurements. It has also meant that annual mean concentrations were not reported at all sites this year.

6.2 Conclusions relating to New Local Developments

The potential air quality impacts of new local developments have been considered including:

- The Cathkin Relief Road.
- Concrete batching plant at Ballochmill Road, Rutherglen.
- Mixed-use residential-led development located at Mavor Avenue in East Kilbride.

Based on the available information submitted with the planning applications for these developments; South Lanarkshire Council has not identified any locations where there may be a risk of the air quality objectives being exceeded. No additional air quality assessment is recommended at this time.

6.3 Proposed Actions

A clearer picture of annual mean concentrations at the new diffusion tube monitoring sites will be available in the 2017 LAQM Annual Progress Report when good annual data capture should provide better measurements.

No amendments are currently recommended for any of the existing AQMAs in South Lanarkshire.

South Lanarkshire Council will now consolidate the Whirlies AQAP into a Council wide AQAP which will include the Rutherglen and Lanark AQMAs. The Council expects to include a full update of the progress of the full council AQAP in next year's LAQM annual progress report (APR).

As part of the Action Plan development, further dispersion modelling and source apportionment will be conducted for the Lanark and Rutherglen AQMA's during 2016

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)
SL04	Rutherglen	Roadside	261128	661703	NO_2, PM_{10}	No	Chemiluminescense FDMS	60 m	1 m	2 m
EK0	Whirlies	Roadside	264370	655670	NO_2, PM_{10}	Yes	Chemiluminescense FDMS	10 m	0.5 m	2 m
SL03	Lanark	Roadside	288426	643704	NO_2, PM_{10}, $PM_{2.5}$	No	Chemiluminescense FIDAS	2 m	0.5 m	1 m
SL05	Hamilton	Roadside	272310	655276	NO_2, PM_{10}	No	Chemiluminescense FDMS	2 m	8 m	1.8 m
SL06	Uddingston	Roadside	269663	660304	NO_2, PM_{10}, $PM_{2.5}$	No	Chemiluminescense FIDAS	2 m	2 m	1.5 m
SL07	Cambuslang	Roadside	269657	660305	NO_2, PM_{10}	No	Chemiluminescense FDMS	10 m	0.5 m	2 m

(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

New Site ID	Old Site ID (pre Sep 2015)	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)	Co-located with a Continuous Analyser?
1	13	3 London Street, Larkhall	Roadside	276085	651570	NO_2	No	2.3 m	1 m	No
2	New site	4 Machan Road, Larkhall	Roadside	276382	650781	NO_2	No	3.2 m	3.8 m	No
3	14	4 Kirkton Street, Carluke	Roadside	284538	650572	NO_2	No	2 m	0.8 m	No
4	New site	4 St Leonard Street, Lanark	Roadside	288178	643663	NO_2	Yes	0.7 m	4.4 m	No
5	New site	32 Friars Lane, Lanark	Roadside	287858	643456	NO_2	Yes	4.8 m	3.6 m	No
6	18	4 Broomgate, Lanark	Roadside	288122	643685	NO_2	Yes	2 m	0.2 m	No
7	3	14 Scott Hill, East Kilbride	Roadside	264416	655372	NO_2	No	7.2 m	3 m	No
8	35	Whirlies (1), East Kilbride	Roadside	264370	655670	NO_2	Yes	6.8 m	1.9 m	No
9	36	Whirlies (2), East Kilbride	Roadside	264370	655670	NO_2	Yes	6.8 m	1.9 m	No
10	37	Whirlies (3), East Kilbride	Roadside	264370	655670	NO_2	Yes	6.8 m	1.9 m	No
11	New site	West Mains/East Mains, East Kilbride	Roadside	263170	654849	NO_2	No	3.6 m	2.3 m	No
12	28	20 Farmeloan Road, Rutherglen	Roadside	261662	661789	NO_2	Yes	0.6 m	2.1 m	No
13	New site	254 Main Street, Rutherglen	Roadside	261653	661663	NO_2	Yes	3.8 m	0.1 m	No
14	31	12 Mill Street, Rutherglen	Roadside	261302	660734	NO_2	Yes	5.1 m	2.6 m	No
15	New site	25 Burnside Road, Rutherglen	Roadside	262484	659416	NO_2	No	9 m	0.3 m	No
16	New site	1 Rodger Drive (opp), Rutherglen	Roadside	261789	660949	NO_2	Yes	18.5 m	0.7 m	No
17	New site	262 Cambuslang Road, Cambuslang	Roadside	263086	661296	NO_2	No	0.3 m	2.3 m	No
18	New site	281 Stonelaw Road, Cambuslang	Roadside	262160	660435	NO_2	Yes	1.6 m	1.4 m	No
19	New site	Blackswell Lane, Hamilton	Roadside	272714	655436	NO_2	No	6.9 m	2.7 m	No
20	New site	4 Annsfield Road, Hamilton	Roadside	271578	653346	NO_2	No	13.6 m	3.8 m	No
21	New site	109 Caird Street, Hamilton	Roadside	271670	656346	NO_2	No	5.7 m	3.1 m	No
22	New site	79 Union Street, Hamilton	Roadside	271852	655320	NO_2	No	1.2 m	3.3 m	No

New Site ID	Old Site ID (pre Sep 2015)	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)	Co-located with a Continuous Analyser?
23	New site	134 Almada Street, Hamilton	Roadside	271424	655786	NO_2	No	3.7 m	1.4 m	No
24	New site	Almada Street-Muir Street, Hamilton	Roadside	271861	655952	NO_2	No	3.6 m	0.1 m	No
25	New site	Technology Avenue, Hamilton	Roadside	268444	656101	NO_2	No	30 m	2.4 m	No
26	New site	24 Low Patrick Street, Hamilton	Roadside	272617	655215	NO_2	No	3.3 m	5.6 m	No
27	9	10 Gateside Street, Hamilton	Roadside	272265	655067	NO_2	No	2.2 m	0.8 m	No
28	12	28 Low Quarry gardens, Hamilton	Roadside	271949	654957	NO_2	No	11.9 m	0.6 m	No
29	21	5 Wordsworth Way, Bothwell	Roadside	270924	659109	NO_2	No	15.9 m	1.6 m	No
30	New site	93 Main Street, Bothwell	Roadside	270335	658722	NO_2	No	8.9 m	2.3 m	No
31	New site	25 Main Street, Bothwell	Roadside	270536	658508	NO_2	No	3.1 m	3.3 m	No
32	New site	233 Glasgow Road, Blantyre	Roadside	268902	657591	NO_2	No	0.4 m	3.6 m	No
33	New site	283 Glasgow Road, Blantyre	Roadside	268754	657689	NO_2	No	5.2 m	3 m	No
34	New site	1 Hunthill Road, Blantyre	Roadside	268000	656643	NO_2	No	4.4 m	2.3 m	No
35	New site	65 Old Mill Road, Uddingston	Roadside	269699	660517	NO_2	No	3.2 m	1.1 m	No
36	New site	Crofthead Road Park, Uddingston	Roadside	269811	660552	NO_2	No	12.9 m	0.4 m	No
37	23	Burnpark Avenue, Uddingston	Roadside	268944	661474	NO_2	No	22 m	29.2 m	No
38	24	81 Main Street, Uddingston	Roadside	269620	660425	NO_2	No	0.5 m	2.7 m	No
39	22	North British Road, Uddingston	Roadside	270180	660753	NO_2	No	29 m	1.1 m	No
Diffusion Tube Sites discontinued from September 2015										
n/a	1	Civic Centre, East Kilbride	Roadside	263600	654194	NO_2	No	None	4m	No
n/a	2	Kingsway, East Kilbride	Roadside	264378	655383	NO_2	Yes	20 m	8	No
n/a	4	Townhead Street, Strathaven	Roadside	270081	644523	NO_2	No	12m	2m	No
n/a	5	179 Quarry Street, Hamilton	Roadside	272246	655099	NO_2	No	0m	1.5m	No
n/a	6	129 Quarry Street, Hamilton	Roadside	272325	655258	NO_2	No	0.5m	2.5m	No
n/a	7	Cadzow Street, Hamilton	Roadside	272461	655556	NO_2	No	No	4m	No

New Site ID	Old Site ID (pre Sep 2015)	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)	Co-located with a Continuous Analyser?
n/a	8	Duke Street , Hamilton	Roadside	272606	655212	NO_2	No	1m	1.5m	No
n/a	10	Almada Street, Hamilton	Roadside	271460	655778	NO_2	No	0m	3m	No
n/a	11	Bothwell Road , Hamilton	Roadside	271854	655980	NO_2	No	0m	6m	No
n/a	15	Hospitland Drive, Lanark	Background	289035	643842	NO_2	Yes	5m	2m	No
n/a	16	Bannatyne Street, Lanark	Roadside	288475	643675	NO_2	Yes	0m	1m	No
n/a	17	Wellgate, Lanark	Roadside	288173	643651	NO_2	Yes	5m	2m	No
n/a	19	51 High Street, Lanark	Roadside	288238	643675	NO_2	Yes	0m	3m	No
n/a	20	Main Street, Bothwell	Roadside	270574	658508	NO_2	No	2m	2m	No
n/a	25	86 Main Street , Uddingston	Roadside	269571	660654	NO_2	No	0m	3m	No
n/a	26	Clydeford Road, Cambuslang	Roadside	264386	661119	NO_2	No	5m	2m	No
n/a	27	Cambuslang Road, Rutherglen	Roadside	263524	661835	NO_2	No	No	2m	No
n/a	29	Stonelaw Road, Rutherglen	Roadside	261688	661174	NO_2	No	21m	2m	No
n/a	30	263 Main Street, Rutherglen	Roadside	261688	661681	NO_2	Yes	0m	2m	No
n/a	32 - 34	Main Street, Rutherglen Co Located	Roadside	261116	661699	NO_2	Yes	10m	2-3m	Yes

(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	Old Site ID (pre Sep 2015)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
						2011	2012	2013	2014	2015
SL04 (Rutherglen)	-	Roadside	Chemiluminescense	92%	92%	37	39	36	**40.6#**	37
EK0 (Whirlies)	-	Roadside	Chemiluminescense	98%	98%	**41**	34#	29*	35	33
Raith (Raith)	-	Roadside	Chemiluminescense	N/A	N/A	**56**	**56**	**51**	**46.3#**	-
SL03 (Lanark)	-	Roadside	Chemiluminescense	86%	86%	30	29	25	22	21
SL05 (Hamilton)	-	Roadside	Chemiluminescense	99%	99%	41*	42$	35	37	35
SL06 (Uddingston)	-	Roadside	Chemiluminescense	96%	96%	24*	31$	27	29	29
SL07 (Cambuslang)	-	Roadside	Chemiluminescense	71%	20%	-	-	-	-	33*
1	13	Roadside	Diffusion tube	50%	50%	27.2	28.0	29.7	23.7	32.3
2	New site	Roadside	Diffusion tube	67%	17%					No result#
3	14	Roadside	Diffusion tube	75%	75%	35.7	33.0	33.2	30.6	36.2
4	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	34.0
5	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	6.6
6	18	Roadside	Diffusion tube	75%	75%	-	34.0	40.3 (38.0)	34.1 (32.1)	38.2
7	3	Roadside	Diffusion tube	75%	75%	17.3	18.0	19.4	14.8	18.5
11	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	21.7
12	28	Roadside	Diffusion tube	50%	50%	32.9	38.0	39.2	32.6	37.2
13	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	28.8
14	31	Roadside	Diffusion tube	75%	75%	-	27.0	29.2	27.3	27.9

15	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	19.6
16	New site	Roadside	Diffusion tube	67%	17%	-	-	-	-	No result#
17	New site	Roadside	Diffusion tube	33%	8%	-	-	-	-	No result#
18	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	27.4
19	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	32.4
20	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	19.8
21	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	26.2
22	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	14.6
23	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	31.6
24	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	31.2
25	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	14.4
26	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	**44.6 (40.8)**
27	9	Roadside	Diffusion tube	75%	75%	-	32.0	34.1	39.5	35.3
28	12	Roadside	Diffusion tube	75%	75%	-	13.0	12.2	12.5	17.8
29	21	Roadside	Diffusion tube	58%	58%	-	18.0	21.5	19.4	20.0
30	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	30.9
31	New site	Roadside	Diffusion tube	33%	8%	-	-	-	-	No result#
32	New site	Roadside	Diffusion tube	67%	17%	-	-	-	-	No result#
33	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	28.8
34	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	24.8
35	New site	Roadside	Diffusion tube	100%	25%	-	-	-	-	18.4
36	New site	Roadside	Diffusion tube	67%	17%	-	-	-	-	No result#
37	23	Roadside	Diffusion tube	50%	50%	25.4	31.0	29.8	26.5	24.0
38	24	Roadside	Diffusion tube	50%	50%	-	29.0	33.3	32.8	31.5
39	22	Roadside	Diffusion tube	50%	50%	25.5	30.0	27.5	24.6	22.1
Diffusion Tube Sites discontinued from September 2015										
n/a	1	Roadside	Diffusion tube	67%	50%	19.2	21.0	19.8	16.9	17.7

n/a	2	Roadside	Diffusion tube	67%	50%	48.6	**50** (37.6)	**41.9** (24.9)	**41.6** (31.9)	**54.4** (37.2)
n/a	4	Roadside	Diffusion tube	44%	33%	23.4	26.0	25.0	24.0	**40.9** (29)
n/a	5	Roadside	Diffusion tube	67%	50%	-	31.0	25.5	25.7#	26.2
n/a	6	Roadside	Diffusion tube	67%	50%	-	**46 (45)**	36.6	25.9	38.5
n/a	7	Roadside	Diffusion tube	56%	42%	27.5	28.0	26.3	24.4	30.9
n/a	8	Roadside	Diffusion tube	56%	42%	-	**50 (47.1)**	**51.3 (48.0)**	**48.5 (44.8)**	**47.5 (44.2)**
n/a	10	Roadside	Diffusion tube	67%	50%	-	36.0	41.7	27.4	31.3
n/a	11	Roadside	Diffusion tube	56%	42%	-	23.0	25.5	25.9	25.6
n/a	15	Background	Diffusion tube	67%	50%	16.3	15.0	9.2	11.2	8.8
n/a	16	Roadside	Diffusion tube	56%	42%	38.7	**42 (42)**	**41.0**	32.8	35.6
n/a	17	Roadside	Diffusion tube	67%	50%	19.8	21.0	21.1	16.8	18.7
n/a	19	Roadside	Diffusion tube	67%	50%	-	22.0	27.6	26.2	28.2
n/a	20	Roadside	Diffusion tube	67%	50%	-	29.0	29.0	24.7	28.9
n/a	25	Roadside	Diffusion tube	56%	42%	-	23.0	25.9	24.8	31.9
n/a	26	Roadside	Diffusion tube	56%	42%	27.2	31.0	18.8	16.2	18.4
n/a	27	Roadside	Diffusion tube	56%	42%	21.0	29.0	25.9	23.3	25.1
n/a	29	Roadside	Diffusion tube	67%	50%	21.0	25.0	23.2	20.2	22.3
n/a	30	Roadside	Diffusion tube	67%	50%	-	36.0	31.8	29.9	36.5

Notes: Exceedences of the NO_2 annual mean objective of 40µg/m3 are shown in **bold**.

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

Where annual data capture is less than 25% an annual mean has not been calculated.

(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.

Distance corrected NO_2 annual mean concentrations are presented in brackets. Where an exceedence is measured at a monitoring site which is not representative of public exposure, the procedure specified in paragraphs 7.77 to 7.79 of LAQM.TG16 has been used to estimate the concentration at the nearest receptor

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 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2011	2012	2013	2014	2015
SL04 (Rutherglen)	Roadside	Chemiluminescense	92%	92%	0	1	1	0	0
EK0 (Whirlies)	Roadside	Chemiluminescense	98%	98%	12	21	5	7	5
Raith (Raith)	Roadside	Chemiluminescense	N/A	N/A	0	4	1	1	-
SL03 (Lanark)	Roadside	Chemiluminescense	86%	86%	0	0	0	0	0
SL05 (Hamilton)	Roadside	Chemiluminescense	99%	99%	1	0	0	0	0
SL06 (Uddingston)	Roadside	Chemiluminescense	96%	96%	0	1	0	0	0
SL07 (Cambuslang)	Roadside	Chemiluminescense	71%	20%	-	-	-	-	-

Notes: Exceedences 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 2015 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
SL04 (Rutherglen)	Roadside	93%	93%	**21**	**18**	**19**	**20#**	**18**
EK0 (Whirlies)	Roadside	91%	91%	16	13	14	**18**	16
Raith (Raith)	Roadside	N/A	N/A	**26**	**26**	**21#**	**22***	N/A
SL03 (Lanark)	Roadside	97%	72%	-	-	-	-	15#
SL05 (Hamilton)	Roadside	93%	93%	-	-	13*	16	17
SL06 (Uddingston)	Roadside	99%	80%	-	-	-	-	11
SL07 (Cambuslang)	Roadside	96%	84%	-	-	-	-	16

Notes: Exceedences 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 2015 (%) (2)	PM_{10} 24-Hour Means > 50µg/m³ (3)				
				2011	2012	2013	2014	2015
SL04 (Rutherglen)	Roadside	93%	93%	**13**	5	9	1 (38.8)	5
EK0 (Whirlies)	Roadside	91%	91%	2	4	0	2	4
Raith (Raith)	Roadside	N/A	N/A	**21**	**16**	3 (48)	1 (47)	-
SL03 (Lanark)	Roadside	98%	72%	-	-	-	-	1 (16)
SL05 (Hamilton)	Roadside	93%	93%	-	-	0 (31)	0	3
SL06 (Uddingston)	Roadside	80%	80%	-	-	-	-	2 (18)
SL07 (Cambuslang)	Roadside	84%	84%	-	-	-	-	5 (26)

Notes: Exceedences of the PM_{10} 24-hour mean objective (50µg/m³ not to be exceeded more than 7 times/year) are shown in **bold.**

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

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

(3) If the period of valid data is less than 85%, the 90.4th 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 2015 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
SL03 (Lanark)	Roadside	99%	72%	-	-	-	-	5#
SL06 (Uddingston)	Roadside	99%	80%	-	-	-	-	6

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

Short-term to long-term adjustment applied as data capture < 75%

(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 2015

Table B.1 – NO_2 Monthly Diffusion Tube Results for 2015

Site ID	Old site ID (pre Sep 2015)	NO_2 Mean Concentrations (µg/m^3)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Annualised raw mean	Bias Adjusted (1)
1	13	-	83.2	34.6	-	-	46.2	-	-	-	37	24	32	31.0	39.8	32.3
2	New site	-	-	-	-	-	-	-	-	-	-	15	23	19.0	data capture < 25%	-
3	14	54.1	47.7	31.6	42.2	-	35.3	28.4	-	-	57	54	52	54.3	44.7	36.2
4	New site	-	-	-	-	-	-	-	-	-	34	66	44	48.0	42.0	34.0
5	New site	-	-	-	-	-	-	-	-	-	6	13	9	9.3	8.2	6.6
6	18	54.1	38.6	60.8	50.3	-	43.3	41.8	-	-	48	61	27	45.3	47.2	38.2
7	3	29.5	24.4	21.7	24.5	-	17.6	16.6	-	-	19	29	23	23.7	22.8	18.5
8	35	46.8	28.6	33	57.1	-	34.6	48.1	-	-	38	55	37	43.3	n/a co-located with automatic site	
9	36	51.4	34.4	32.6	51	-	34.3	-	-	-	41	68	38	49.0	n/a co-located	
10	37	42.8	-	25.4	-	-	34.2	-	-	-	42	61	35	46.0	n/a co-located	
11	New site	-	-	-	-	-	-	-	-	-	25	43	24	30.7	26.8	21.7
12	28	62.4	38.1	42.1	64.7	-	30.6	34.8	-	-	50	73	39	54.0	45.9	37.2
13	New site	-	-	-	-	-	-	-	-	-	33	56	33	40.7	35.6	28.8
14	31	40	32.9	32.6	40.4	-	26	34	-	-	35	42	28	35.0	44.7	36.2
15	New site	-	-	-	-	-	-	-	-	-	35	30	18	27.7	24.2	19.6
16	New site	-	-	-	-	-	-	-	-	-	-	52	29	40.5	data capture < 25%	-
17	New site	-	-	-	-	-	-	-	-	-	-	44	-	44.0	data capture < 25%	-
18	New site	-	-	-	-	-	-	-	-	-	28	57	31	38.7	33.8	27.4
19	New site	-	-	-	-	-	-	-	-	-	44	40	53	45.7	39.9	32.4

Site ID	Old site ID (pre Sep 2015)	NO_2 Mean Concentrations (µg/m^3)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Annualised raw mean	Bias Adjusted (1)
20	New site	-	-	-	-	-	-	-	-	-	39	26	19	28.0	24.5	19.8
21	New site	-	-	-	-	-	-	-	-	-	42	30	39	37.0	32.4	26.2
22	New site	-	-	-	-	-	-	-	-	-	17	23	22	20.7	18.1	14.6
23	New site	-	-	-	-	-	-	-	-	-	58	31	45	44.7	39.1	31.6
24	New site	-	-	-	-	-	-	-	-	-	70	26	36	44.0	38.5	31.2
25	New site	-	-	-	-	-	-	-	-	-	21	15	25	20.3	17.8	14.4
26	New site	-	-	-	-	-	-	-	-	-	77	43	69	63.0	55.1	44.6
27	9	54.6	26.3	51.8	33	-	54.1	51.8	-	-	50	32	39	40.3	43.6	35.3
28	12	34.1	7.1	16.4	10.1	-	78.3	11.6	-	-	13	12	15	13.3	22.0	17.8
29	21	64.9	10.3	27.9	17.9	-	19.3	22.1	-	-	-	23	-	23.0	24.7	20.0
30	New site	-	-	-	-	-	-	-	-	-	57	46	28	43.7	38.2	30.9
31	New site	-	-	-	-	-	-	-	-	-	-	-	28	28.0	data capture < 25%	-
32	New site	-	-	-	-	-	-	-	-	-	-	114	162	138.0	data capture < 25%	-
33	New site	-	-	-	-	-	-	-	-	-	42	46	34	40.7	35.6	28.8
34	New site	-	-	-	-	-	-	-	-	-	31	41	33	35.0	30.6	24.8
35	New site	-	-	-	-	-	-	-	-	-	29	28	21	26.0	22.7	18.4
36	New site	-	-	-	-	-	-	-	-	-	-	21	23	22.0	data capture < 25%	-
37	23	55.1	12.2		38.5	-	26.4	37.9	-	-	n/a	25	22	23.5	29.6	24.0
38	24	62.6	26.3	42.7	55.3	-	34.3	44.9	-	-	26	76	32	44.7	38.9	31.5
39	22	41.2	10.3	37.1	35.9	-	18.7	28.7	-	-	30	24	20	24.7	27.3	22.1
Diffusion Tube Sites discontinued from September 2015																
n/a	1	25.1	21	22	24.4	-	16.2	21	-	-	-	-	-	21.6	21.8	17.7
n/a	2	85.8	50.3	57.2	85.4	-	51.9	68.1	-	-	-	-	-	66.5	67.1	54.4

Site ID	Old site ID (pre Sep 2015)	NO_2 Mean Concentrations (µg/m^3)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Annualised raw mean	Bias Adjusted (1)
n/a	4	35	70	-	-	-	35.4	48.3	-	-	-	-	-	47.2	50.5	40.9
n/a	5	57.8	14.7	33.6	24	-	28.9	33.1	-	-	-	-	-	32.0	32.4	26.2
n/a	6	85.5	20.5	37.4	32.8	-	47.2	59	-	-	-	-	-	47.1	47.6	38.5
n/a	7	54.6	13.3	28.5	-	-	38.6	52.6	-	-	-	-	-	37.5	38.2	30.9
n/a	8	-	30.1	65.8	96.3	-	12.7	83	-	-	-	-	-	57.6	58.7	47.5
n/a	10	53.2	29.3	40.4	27.7	-	47.2	31.7	-	-	-	-	-	38.3	38.6	31.3
n/a	11	-	33	25.9	31.6	-	30.8	33.8	-	-	-	-	-	31.0	31.6	25.6
n/a	15	17.3	11.7	9.6	8.7	-	7.9	9.3	-	-	-	-	-	10.8	10.9	8.8
n/a	16	59.6	33.6	39.1	41.2	-	-	56.1	-	-	-	-	-	45.9	43.9	35.6
n/a	17	36.7	20.4	24.4	22	-	17.4	15.9	-	-	-	-	-	22.8	23.0	18.7
n/a	19	47.4	27.4	41	31.8	-	33	26	-	-	-	-	-	34.4	34.8	28.2
n/a	20	56.6	16	41	42.3	-	24.9	31	-	-	-	-	-	35.3	35.7	28.9
n/a	25	84.1	12.8	39.6	33.8	-	-	35.8	-	-	-	-	-	41.2	39.4	31.9
n/a	26	36.9	18	19.7	28	-	17.4	-	-	-	-	-	-	24.0	22.7	18.4
n/a	27	45.5	28.1	26.8	36.2	-	27	-	-	-	-	-	-	32.7	31.0	25.1
n/a	29	44.5	17.5	27.3	36.5	-	14.5	23.4	-	-	-	-	-	27.3	27.6	22.3
n/a	30	55.2	33.1	43.5	51.6	-	39.1	44.8	-	-	-	-	-	44.6	45.0	36.5
n/a	32	59.9	34.9	42.8	57.8	-	-	-	-	-	-	-	-	48.9	n/a co-located with automatic site	
n/a	33	59.6	-	44.7	61.5	-	-	-	-	-	-	-	-	55.3	n/a co-located	
n/a	34	58.3	-	37.5	56.9	-	-	-	-	-	-	-	-	50.9	n/a co-located	

(1) See Appendix C for details on bias adjustment

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

QA/QC of automatic monitoring

All of South Lanarkshire Council's automatic monitoring sites are calibrated and audited by Ricardo Energy & Environment whereby monitoring data are managed to the same procedures and standards as AURN sites.

PM Monitoring Adjustment

PM_{10} and $PM_{2.5}$ measurements were made using either TEOM analysers fitted with FDMS units, or FIDAS analysers. All PM measurement data were fully ratified by Ricardo-AEA to AURN standards.

QA/QC of diffusion tube monitoring

All passive diffusion tubes (PDT) for NO_2 measurements were prepared and analysed by Edinburgh Scientific Services. The PDTs were prepared using the 50% triethanolamine (TEA) in water method.

Edinburgh Scientific Services is a UKAS accredited laboratory with documented Quality Assurance/Quality Control (QA/QC) procedures for diffusion tube analysis.

Edinburgh Scientific Services participates in the HSL AIR PT rounds. The percentage (%) of results submitted which were subsequently determined to be satisfactory during the last five rounds in 2014/2015 based upon a z-score of $< \pm 2$ were as follows:

- October – November 2014 100%
- January – February 2015 75%
- April – May 2015 100%
- July – August 2015 100%
- October – November 2015 100%

Over a rolling five round WASP window, it is expected that 95 % of laboratory results should be $\leq \pm 2$. If this percentage is substantially lower than 95 % for a particular laboratory, within this five round window, then one can conclude that the laboratory in

question may have significant systematic sources of bias in their assay. In this case the average percentage over the last five rounds is 95% which is considered satisfactory.

Diffusion Tube Bias Adjustment Factors

A diffusion tube co-location study was conducted during 2015 at the Whirlies Roundabout where NO_2 concentrations are also measured with an automatic analyser.

Co-located diffusion tubes at the Rutherglen automatic monitoring sites was discontinued in July 2015.

A local bias adjustment factors have been calculated for the Whirlies co-location study in 2015. Details of the co-location factor calculations, including the precision checks are presented in Figure C.1. The bias factor from the latest version of the national database[2] is presented in Fig C.2.

Figure C.1: Co-location study 2015 – Whirlies Roundabout East Kilbride

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
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	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1		Jan	46.8	51.4	42.8	47	4.3	9	10.7	39.5	100	Good	Good
2		Feb	28.6	34.4		32	4.1	13	36.8	37.5	93	Good	Good
3		Mar	33.0	32.6	25.4	30	4.3	14	10.6	35.3	100	Good	Good
4		Apr	57.1	51.0		54	4.3	8	38.8	37.9	100	Good	Good
5		May								28.6	100		Good
6		Jun	34.6	34.3	34.2	34	0.2	1	0.5	25.9	100	Good	Good
7		Jul	48.1							24.0	100		Good
8		Aug								22.6	93		Good
9		Sep								32.5	100		Good
10		Oct	38.0	41.0	42.0	40	2.1	5	5.2	46.2	100	Good	Good
11		Nov	55.0	67.0	61.0	61	6.0	10	14.9	36.5	100	Good	Good
12		Dec	37.0	38.0	35.0	37	1.5	4	3.8	29.7	100	Good	Good
13													

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

Overall survey --> Good precision | Good Overall DC

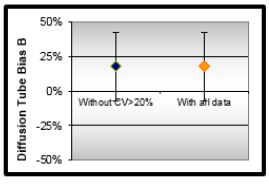
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Whirlies Roundabout East Kilbride

Precision: 8 out of 8 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 8 periods of data	
Bias factor A	0.86 (0.71 - 1.1)
Bias B	16% (-9% - 41%)
Diffusion Tubes Mean:	42 µgm^{-3}
Mean CV (Precision):	8
Automatic Mean:	36 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	36 (30 - 46) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 8 periods of data	
Bias factor A	0.86 (0.71 - 1.1)
Bias B	16% (-9% - 41%)
Diffusion Tubes Mean:	42 µgm^{-3}
Mean CV (Precision):	8
Automatic Mean:	36 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	36 (30 - 46) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

[2] Database_Diffusion_Tube_Bias_Factors_v03_16_Final_v2

Figure C.2: Edinburgh Scientific Services – National average bias adjustment factor 2015

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

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2016
LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List. If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List. If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List. If a year is not shown, we have no data[2]

Step 4: **Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.**

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[5]	Bias Adjustment Factor (A) (Cm/Dm)
Edinburgh Scientific Services	50% TEA in acetone	2015	R	West Lothian Council	12	37	28	29.7%	G	**0.77**
Edinburgh Scientific Services	50% TEA in acetone	2015	R	West Lothian Council	11	39	33	18.4%	G	**0.84**
Edinburgh Scientific Services	50% TEA in acetone	2015	KS	Marylebone Road Intercomparison	12	98	81	21.3%	G	**0.82**
Edinburgh Scientific Services	50% TEA in acetone	2015		**Overall Factor[3] (3 studies)**				**Use**		**0.81**

Discussion of Choice of Factor to Use

The bias adjustment factor of 0.81 from the latest version of the combined national database of adjustment factors was used to adjust the 2015 diffusion tube results. This adjustment factor was considered most appropriate because:

- Although tube precision and automatic data quality was good at the automatic site for the months where data was available; the adjustment factor was based on only 8 months of data available from the Whirlies automatic monitoring site during 2014.
- The national database adjustment factor of 0.81 is more consistent with the bias adjustment factors applied to the South Lanarkshire Council diffusion tube results in recent years.

Short term to long term adjustment of measurements with annual data capture less than 75%

For measurement sites where the annual data capture was less than 75%, the short term period means were adjusted to annual means using the method recommended in TG(16) Box 7.9. Details of the adjustment ratios calculated for various period means relevant to the 2015 South Lanarkshire Council measurements are presented below.

Short term to Long term adjustments applied to 2015 NO_2 diffusion tube results

A Jan to April + Jun to Jul			
Long term site	Annual Mean	Period Mean	Ratio (Am/Pm)
Edinburgh St Leonards	26	25.2	1.023
Eskdalemuir	2	2.0	1.042
Glasgow Townhead	26	27.3	0.966
		Average Ratio	1.010

B Jan toFeb + Jun to Jul			
Long term site	Annual Mean	Period Mean	Ratio (Am/Pm)
Edinburgh St Leonards	26	24.3	1.062
Eskdalemuir	2	1.8	1.190
Glasgow Townhead	26	27.5	0.961
		Average Ratio	1.071

C Jan to March + Jun to Jul			
Long term site	Annual Mean	Period Mean	Ratio (Am/Pm)
Edinburgh St Leonards	26	24.6	1.047
Eskdalemuir	2	2.0	1.042
Glasgow Townhead	26	27.4	0.964
		Average Ratio	1.018

D Feb to Apr + Jun to Jul			
Long term site	Annual Mean	Period Mean	Ratio (Am/Pm)
Edinburgh St Leonards	26	25.6	1.006
Eskdalemuir	2	2.0	1.042
Glasgow Townhead	26	26.2	1.008
		Average Ratio	1.019

E Feb to Mar + Jun			
Long term site	Annual Mean	Period Mean	Ratio (Am/Pm)
Edinburgh St Leonards	26	26.7	0.966
Eskdalemuir	2	2.3	0.893
Glasgow Townhead	26	28.3	0.932
		Average Ratio	0.930

F Jan to April + Jul			
Long term site	Annual Mean	Period Mean	Ratio (Am/Pm)
Edinburgh St Leonards	26	25.6	1.006
Eskdalemuir	2	2.2	0.947
Glasgow Townhead	26	28.8	0.917
		Average Ratio	0.957

G Jan to April + Jun to Jul + Nov			
Long term site	Annual Mean	Period Mean	Ratio (Am/Pm)
Edinburgh St Leonards	26	26	0.997
Eskdalemuir	2	2	0.893
Glasgow Townhead	26	29	0.911
		Average Ratio	0.934

H Jan to April + Jun to Jul + Nov to Dec			
Long term site	Annual Mean	Period Mean	Ratio (Am/Pm)
Edinburgh St Leonards	26	25	1.024
Eskdalemuir	2	2	0.911
Glasgow Townhead	26	28	0.929
		Average Ratio	0.955

I Jan to April + Jun			
Long term site	Annual Mean	Period Mean	Ratio (Am/Pm)
Edinburgh St Leonards	26	26	0.983
Eskdalemuir	2	2	0.947
Glasgow Townhead	26	29	0.911
		Average Ratio	0.947

J oct to Dec			
Long term site	Annual Mean	Period Mean	Ratio (Am/Pm)
Edinburgh St Leonards	26	27	0.942
Eskdalemuir	2	3	0.781
Glasgow Townhead	26	29	0.901
		Average Ratio	0.875

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