Annual Progress Report (APR)

2017 Air Quality Annual Progress Report (APR) for
Renfrewshire Council

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

June 2017

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Executive Summary: Air Quality in Our Area

This report provides an overview of air quality within Renfrewshire Council during 2016. It provides a review of pollutant monitoring data and atmospheric emissions sources within Renfrewshire and compares the available monitoring data to national air quality standards in accordance with the guidance in LAQM.TG (16) Technical Guidance.

Air Quality in Renfrewshire Council

Air quality across Renfrewshire has gradually improved over the past two years and for the first time in over a decade, monitoring during 2016 has not identified any exceedances of statutory air quality objectives within Renfrewshire.

Concentrations of the annual mean and short term objectives for nitrogen dioxide (NO_2) and particulate matter (PM_{10}) recorded at all automatic monitoring sites were below statutory objective levels.

There were no exceedances of the NO_2 annual mean objective (after bias adjustment and distance correction) at any diffusion tube monitoring locations across the Council area, including those within the existing Paisley Town Centre Air Quality Management Area (AQMA) and the two new AQMAs in Renfrew Town Centre and Johnstone High Street; declared in 2016. This is an improvement on the 2 locations of exceedance in 2015 located in High St Johnstone and Inchinnan Road Renfrew.

In terms of the Paisley Town Centre AQMA there has been a continuous improvement in air quality since 2015, and there are now two consecutive years of monitoring data where all objectives have been complied with. Monitoring will continue for a further two to three years before any consideration is given to amending or revoking the AQMA.

Whilst no exceedances were identified within the Renfrew and Johnstone AQMAs, there are some diffusion tube locations where the annual mean NO_2 concentration is close to the objective. It is intended that continuous monitoring is undertaken in these areas during 2017/18.

Data was also gathered from various national and local sources with regards to new or changed atmospheric emissions from: road traffic; rail; aircraft; shipping; industrial processes; intensive farming operations; domestic properties; biomass plants; and

dusty processes. Screening methods outlined in the technical guidance were used to determine the likelihood that a particular source would result in an exceedance of national air quality standards.

The review of new and changed emission sources identified no new sources that were likely to result in an exceedance of the NAQS objectives and that there is no requirement to proceed to additional Detailed Assessments for any area of the Council.

Actions to Improve Air Quality

Following declaration of the Johnstone and Renfrew AQMAs in August 2016, the Council is currently developing a Renfrewshire-wide Air Quality Action Plan (AQAP) which incorporates all three AQMAs. This will replace the existing Paisley Town Centre AQAP and is due for consultation in autumn 2017. Examples of some action measures undertaken by the Council during 2016 to improve air quality (and which will be incorporated within the new AQAP) are detailed below:

Raising Public Awareness

Renfrewshire Council's Community Safety Partnership and Community Resources Wardens Service work together on regular targeted campaigns to raise awareness of the links between idling vehicles & air pollution. Campaigns are aimed at specific categories of drivers or in areas where vehicles idle unnecessarily e.g. schools, bus terminals and taxi ranks. The campaigns will continue over 2017/2018 and funding will enable the Schools Idling Initiative to be implemented at all primary schools within the Council area to raise awareness of the issue and encourage walking to school and the use of more sustainable transport options.

There is also a programme of vehicle emissions testing undertaken twice per year. The first round of testing in 2017 was undertaken in Johnstone and Renfrew following the recent AQMA declaration in these areas. Where vehicles fail relevant emissions standards, the Council issues drivers with a fixed penalty notice (FPN). However, the notice is considered to be complied with where the driver presents an MOT test certificate within 14 days indicating that the fault has been repaired and that re-testing of vehicle exhaust emissions demonstrate compliance with current legislation. All drivers are issued with information leaflets regarding the impacts on local air quality from vehicle emissions and idling.

Setting Examples

Renfrewshire Council has a number of initiatives to minimise the impact on local air quality by Council personnel. These include continuous improvement of the council fleet by improving vehicle EURO standards; increasing the number of electric vehicles in use and promoting active travel by, for example, establishing a staff bike hire scheme.

In 2016/17 the Council also received funding to implement the ECO Stars (Efficient and Cleaner Operations) Fleet Recognition Scheme within the Council area, which provides recognition and guidance on operational best practice to fleet operators. The Council's own fleet was the first to be assessed under this scheme and was awarded a 4 (out of 5) star rating. The Council were commended by ECO Stars for a number of positive environmental operational practices including our on-going policy of fleet renewals, willingness to trial new technologies and the installation of telematics support systems. The Council are now encouraging other local fleet operators to consider joining the scheme which is completely free for members.

New Infrastructure

Renfrewshire Council are in the process of submitting two planning applications for large scale infrastructure projects under the UK Government City Deals programme of investment. These are the Clyde Waterfront and Renfrew Riverside project (CWRR) and the Glasgow Airport Improvement Area project (GAIA), both of which have the potential to change traffic flows across Renfrewshire and within the Renfrew AQMA in particular. The projects will increase the opportunities for local residents to make active travel choices and provide additional and alternative routes for traffic such that congestion within the AQMAs and distances travelled by road vehicles will be reduced.

Update to Plans and Strategies

A detailed review is currently being undertaken of the town centre Transportation Plans for Paisley and Johnstone. A review of Renfrew town centre was not considered appropriate at this time due to the proposed City Deals project which will have a significant impact on traffic within Renfrew town centre. A review of the Renfrewshire-wide Local Transport Strategy is also being undertaken. The outcomes

of these strategies will be reported within the Renfrewshire AQAP due for consultation later this year.

Priorities in LAQM for Renfrewshire Council in 2017/2018

The next LAQM requirements for Renfrewshire Council are:

- Prepare a draft Renfrewshire AQAP by autumn 2017 for consultation. The updated AQAP will incorporate the recently declared AQMAs in Renfrew and Johnstone and replace the Paisley Town Centre AQAP published in 2014. The Plan will also consider the Scottish Government's Cleaner Air for Scotland (CAFS) strategy and detail how it will assist in delivering the aims and objectives of CAFS.
- Install additional monitoring capability in Renfrew and Johnstone via relocation of the Glasgow Airport NO_x analyser to Renfrew Town Centre, installation of a new PM monitor in Johnstone and use of the new mobile AQ Mesh monitor where necessary at either location;
- Complete improvements to the SCOOT traffic management system within Renfrewshire by July 2017;
- Continue to improve the Council fleet of vehicles;
- Continue the schools idling and vehicle emissions testing initiatives;
- Continue with promoting the uptake of ECO Stars to fleet operators across the Council area; and
- Submit the 2018 Annual Progress Report.

How to Get Involved

The general public can find out more about air quality and how to get involved on the Renfrewshire Council web site at http://www.renfrewshire.gov.uk/airquality.

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1. Local Air Quality Management

This report provides an overview of air quality in Renfrewshire Council during 2016. 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 Renfrewshire Council to improve air quality and any progress that has been made.

Table 1.1 – Summary of Air Quality Objectives in Scotland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m^3	Annual mean	31.12.2010
Particulate Matter ($PM_{2.5}$)	10 µg/m^3	Annual mean	31.12.2020
Sulphur dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 µg/m^3	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m^3	Running 8-Hour mean	31.12.2003

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

2. Actions to Improve Air Quality

2.1 Air Quality Management Areas

AQMAs are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an AQAP within 12 months, setting out measures it intends to put in place in pursuit of the objectives.

A summary of the current AQMAs within Renfrewshire Council can be found in Table 2.1. The Paisley Town Centre AQMA was declared in August 2009. Two further AQMAs were declared in Renfrew Town Centre and Johnstone High Street during 2016. The Council are currently developing a Renfrewshire-wide AQAP which incorporates the recently declared AQMAs in Johnstone and Renfrew and replaces the AQAP published in 2014 for the Paisley Town Centre AQMA. A first draft of the Action Plan detailing the proposed measures that the Council will take forward to improve air quality within the AQMAs is anticipated in autumn 2017 for consultation.

Further information related to the AQMAs, including maps of the AQMA boundaries is available online at http://www.scottishairquality.co.uk/laqm/aqma?id=382

or by following the links in Table 2.1.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
Paisley Town Centre (PTC)	• NO_2 annual mean • NO_2 1-hour mean • PM_{10} Annual Mean	Paisley	Paisley Town Centre http://www.renfrewshire.gov.uk/media/1590/AQMA-Map/pdf/AQMAMap_2015.pdf	Paisley Town Centre Air Quality Action Plan 2014 http://www.renfrewshire.gov.uk/media/1124/Paisley-Town-Centre-Air-Quality-Action-Plan-2014/pdf/AirQualityActionPlan2014.pdf
Johnstone High Street	• NO_2 annual mean	Johnstone	Johnstone High Street http://www.scottishairquality.co.uk/assets/aqma-maps/Renfrewshire_Council_air_quality_r	Consultation draft due Autumn 2017

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
			eview_and_assessment_Johnstone_AQMA_Order_and_map_September_2016.pdf	
Renfrew Town Centre	• NO_2 annual mean • NO_2 1-hour mean	Renfrew	Renfrew Town Centre http://www.scottishairquality.co.uk/assets/aqma-maps/Renfrewshire_Council_air_quality_review_and_assessment_Renfrew_AQMA_Order_and_map_September_2016.pdf	Consultation draft due Autumn 2017

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

The Council's most recently published Air Quality Action Plan is the 2014 Paisley Town Centre AQAP. Progress on the action measures within this was reported on in the 2016 APR. The majority of measures are either now complete or are ongoing measures. Those that are fully complete have now been removed from Table 2.2. These include the Paisley Central Road Refurbishment, the Paisley Town Centre Statutory Quality Bus Partnership Scheme, ECO Driver Training, Parking Controls, the Council's Fuel Poverty Strategy and certain public and inter-departmental awareness raising initiatives e.g. improvements to the air quality information available on the Council website, a biomass guidance document, planning guidance documents.

Some ongoing measures from the 2014 AQAP include the following:

- **Masternaut fleet tracking telemetric system** – The Masternaut fleet tracking system has been upgraded this year (2017) and a dedicated member of staff will be employed to work solely with this reviewing the information obtained from the system. This shows the Council's commitment to optimising the use of this tool which will ultimately reduce fuel usage by optimising vehicle routes and reducing idling therefore reducing emissions;

- **SCOOT (Split Cycle Offset Optimisation Technique) Upgrades** - 2016/17 Scottish Government funding was approved to undertake improvements to the existing traffic management system within Paisley Town Centre to help improve traffic flow and reduce congestion particularly at peak periods. Upgrades are currently being undertaken and anticipated to be complete June/July 2017;
- **School Idling Initiative** – continuation of scheme to all Renfrewshire Primary Schools subject to receipt of Scottish Government funding;
- **Vehicle Emissions Testing** – continuation of scheme twice a year subject to receipt of Scottish Government funding;
- **Green Travel Planning Initiatives** – continuation of Council employee cycle to work scheme;

The Council are in the process of developing a new Renfrewshire Air Quality Action Plan covering all three AQMAs within Renfrewshire and replacing the Paisley Town Centre AQAP. Over the course of 2016/17, the Council have identified and taken forward a number of potential new action measures in pursuit of improving local air quality. Details of some of these are provided below and in Table 2.2.

- **ECO Stars –** 2016/17 Scottish Government funding has been provided to establish this emissions reduction fleet recognition scheme within Renfrewshire;
- **City Deals - Clyde Waterfront & Renfrew Riverside (CWRR) and Glasgow Airport Investment Area Projects (GAIA) (Renfrew AQMA)** – Proposed Planning applications to be submitted in 2017 which would promote travel alternatives and new transport infrastructure;
- **Transportation Plans (Johnstone & Paisley) –** a detailed review of the town centre Transportation Plans;
- **Renfrewshire Wide Local Transport Strategy –** a review of the Renfrewshire wide Local Transport Strategy; and
- **Real Time Bus Information –** being installed in certain areas.

These new measures will be contained within the first draft of the Renfrewshire AQAP which is anticipated for consultation during autumn 2017.

Table 2.2 – Ongoing Action Plan Measures

Measure No.	Measure	Category	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Relevant AQMA & Target Pollution Reduction	Progress to Date	Estimated Completion Date & Costs	**Comments**
1	Glasgow City Region City Deal (GCRCD) - Clyde Waterfront & Renfrew Riverside (CWRR) - Glasgow Airport Investment Area (GAIA)	Traffic Management Transport Planning and Infrastructure Promoting Travel Alternatives	Scottish Gov't & LAs across the region. The decision making body is the Glasgow City Region Cabinet. The Renfrewshire projects are lead within Renfrewshire by the Dev't & Housing Services City Deals team	March 2017 – Proposal of Application Notices submitted April to May 2017 – Consultation with Elected Members/ Community Councils/ public June 2017 - Submission of planning application	2018 – start of construction 2020 – complete construction; roads & bridges open (dependant on planning application outcomes and timescales)	Various – reduction in journey times, significantly reduced traffic through Renfrew Town Centre through construction of Renfrew North Development Road	Renfrew AQMA Proposed changes in traffic volume within Renfrew Town Centre will be detailed within the Environmental Statement	Planning application due to be submitted by end of June 2017.	2020 Funding for City Deals Projects is provided by the UK and Scot Gov't over a 20 yr period. LAs will require to fund a proportion of the costs. Further funding is also provided by other partners e.g. DWP CWRR - £90.7m GAIA -£39.1m	
2	Upgrades & Improvements to the Council's Urban Traffic Control (UTC) system - Identification of faults within the Council's UTC SCOOT system, repair/ replacement of defective loops, validation of traffic signals & PROM updates to traffic controllers	Traffic Management (UTC, congestion management)	Community Resources Roads	Jan/Feb 2017 -preparation and advertising of tender. March 2017 - award of tender	May - July 2017	Reduction in congestion. An effective SCOOT system is typically thought to reduce traffic delay by an average of 20% in urban areas Peak time congestion in particular is a major issue. It is recognised	Paisley & Johnstone AQMA Paisley – 9 traffic signal sites identified for repair/ validation on the Paisley Town Centre (PTC) ring road. The PTC source apportionment analysis confirmed that congestion	Works currently ongoing	July 2017 Cost - £31,495 of Scottish Government AQAP funding	

						that if this could be reduced then traffic would flow more freely resulting in a reduction in air pollution levels Data in relation to traffic congestion pre and post SCOOT updates will be compared to identify the level of improvement achieved	contributes to pollutant levels to varying degrees dependant on location within the AQMA Johnstone – 3 sites on High St identified for repair/ validation			
3	Council Fleet Improvements - Continue to improve the standard of fleet	Promoting Low Emission Transport (Company vehicle procurement - Prioritising uptake of low emission vehicles)	Community Resources Transport	Ongoing Each year there is a vehicle replacement programme whereby vehicles at the end of their service life are replaced with an improved EURO standard version or an electric alternative Council fleet (approx 440 vehicles) are currently minimum EURO 5 standard.	Ongoing In 2016/17 12 HGVs were replaced with EURO 6 standard	Improves overall environmental impact of vehicles. Reduces number of polluting vehicles, operational running costs of vehicles and CO_2 emissions across entire Council area Council PI - all HGVs (100 in total) replaced with EURO 6 vehicles by 2022	All AQMAs, council wide air quality improvements Paisley – the Council's transport depot is located on the Paisley AQMA boundary. All vehicles travelling to and from here will go through this AQMA. Council's HQ also located within Paisley AQMA. Several thousand employees work from this location	EURO 5 standard currently implemented 12 HGVs upgraded to EURO 6 year 2016/17	Ongoing. The Council will continue to improve the standard of fleet and introduce greener vehicles where opportunities and funding permits	

4	Council Fleet Improvements - Increase numbers of electric vehicles (EVs) & associated charging infrastructure	Promoting Low Emission Transport (Company vehicle procurement prioritising uptake of low emission vehicles & Procuring alternative refuelling infrastructure to promote low emission vehicles, EV recharging	Community Resources Transport	Ongoing	Ongoing First EVs purchased 2012. Four EV vehicles will be introduced into fleet in 2017 Pilot EV pool car scheme commenced May 2016 First council operated EV charging points installed 2012	By acting to reduce its own emissions through the uptake of low emissions technology and vehicles, the Council will encourage other vehicle users to consider greener fuel options The pool car funded through the Scottish Government AQAP fund is being used to facilitate a pilot programme for the Council to consider an introduction of pool cars for staff use and for these to be electric where possible	All AQMAs, council wide air quality improvements A review of the use of the EVs is due to be undertaken which will consider the mileage done and potential emissions prevented.	Fleet currently contains 24 EVs. There are 20 council operated charging points, 6 of which are available for public use.	Ongoing. The Council will continue to improve the standard of their fleet and introduce EVs & charging points where opportunities and funding permits.	The introduction of the pilot pool car scheme means that officers no longer require to use their own car for work purposes. This has already resulted in officers travelling into work by alternative means – train & cycling.
5	Masternaut - upgrade of fleet tracking telemetric system fitted to all Council vehicles	Freight and Delivery Management (Route management plans/ Strategic routing strategy for HGV's) Vehicle Fleet Efficiency	Community Resources Transport	Masternaut was originally installed in all council vehicles in 2009-10. This is being upgraded to a newer version in 2017 which will provide an easier	Procurement process undertaken in 2016 and tender awarded. Implementation of upgraded system the beginning of 2017	Emission reductions as well as financial long term gain by reducing fuel consumption. Improves efficiency via optimising vehicle routes & movements. The route	All AQMAs, council wide air quality improvements . The new system will provide an easier reporting system which may allow			

		(other)		reporting system and focus in more detail on driver behaviour. A dedicated member of staff will be employed to work solely with the Masternaut system.		optimisation aspect of Masternaut has allowed the Council to effectively reduce the numbers of vehicles in operation. In some instances one vehicle is now able to cover the route previously undertaken by two vehicles. Reduction of idling is also seen as a key area to reduce fuel and maintenance costs & to lower emissions produced by fleet vehicles. Masternaut is able to monitor the idling time of vehicles.	calculations to be undertaken on emission reductions achieved.			
6	ECO Stars Fleet Recognition Scheme	Vehicle Fleet Efficiency (Fleet efficiency and recognition schemes)	Community Resources Environmental Improvements	Scheme was initiated on a small scale during 2016/17 Scottish Gov't funding received to fully implement during 2017/18	Full scheme implementation expected following procurement process autumn 2017 onwards Public launch expected during 2018	Membership numbers & numbers of vehicles within scheme	All AQMAs, council wide air quality improvements The ECO Stars emissions toolkit, which provides a quantitative estimate of the reduction	Scheme first initiated at the end of 2016 on a small scale trial period. 10 members established during this time Continuation of scheme during 2017/18 to commence	Full scheme implementatio n by end of year 2017/18 Fully funded via the Scottish Government AQAP fund, no cost to council	

				Procurement process to be undertaken autumn 2017			in NOx and PM as a direct result of adopting ECO Stars and the recommended interventions, will be applied to our own fleet.	following procurement process	2016/17 £9,000	
7	Vehicle Idling Awareness Raising - Regular targeted campaigns to raise awareness regarding idling vehicles & air pollution. Campaigns aimed at specific categories of drivers or in areas where vehicles idle unnecessarily e.g. schools, bus terminals, taxi ranks or in response to complaints	Traffic Management (Anti-idling enforcement) Public Information (via other mechanisms)	Renfrewshire Community Safety Partnership; Community Resources Wardens Service		Ongoing since 2011	Improves overall awareness of fuel efficiency & environmental impacts of vehicles particularly at areas of sensitive receptors e.g. primary schools. .	Measure is more an awareness raising tool however it is also a useful measure to prevent vehicles idling and stopping in inappropriate places that may cause congestion, which is a significant cause of emissions generated in the AQMA. The measure can be used where necessary to reduce congestion and keep traffic flowing.	Further funding received for 2017/18 to continue the success of the School Idling Initiative across primary schools in Renfrewshire	Ongoing measure subject to Scottish Gov't funding.	Fixed Penalty Notices not issued, drivers are instead requested to turn their engines off & invariably all drivers comply. It provides Wardens with a valuable opportunity to educate and engage with the public.
8	Vehicle Emissions Testing - programme of roadside vehicle emissions testing of private vehicles in accordance with the Road Traffic	Vehicle Fleet Efficiency (Testing vehicle emissions)	Renfrewshire's Community Safety Partnership; Community Resources Wardens Service & Police Scotland with assistance from Glasgow, East		From 2011 to current.	Improves overall awareness of fuel efficiency & environmental impacts of vehicles. Reduces	Measure is more an awareness raising tool. Location of the testing is either within or as close to the	Testing undertaken over two days twice a year since 2011. 356 vehicles were tested in March 2016 & 6 FPNs	Ongoing measure subject to Scottish Gov't funding. £19,000 of funding received to continue	

	(Vehicle Emissions) (Fixed Penalty) (Scotland) Regulations 2003.		Renfrewshire & North Lanarkshire Council's taxi enforcement and emissions testing officers.			numbers of polluting vehicles.	AQMAs as possible. All drivers stopped & tested are given a Renfrewshire Council "Don`t Be An Idler" information leaflet & an explanatory letter.	served. Where vehicles fail relevant emissions standards, drivers are issued with a fixed penalty notice. However, the notice is complied with if the driver presents an MOT test certificate within 14 days indicating that the fault has been repaired and vehicle exhaust emissions comply with current legislation.	vehicle idling & emissions testing campaign in 2017/18.	

2.3 Cleaner Air for Scotland

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

2.3.1 Transport – Avoiding travel – T1

A detailed review is currently being undertaken of the town centre Transportation Plans for Paisley and Johnstone. A review of Renfrew town centre was not considered appropriate at this time due to the proposed City Deals which will have a significant impact on traffic within Renfrew town centre. A review of the Renfrewshire-wide Local Transport Strategy is also being undertaken. The outcomes of these strategies will be reported within the Renfrewshire AQAP due for consultation later this year.

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

Scottish Government expects any Scottish local authority which has or is currently developing a Sustainable Energy Action Plan to ensure that air quality considerations are covered. Renfrewshire Council has a Carbon Management Plan (2014) which includes replacement of inefficient appliances in buildings, continued investment in cleaner vehicles and the purchase of energy from renewable sources; all achieving air quality improvements.

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

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

3.1 Summary of Monitoring Undertaken

The monitoring undertaken during 2016 was a continuation of the 2015 programme with the exception of the following six diffusion tube sites which were discontinued at various times throughout 2016. These were:

- High St, Johnstone 7;
- Incle St, Paisley 18;
- Regent St, Paisley 4;
- Hillington Rd, Renfrew 23;
- Glasgow Airport, Paisley 39; and
- Central Rd West, Paisley 42.

The Johnstone 7 site was discontinued as the lamppost where this site was located was removed by the Council Roads department. The Paisley 18 site was discontinued and a more representative site within the same area introduced (No. 79). The other sites were discontinued due to consistently low measurements of NO_2 over previous years.

New diffusion tube monitoring sites have been introduced at 13 locations in 2016. The new sites are highlighted in green in Table A.2. Other changes include site 31 at West Walkinshaw becoming a triplicate site in June 2016. However the site is not co-located next to a continuous analyser.

Automatic monitoring continued at 3 sites as detailed in Section 3.1.1. The Glasgow Airport Site was discontinued during July 2015. Subject to receipt of Scottish Government funding and the equipment remaining serviceable, it is the intention to relocate this equipment from Glasgow Airport to Renfrew Town Centre,

A mobile continuous AQ Mesh monitor has been purchased and is currently located on Johnstone High Street. The monitor has been onsite for a few months and therefore there is currently insufficient data to report on.

3.1.1 Automatic Monitoring Sites

Renfrewshire Council undertook automatic (continuous) monitoring at three sites during 2016. Table A.1 in Appendix A shows the details of these sites. National monitoring results are available at http://www.scottishairquality.co.uk.

All of Renfrewshire Council's automatic sites are part of the Scottish Air Quality Database network, whereby monitoring data are managed to the same procedures and standards as AURN sites by Ricardo-AEA.

Maps showing the locations of the monitoring sites are provided in Appendix A in Figures A.1 to A.2. 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

Renfrewshire Council undertook non-automatic (passive) monitoring of NO_2 at 62 sites during 2016. Table A.2 in Appendix A shows the details of these sites.

Maps showing the location of the monitoring sites are provided in Appendix A in Figures A.4 to A.15. 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 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.

Annual mean NO_2 concentrations recorded at all automatic monitoring sites in 2016 were below the annual mean objective level.

There were no exceedances of the NO_2 annual mean objective (after bias adjustment and distance correction) at any of the diffusion tube monitoring locations within the existing Paisley Town Centre AQMA or the two new AQMAs in Renfrew Town Centre and Johnstone High Street.

There were no exceedances of the annual mean objective at any of the diffusion tube monitoring locations outside of the AQMAs (after bias adjustment and distance correction).

The full 2016 diffusion tube dataset of raw monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. There were no exceedances of the NO_2 hourly mean at any of the automatic monitoring sites.

The trend is towards continually reducing NO_2 concentrations within the Paisley Town Centre AQMA and the two newly declared AQMAs in Johnstone and Renfrew. Compliance with all of the objectives within the Paisley Town Centre AQMA was also achieved in 2015. Renfrewshire Council will maintain the current programme of monitoring NO_2 in Paisley for at least two years before any consideration is given to amending or revoking the AQMA.

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 air quality objective of 18µg/m^3.

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

Annual mean PM_{10} concentrations recorded at all automatic monitoring sites were below the annual mean objectives in 2016.

No exceedances of the PM_{10} short-term objective were recorded in 2016 at any of the automatic site locations.

3.2.3 Particulate Matter ($PM_{2.5}$)

Renfrewshire Council does not currently monitor $PM_{2.5}$ annual mean concentrations at any location. However 2016/17 Scottish Government funding for a $PM_{2.5}$ monitor was approved and procurement is complete. The new monitor, which measures both PM_{10} and $PM_{2.5,}$ will be installed in the Johnstone AQMA by the end of June 2017.

3.2.4 Sulphur Dioxide (SO_2)

Renfrewshire Council does not currently measure sulphur dioxide (SO_2) within the Council area. Historically SO_2 was measured at Glasgow airport; this was

discontinued following a continued decline in measured concentrations that were substantially below the objective.

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

Renfrewshire Council does not currently measure carbon monoxide, lead or 1,3-Butadiene concentrations within the council area. No significant sources of these pollutants have been identified in previous rounds of review and assessment.

4. New Local Developments

In addition to local knowledge, this section has been completed in consultation with other relevant Council services including Community Resources Roads & Transport and Planning & Housing.

4.1 Road Traffic Sources

Renfrewshire Council confirms that there are none of the following new or significantly changed road traffic sources:

- Narrow congested streets with residential properties close to the kerb.
- Busy streets where people may spend one hour or more close to traffic.
- Roads with a high flow of buses and/or HGVs.
- Junctions.
- Roads with significantly changed traffic flows.
- Bus or coach stations.

However, the proposed City Deal infrastructure projects known as the CWRR and GAIA projects are currently undergoing Environmental Impact Assessment and a full planning application is expected to be submitted in June 2017. An update on the progress of these measures will be provided within the 2018 APR but a summary of the main elements that will impact traffic flows and hence air quality within Renfrewshire is provided below:

<u>CWRR</u>

- Yoker Train Station Cycle Link;
- Connection of Clyde Crossing approach road at Dock Street with the A814 Glasgow Road/Dumbarton Road;
- New Clyde Crossing;
- The Renfrew Northern Relief Road (RNRR), including extension of Argyll Avenue from Inchinnan Road to Meadowside Street East; and
- Inchinnan Road Cycle Link.

<u>GAIA</u>

- Inchinnan Cycle way;
- Black Cart Cycleway Bridge;
- Abbotsinch Road Realignment;
- Wright Street Link and Wright Street Link Bridge; and
- Abbotsinch Road Cycleway Link.

4.2 Other Transport Sources

Renfrewshire Council confirms that there are none of the following new or significantly changed transport sources:

- Airports.
- Locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.
- Locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.
- Ports for shipping.

4.3 Industrial Sources

Renfrewshire Council confirms that there are none of the following new or significantly changed industrial sources:

- **Industrial installations:** new or proposed installations for which an air quality assessment has been carried out.
- **Industrial installations:** existing installations where emissions have increased substantially or new relevant exposure has been introduced.
- **Industrial installations:** new or significantly changed installations with no previous air quality assessment.
- Major fuel storage depots storing petrol.
- Petrol stations.
- Poultry farms.

4.4 Commercial and Domestic Sources

Renfrewshire Council confirms that there are none of the following new or significantly changed commercial and domestic sources:

- Areas where the combined impact of several biomass combustion sources may be relevant.
- Areas where domestic solid fuel burning may be relevant.
- Combined Heat and Power (CHP) plant.

New biomass plants are considered in Section 5.

4.5 New Developments with Fugitive or Uncontrolled Sources

Renfrewshire Council confirms that there are none of the following new or significantly changed fugitive or uncontrolled sources:

- Landfill sites.
- Quarries.
- Unmade haulage roads on industrial sites.
- Waste transfer stations, etc.
- Other potential sources of fugitive particulate matter emissions.

5. Planning Applications

This section summarises the planning applications for which air quality assessments were provided and accepted and those for which Renfrewshire Council carried out screening assessments.

The applications and outcomes are summarised in Table 5.1. Supplementary screening assessments undertaken by Renfrewshire Council are included in Appendix C.

Table 5.1: Details of Planning Applications Requiring Air Quality Assessments or Screening Assessments by Renfrewshire Council

Name of Establishment	Data Submitted by Applicant	Screening Assessment by Renfrewshire Council	Outcome
16/0294/PP - St Paul's Primary School, Orchy Crescent, Paisley, PA2 0NN Erection of primary school with pre-5 and adult learning centres, formation of access, parking, landscaping, boundary treatments, lighting, all weather pitch and associated works Including biomass boiler plant and flue	Granted planning permission in July 2016 subject to an air quality assessment being submitted (ongoing).	None	There was a partially completed Biomass Boiler Information Request Form submitted last year for the development but the information contained within this may be superseded by the info within the AQA still to be submitted.
16/0157/PP - 1 Blackstoun Farm Cottages, Blackstoun Road, Linwood, Paisley, PA3 3AF Installation of combined heat and power unit within agricultural shed.	A Biomass Boiler Information Request Form (BBIRF) was submitted. The application was granted planning permission in Sept 2016 subject to the planning conditions.	Unit Conversion and Screening Tool (see Appendix C7).	Maximum Contribution to Annual mean <1% of air quality standards in an area of low background concentrations – no further assessment required by the Council. However, in accordance with the Clean Air Act 1993, chimney height approval is required where appliances burn fuel at a rate of 45.4kg/hr or more.

Name of Establishment	Data Submitted by Applicant	Screening Assessment by Renfrewshire Council	Outcome
16/0528/PP - Gleniffer Hotel, 9 Glenburn Road, Paisley, PA2 8TA Erection of biomass plant building and erection of flue	A BBIRF was submitted by the applicant as part of the application 15/0935/PP. Detailed Dispersion Modelling Assessment by external consultant	None	Planning application 15/0935/PP was withdrawn and a new application 16/0528/PP was submitted with an increased flue height from 5.6m to 10.6m. This was approved and planning permission granted August 2016.
16/0905/PP - St Mirren Football Club, Love St, Paisley PA3 2EA - Approval of Reserved Matters (16/0644/PP) for residential development of 132 dwellings with associated car parking etc.	Detailed Dispersion Modelling Assessment by external consultant	None	Conclusions of the assessment accepted and permission without further planning conditions for air quality granted (March 2017).
16/0643/PP - Paton's Mill, 93 High St, Johnstone PA5 8SN - Demolition of buildings & erection of two retail units, restaurant with drive through and formation of community woodland with associated access, parking etc.	Detailed Dispersion Modelling Assessment by external consultant	None	Conclusions of the assessment accepted and permission granted (Jan 2017) with planning conditions for various air quality mitigation measures including contribution towards traffic signal modifications and installation of electric car charging points
16/0639/PP – Land at North West end of King's Inch Rd, Renfrew – Erection of residential development comprising 120 flats with associated roads etc.	Detailed Dispersion Modelling Assessment by external consultant	None	Conclusions of the assessment accepted and permission granted (Nov 2016) with planning condition for a site specific Dust Management Plan.

Name of Establishment	Data Submitted by Applicant	Screening Assessment by Renfrewshire Council	Outcome
16/0612/PP - Site on South Eastern boundary of junction with Fleming Street, New Inchinnan Road, Paisley - Erection of residential development comprising 116 dwelling houses and 66 flats including roads, footpaths, open space and associated works	Detailed Dispersion Modelling Assessment by external consultant	None	Conclusions of the assessment accepted and permission without further planning conditions for air quality granted (Nov 2016).

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

There were no exceedances of statutory air quality objectives identified during 2016 at any monitoring locations throughout Renfrewshire. Air quality across Renfrewshire has improved over the past couple of years and the trend is towards reducing concentrations within the Paisley Town Centre AQMA and the two newly declared AQMAs in Johnstone and Renfrew.

In terms of the Paisley Town Centre AQMA there has been a continuous improvement in air quality since 2015, and there are now two consecutive years of monitoring data where all objectives have been complied with. Monitoring will continue for a further two to three years before any consideration is given to amending or revoking the AQMA.

Within the Renfrew and Johnstone AQMAs, whilst no exceedances were identified, there are some diffusion tube locations where the annual mean NO_2 concentration is close to the objective. It is intended that continuous monitoring is undertaken in these areas during 2017/18 including $PM_{2.5}$ monitoring within Johnstone that should commence by July 2017.

The Council is currently developing a Renfrewshire-wide AQAP which incorporates the recently declared AQMAs in Johnstone and Renfrew and replaces the 2014 Paisley Town Centre AQAP. The Action Plan will detail appropriate measures which the Council will take forward to further improve air quality within the AQMAs and across the Council area in general, with the first draft for consultation, anticipated during autumn 2017.

6.2 Conclusions relating to New Local Developments

Renfrewshire Council is satisfied that any new developments likely to have an impact on local air quality or potentially introduce new receptors into areas of poor air quality have been adequately assessed during the planning process. Mechanisms and guidance notes are in place to ensure that prospective developers and Renfrewshire Council Planning Officers have clear instructions on what information is required with certain types of development, especially biomass, and when to request more detailed information on the potential impacts of the proposals.

6.3 Proposed Actions

The next LAQM requirements for Renfrewshire Council are:

- Prepare a draft Renfrewshire AQAP by autumn 2017 for consultation. The updated AQAP will incorporate the recently declared AQMAs in Renfrew and Johnstone and replace the Paisley Town Centre AQAP published in 2014. It will also consider the Scottish Government's Cleaner Air for Scotland (CAFS) strategy and detail how it will assist in delivering the aims and objectives of CAFS.
- Install additional monitoring capability in Renfrew and Johnstone via relocation of the Glasgow Airport NO_x analyser to Renfrew Town Centre, installation of a new PM monitor in Johnstone and use of the new mobile AQ Mesh monitor where necessary at either location;
- Complete improvements to the SCOOT traffic management system within Renfrewshire by July 2017;
- Continue to improve the Council fleet of vehicles;
- Continue the schools idling and vehicle emissions testing initiatives;

- Continue with promoting the uptake of ECO Stars to fleet operators across the Council area ; and
- Submit the 2018 Annual Progress Report.

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)
Gordon Street/ Causeyside St, Paisley		Roadside	248316	663612	NO_2, PM_{10}	Y	Chemiluminescence / FDMS-TEOM	Y (-6.5m)	10m	2.2m NO_x 2.4m PM_{10}
St James St, Paisley		Roadside	248173	664320	PM_{10}	Y	FDMS-TEOM	Y (0m)	4m	2.35m
Cockels Loan		Roadside	250463	665934	NO_2, PM_{10}	N	Chemiluminescence / FDMS-TEOM	Y (0m)	18m	2.7m NO_x 2.8m PM_{10}

(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.

The locations of the automatic monitoring sites are shown in maps in Figures A.1 to A.2.

Figure A.4 – Paisley Automatic Monitoring Sites

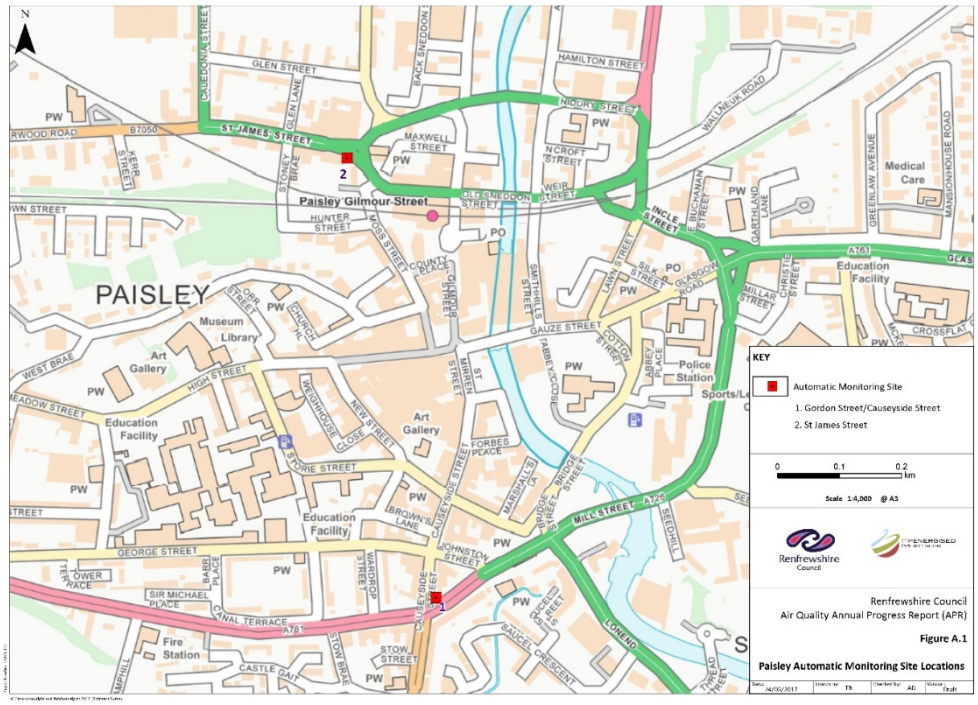


Figure A.2 – Cockels Loan Renfrew Automatic Monitoring Site

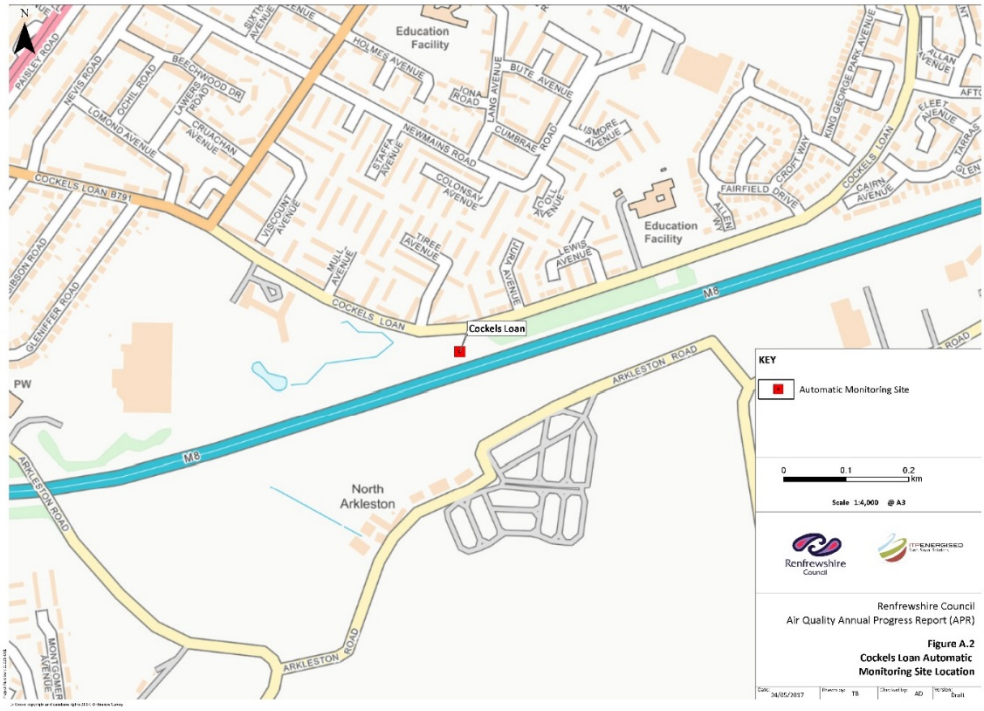


Table A.2 – Details of Non-Automatic Monitoring Sites

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?
1	Gilmour Street, Paisley	Urban Centre	248350	664082	NO_2	Y (Paisley)	N	68m	N
2	Oakshaw Street, Paisley	Urban Background	247925	664052	NO_2	Y (Paisley)	11m	35m	N
3	Lochfield Drive, Paisley	Urban Background	249004	662142	NO_2	N	8m	1.5m	N
4	Regent Street, Paisley	Urban Background	249665	664364	NO_2	N	9m	2m	N
8	15 Inchinnan Road, Renfrew	Kerbside	250589	667547	NO_2	Y (Renfrew)	0.1m	2.6m	N
9	Station Road, Bishopton	Roadside	243975	670545	NO_2	N	13m	3m	N
13	Greenock Road, Paisley	Urban Background	247371	665674	NO_2	N	-12m	23m (M8)	N
15	Montgomery Drive, Paisley	Urban Background	249185	665713	NO_2	N	4.3m	1.6m (11.5m to M8 slip)	N
17	Tanar Way, Renfrew	Roadside	251524	666287	NO_2	N	-5m	29m to M8	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?
19	Linwood Road, Paisley	Roadside	245701	663604	NO_2	N	5m	2.5m	N
20	High Street, Johnstone	Kerbside	242675	663286	NO_2	Y (Jonhstone)	1.6m	0.1m	N
21	Causeyside Street, Paisley (Triplicate)	Roadside	248316	663612	NO_2	Y (Paisley)	-6.3m	9.9m	Y
23	Hillington Road, Renfrew	Roadside	251869	666628	NO_2	N	12m	7m	N
27	Rossland Gardens, Bishopton	Suburban	243183	671188	NO_2	N	6m	2m	N
31	West Walkinshaw	Roadside	246189	666141	NO_2	N	-14m	17m (M8)	N
33	76 Causeyside Street, Paisley	Roadside	248277	663524	NO_2	Y (Paisley)	1.1m	2.9m	N
34	63 Causeyside Street, Paisley	Roadside	248303	663566	NO_2	Y (Paisley)	3m	0.7m	N
35	Old Sneddon Street,	Roadside	248360	664272	NO_2	Y (Paisley)	0.4m	3.4m	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?
	Paisley								
36	Caledonia Street, Paisley	Roadside	247948	664774	NO_2	Y (Paisley)	4.5m	3.3m	N
38	99 Paisley Road, Renfrew	Roadside	250108	666856	NO_2	N	0.6m	2.5m	N
39	Glasgow Airport, Paisley (Triplicate)	Special	248293	666542	NO_2	N	60m to nearest house	40m	Y
40	Hairst Street, Renfrew	Roadside	250763	667631	NO_2	Y (Renfrew)	0.25m	6.2m	N
41	Smithhills Street (West), Paisley	Roadside	248463	664175	NO_2	Y (Paisley)	16m	5m	N
42	Central Road (West), Paisley	Roadside	248371	664187	NO_2	Y (Paisley)	50m	1.5m	N
43	Smithhills Street (East), Paisley	Roadside	248481	664153	NO_2	Y (Paisley)	0m	2.5m	N
44	Love Street, Paisley	Roadside	248209	664474	NO_2	Y (Paisley)	0.2m	2.2m	N
45	Xscape, Renfrew	Kerbside	251803	667365	NO_2	N	18m	2m	N
48	Glen Sax	Roadside	251264	666217	NO_2	N	-9m	45m	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?
	Drive, Renfrew								
49	Tanar Way 2, Renfrew	Roadside	251462	666326	NO_2	N	9m	85m	N
50	Renfrew Road, Paisley	Roadside	248985	665494	NO_2	N	7m	12m	N
52	Glasgow Road 2, Renfrew	Roadside	251515	666955	NO_2	N	4m	3m	N
53	Old Greenock Rd, Inchinnan	Roadside	248154	668832	NO_2	N	9m	1.5m	N
54	Easwald Bank, Kilbarchan	Roadside	241059	662743	NO_2	N	4.5m	1.2m	N
56	Paisley Road, Renfrew	Roadside	250579	667488	NO_2	Y (Renfrew)	3.5m	4.5m	N
57	Paisley Road, Renfrew	Roadside	250597	667473	NO_2	Y (Renfrew)	1.2m	6m	N
58	Glebe Street, Renfrew	Roadside	250667	667448	NO_2	N	4.5m	2.8m	N
59	High Street, Johnstone	Roadside	242656	663281	NO_2	Y (Jonhstone)	0.1m	1.7m	N
60	Underwood Rd, Paisley	Roadside	247525	664326	NO_2	Y (Paisley)	7.8m	0.5m	N
61	High Barholm, Kilbarchan	Roadside	240584	663007	NO_2	N	0.1m	1.1m	N
62	Cockels Loan,	Roadside	250463	665934	NO_2	N	0m	18m	Y

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?
	Renfrew								
63	Renfrew Road, Paisley	Roadside	249159	665710	NO_2	N	6.8m	3.7m	N
64	Montgomery Road, Paisley	Roadside	249202	665708	NO_2	N	8.8m	0.15m	N
65	High Barholm, Kilbarchan	Roadside	240599	663000	NO_2	N	0.4m	2m	N
66	High Barholm, Kilbarchan	Roadside	240573	663021	NO_2	N	0.4m	1.6m	N
67	High Barholm, Kilbarchan	Roadside	240512	663027	NO_2	N	1.8m	3 m	N
68	Paisley Road, Renfrew	Roadside	250522	667419	NO_2	N	0.2m	3m	N
69	Inchinnan Road, Renfrew	Roadside	250537	667602	NO_2	Y (Renfrew)	0.1m	2.9m	N
70	Inchinnan Road, Renfrew	Roadside	250599	667561	NO_2	Y (Renfrew)	4.5m	3.7m	N
71	Braille Drive, Renfrew	Roadside	251729	666360	NO_2	N	0 (equivalent distance to nearby housing)	25m (M8)	N
72	High St, Johnstone	Roadside	243080	663140	NO_2	Y (Jonhstone)	0.45m	3m	N
73	Lawn Street, Paisley	Roadside	248566	664072	NO_2	Y (Paisley)	0.19m	1.95m	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?
74	Causeyside Street, Paisley	Roadside	248313	663621	NO_2	Y (Paisley)	0.19m	3.3m	N
75	Canal Street, Renfrew	Roadside	250853	667747	NO_2	Y (Renfrew)	0.17m	5m	N
76	Main Road, Bridge of Weir	Roadside	238899	665488	NO_2	N	0.15m	4.73m	N
77	Main Road/Houston Rd, Bridge of Weir	Roadside	238570	665892	NO_2	N	0.15m	2.26m	N
78	Neilston Road, Paisley	Roadside	248339	662575	NO_2	N	0.15m	2.63m	N
79	Incle Street, Paisley	Roadside	248632	664212	NO_2	Y(Paisley)	0.18m	2.8m	N
80	Glasgow Road, Paisley	Roadside	249653	664123	NO_2	N	1.9m	2.1m	N
81	Glasgow Airport	Roadside	247346	665805	NO_2	N	32m	33m	N
82	Well Street, Paisley	Roadside	247513	664024	NO_2	Y (Paisley)	0.2m	2.27m	N
83	Wellmeadow Street, Paisley	Roadside	247671	663913	NO_2	Y (Paisley)	0.4m	3.32m	N
84	Ferry Village, Renfrew	Kerbside	251254	667876	NO_2	N	18m	0.5m	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.

Sites highlighted in green are new sites where monitoring has commenced in 2016.

The locations of the non-automatic monitoring sites are shown in maps in Figures A.3 to A.15

Figure A.3 – Paisley (Central) Diffusion Tube Sites

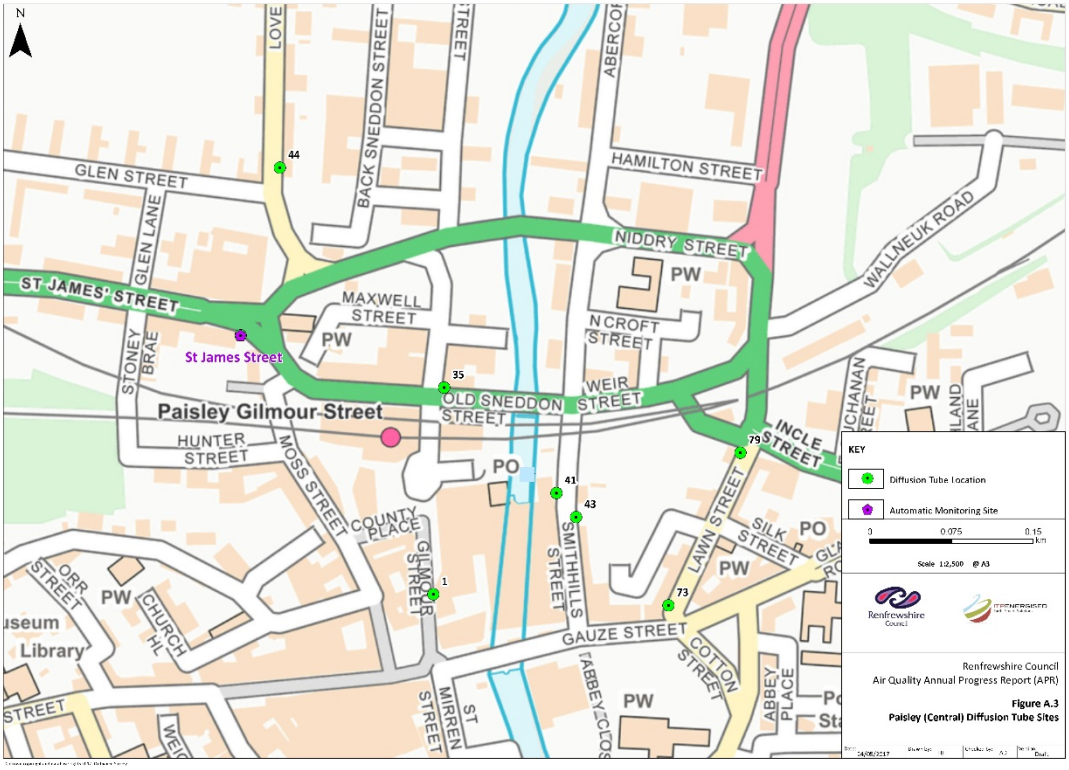


Figure A.4 – Paisley (West) Diffusion Tube Sites

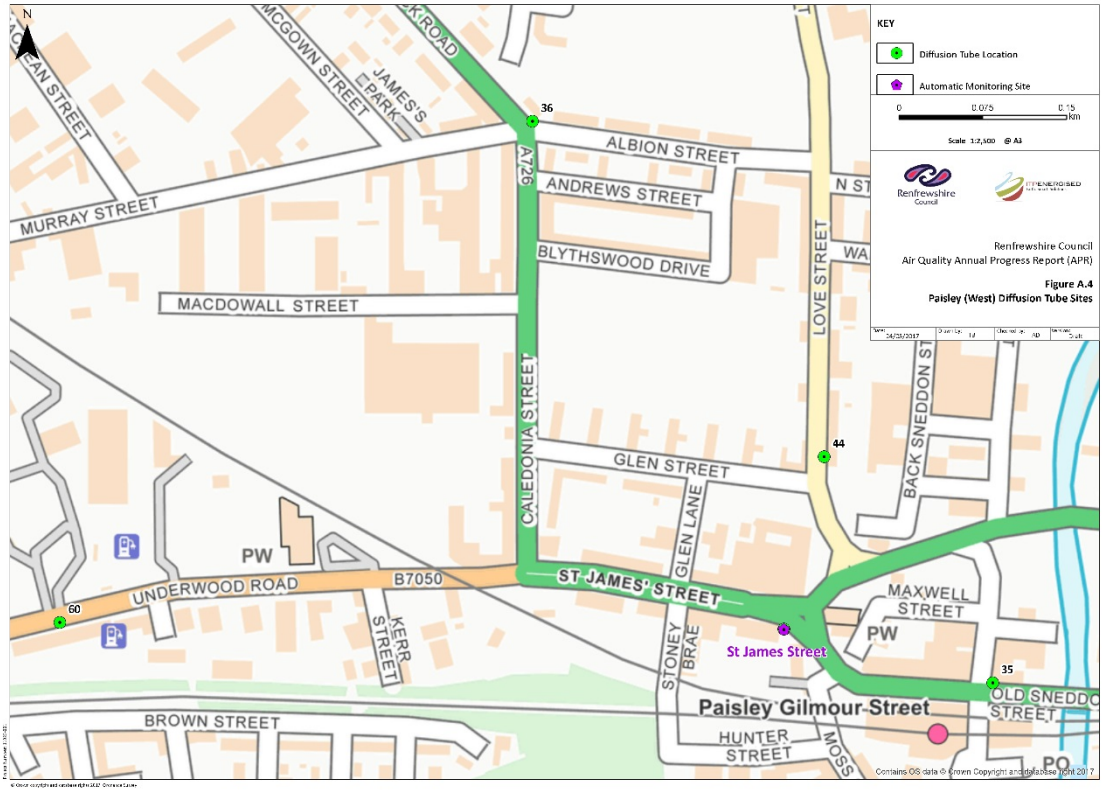


Figure A.5 – Paisley (North) Diffusion Tube Sites

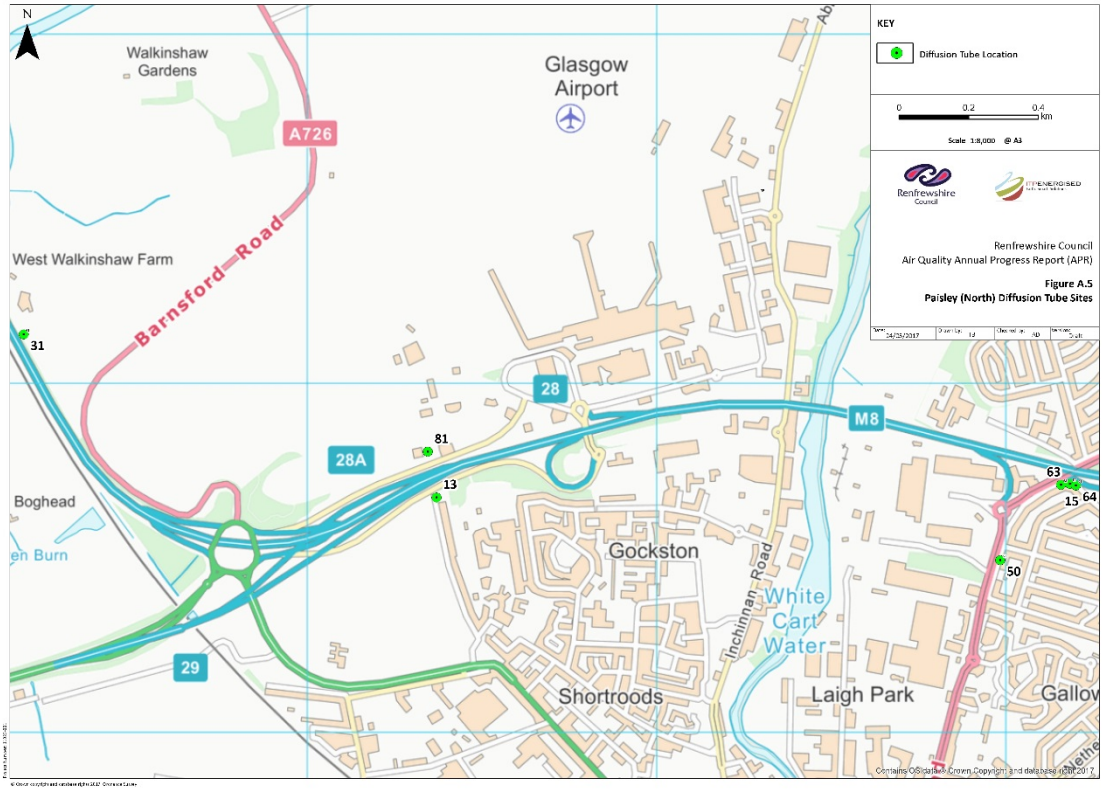


Figure A.6 – Paisley (South) Diffusion Tube Sites

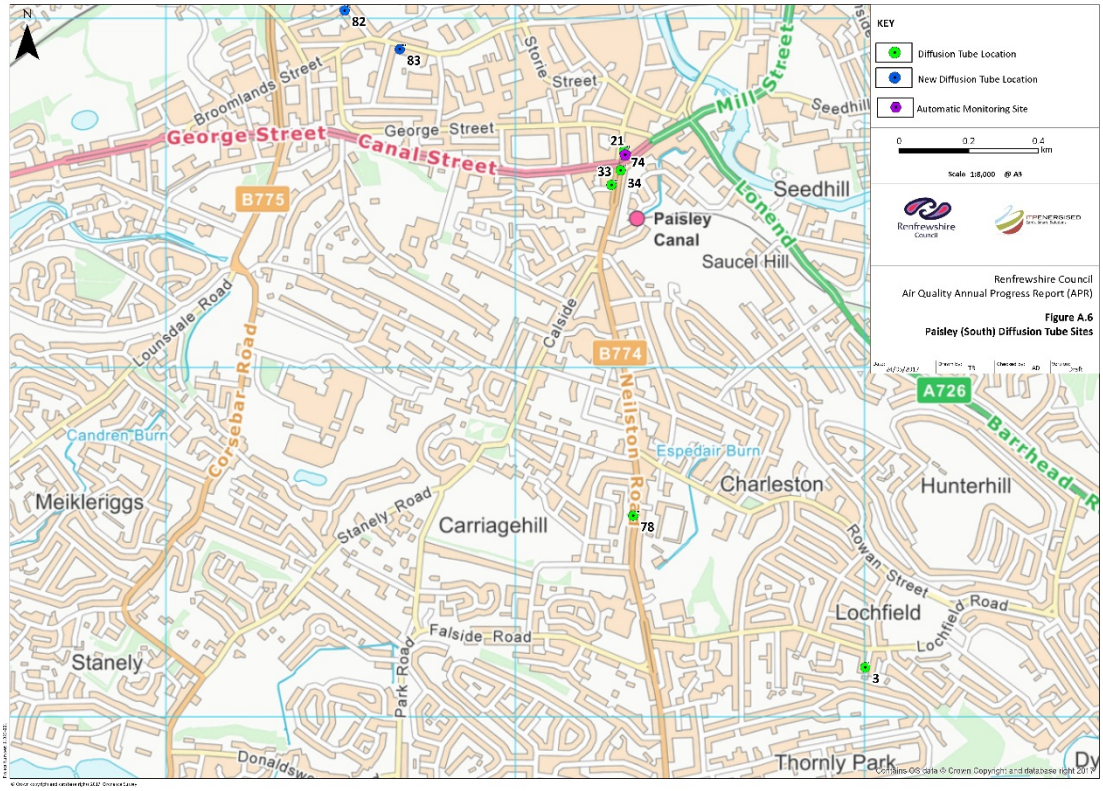


Figure A.7 – Paisley (South West) Diffusion Tube Sites

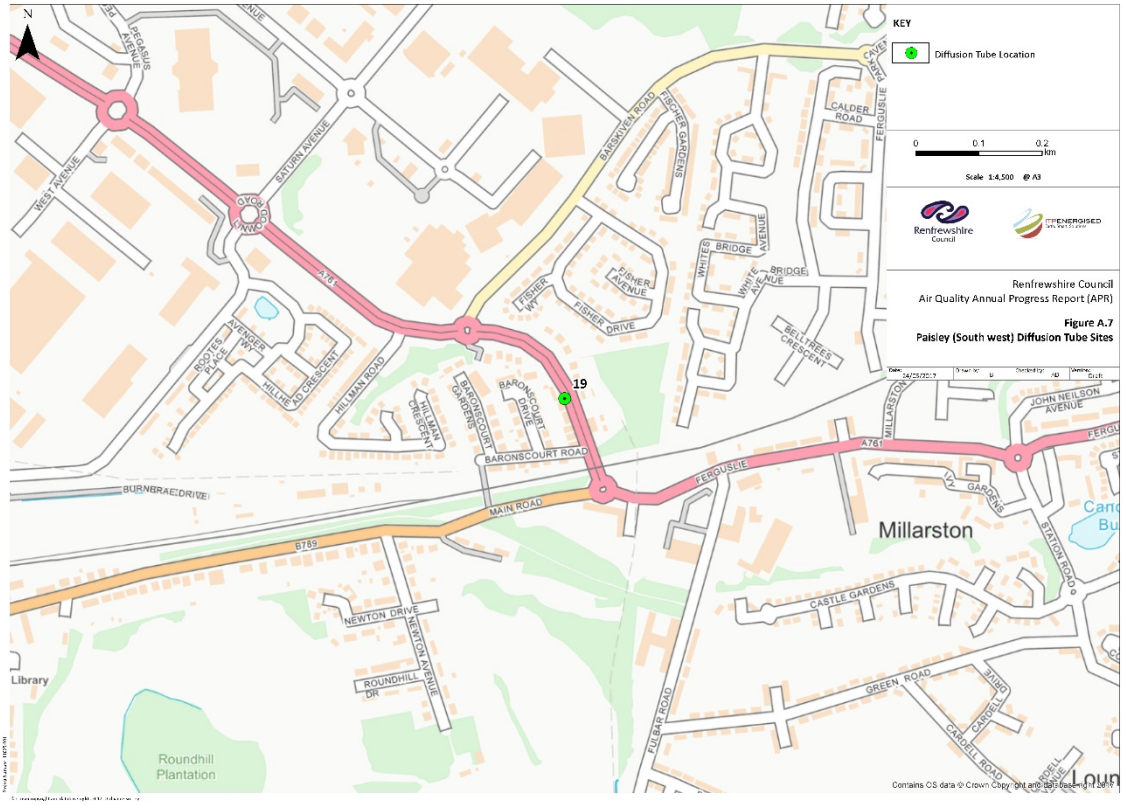


Figure A.8 – Renfrew (Central) Diffusion Tube Sites

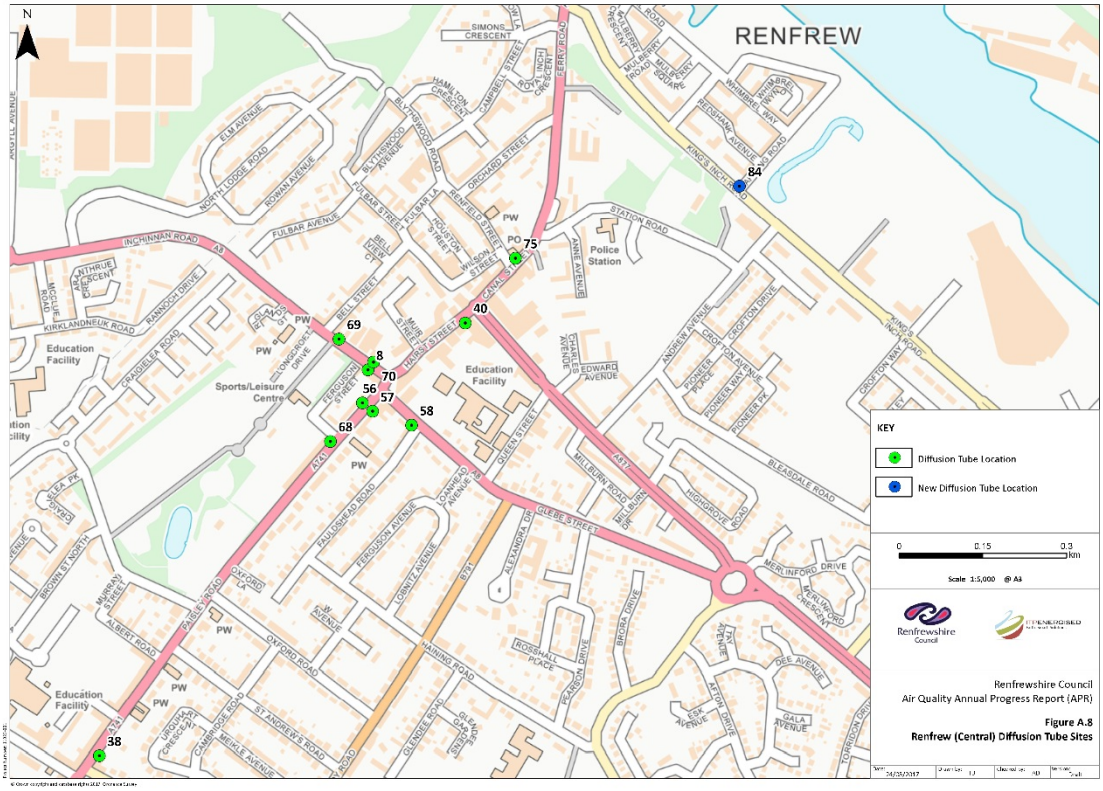


Figure A.9 – Renfrew (East) Diffusion Tube Sites

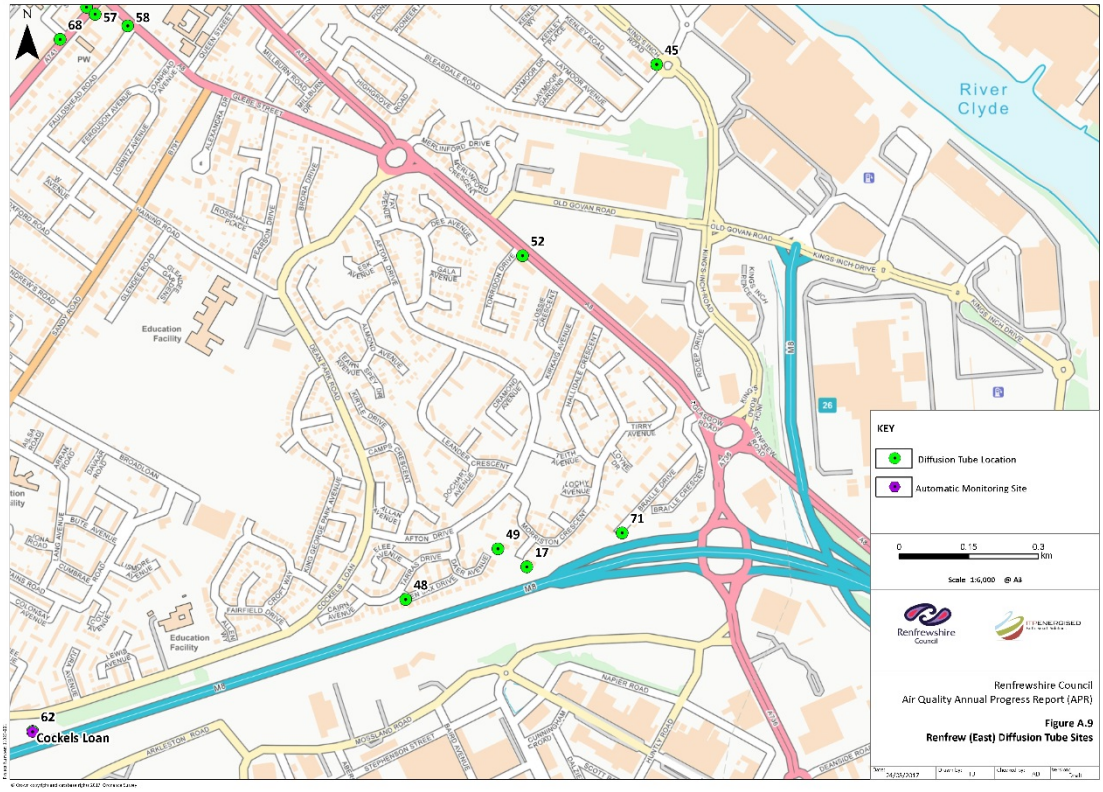


Figure A.5 – Johnstone Diffusion Tube Sites

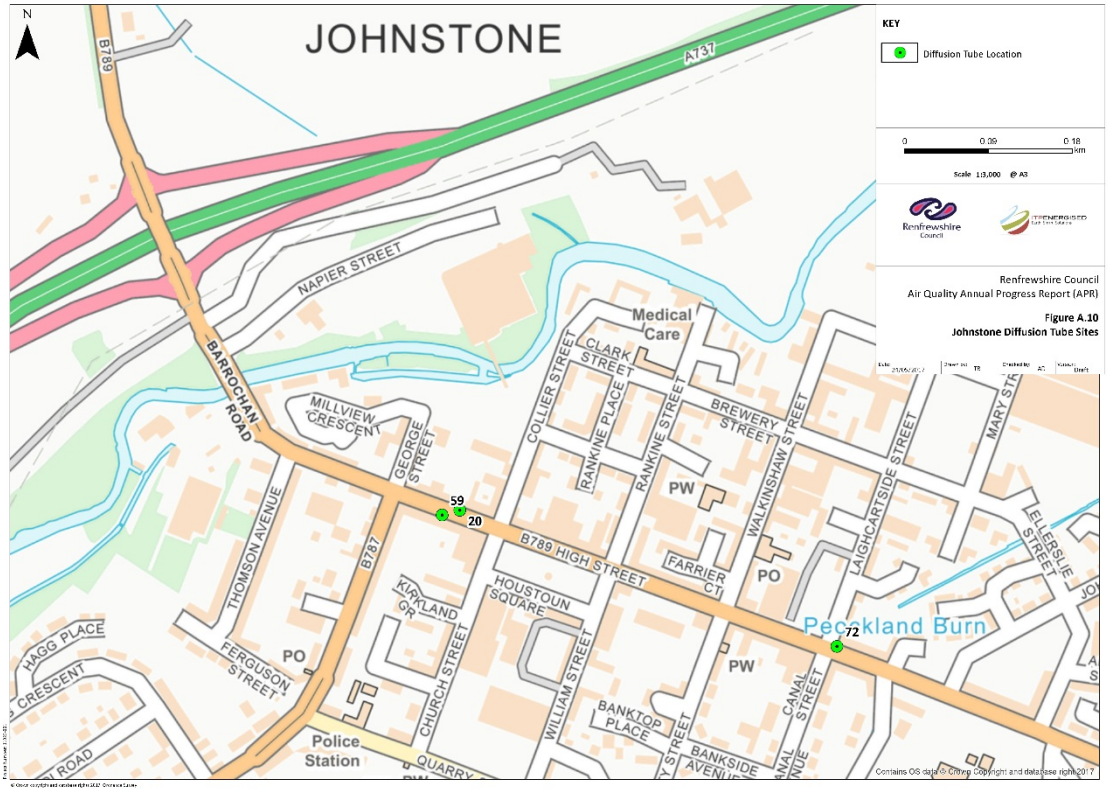


Figure A.11 – Kilbarchan Diffusion Tube Sites

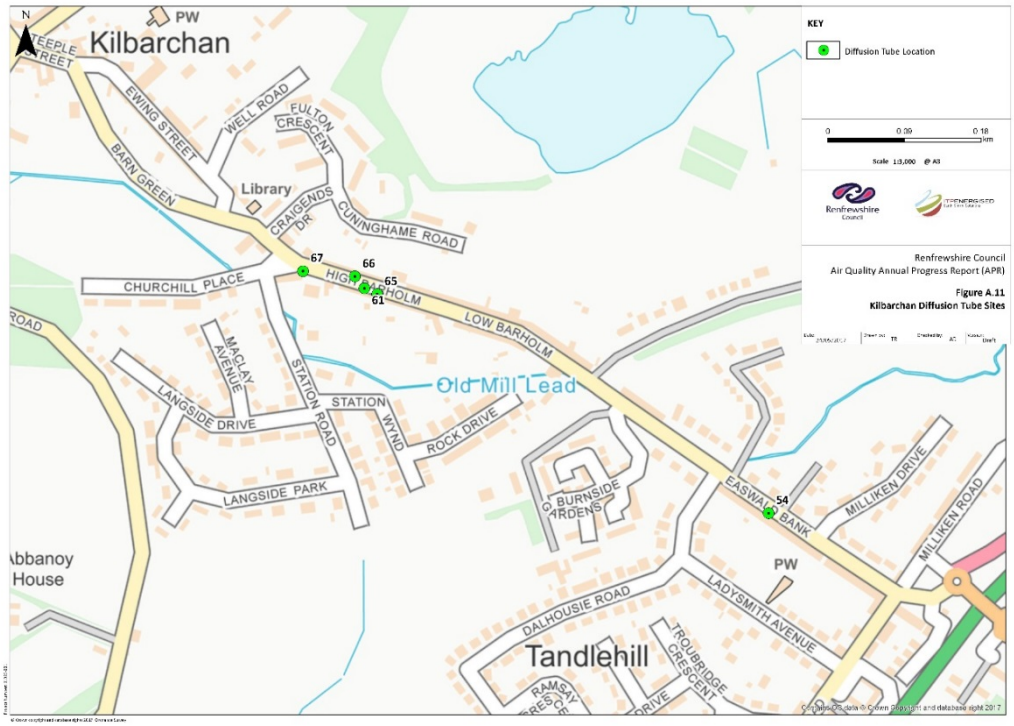


Figure A.12 – Bishopton Diffusion Tube Sites

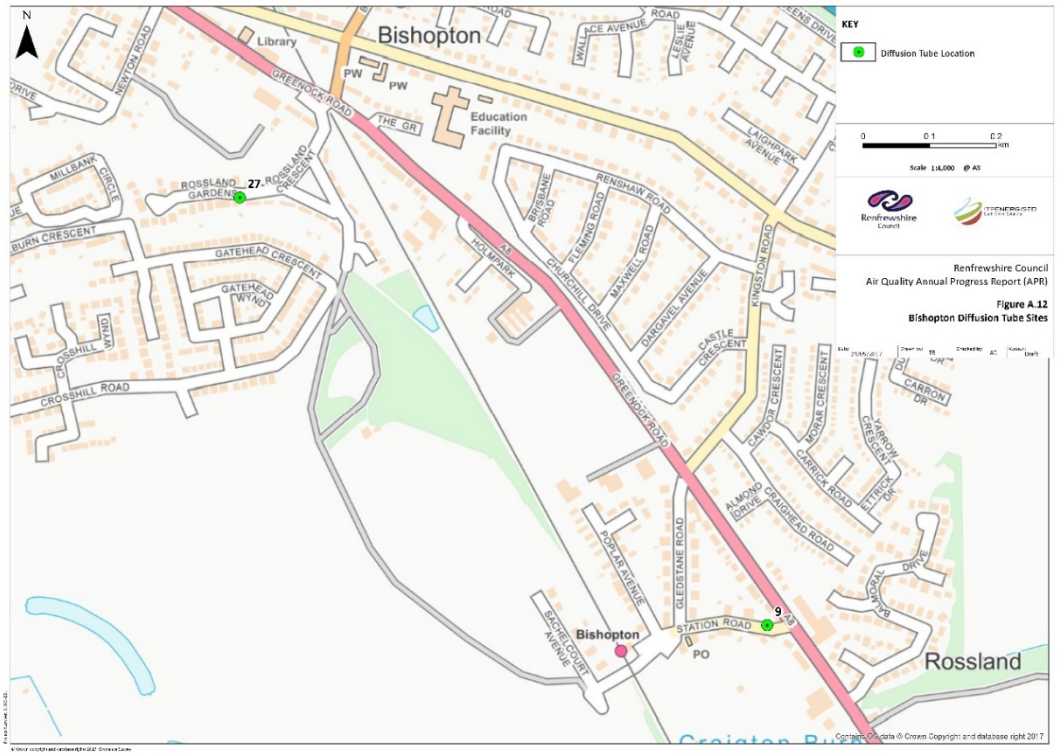


Figure A.13 – Inchinnan Diffusion Tube Site

Figure A.14 – Paisley (East) Diffusion Tube Sites

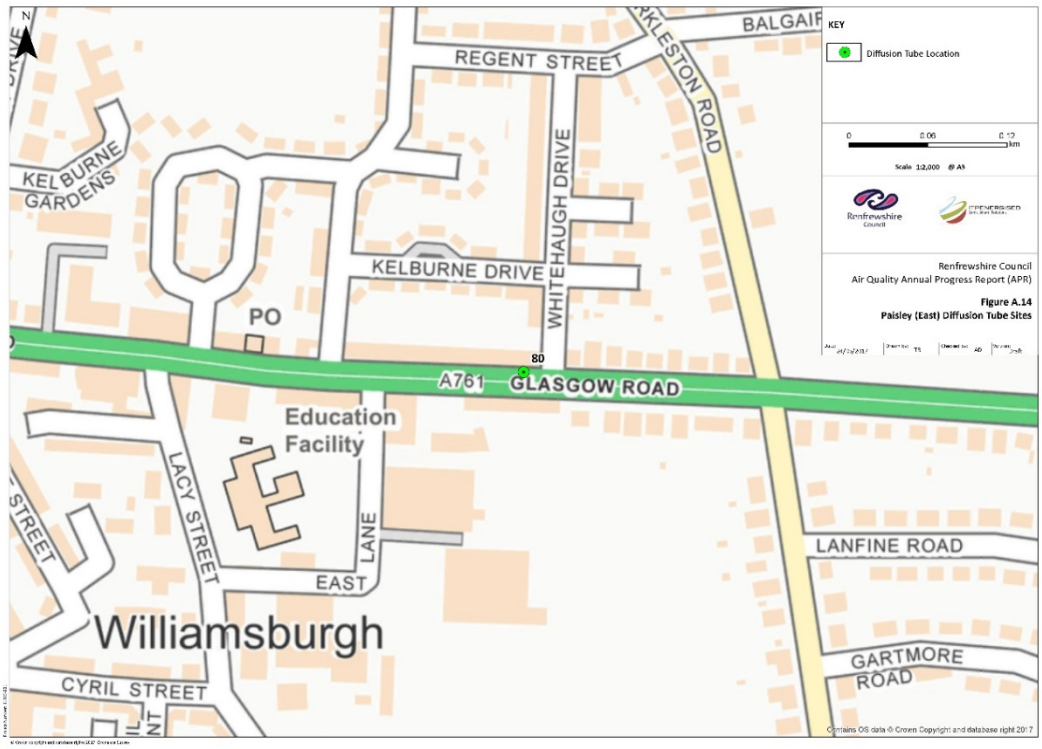


Figure A.15 – Bridge of Weir Diffusion Tube Sites

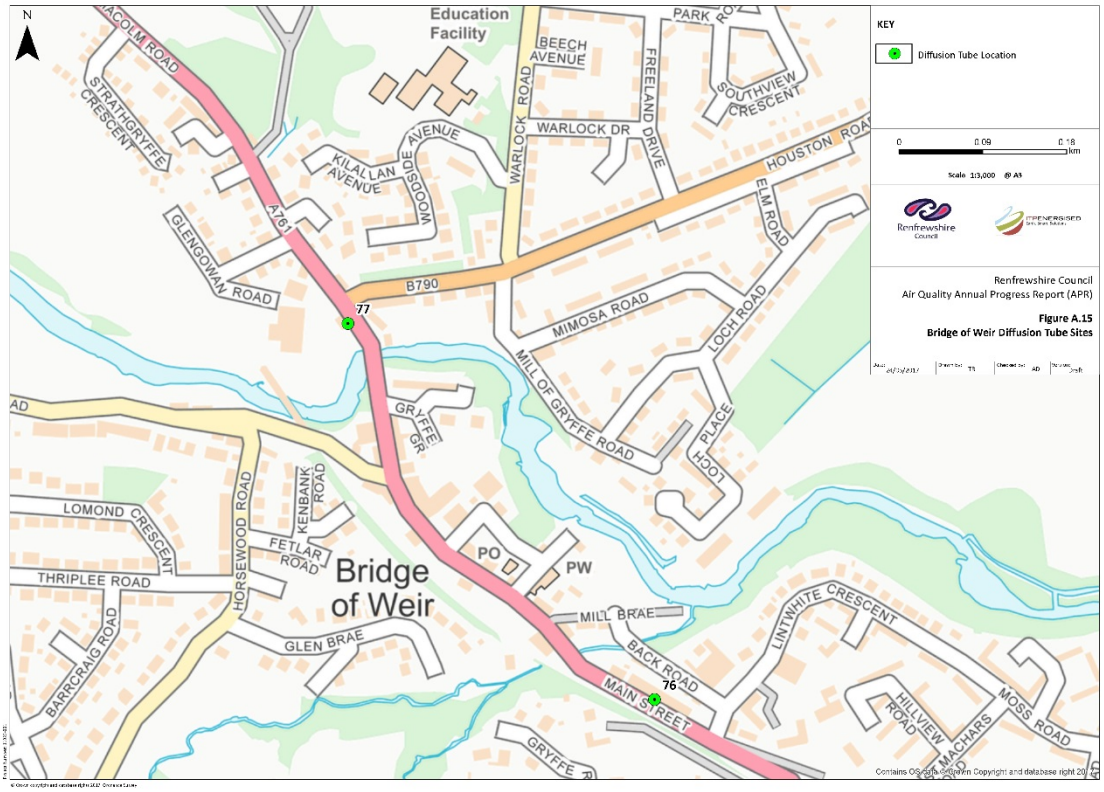


Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2012 (Bias Adj. Factor = 1.13)	2013 (Bias Adj. Factor = 1.12)	2014 (Bias Adj. Factor = 1.06)	2015 (Bias Adj. Factor = 0.94)	2016 (Bias Adj. Factor = 0.98)
Glasgow Airport	Special	Automatic	52.7	52.7	22	20	22	18	Stopped
Gordon Street, Paisley	Roadside	Automatic	99	99	38	34*	28	27	30.0
Cockels Loan	Roadside	Automatic	91	91	-	-	34	36	34.0
Paisley 1	Urban Centre	Passive	100	100	28.7	27.0	29.4	18.8	18.9
Paisley 2	Urban Background	Passive	100	100	21.0	20.0	17.8	12.7	14.8
Paisley 3	Urban Background	Passive	100	100	13.5	13.6	12.4	9.3	9.8
Paisley 4	Urban Background	Passive	100	8	21.8	19.0	18.0	13.1	12.4
Johnstone 7	Kerbside	Passive	-	-	37.4	38.3	36.7	27.9	Stopped
Renfrew 8	Kerbside	Passive	100	100	**48.8**	**53.8 (53.8)**	**62.0 (61.6)**	**43.4 (43.2)**(4)	37.8
Bishopton 9	Roadside	Passive	100	100	19.1	20.9	19.2	13.1	13.2
Paisley 13	Roadside	Passive	100	100	30.3	28.2	27.9 (30.6)	20.5 (21.3)	23.2 (26.7)
Paisley 15	Roadside	Passive	100	100	38.5	**43.7 (42.1)**	**41.2** (36.2)	26.2	31.1
Renfrew 17	Roadside	Passive	92	92	37.3	**45.2 (42.6)**	**40.0 (42.1)**	32.5 (34.1)	32.5
Paisley 18	Roadside	Passive	-	-	**48.5 (41.7)**	**44.8** (35.4)	**47.9 (45.8)**	35.5	Stopped
Paisley 19	Roadside	Passive	100	100	36.1	38.0	34.8	24.5	25.5
Johnstone 20	Kerbside	Passive	100	100	**44.4** (33.2)	**46.6** (34.3)	**45.2**	33.2	27.8
Paisley 21	Roadside	Passive	100	100	38.6	37.7	39.4 **(48.1)**	28 (31.6)	28.8 (35.0)
Renfrew 23	Roadside	Passive	88	58	29.5	30.3	35.0	22.1	16.9
Bishopton 27	Suburban	Passive	100	100	9.1	13.8	12.3	8.1	9.1
Paisley 31 West Walkinshaw Farm	Roadside	Passive	100	100	29.9	36.9	33.1 **(44.6)**	26.4 (32.8)	26.6 (39.2)
Paisley 33	Roadside	Passive	100	100	**42.5 (41.7)**	**45.9 (44.9)**	**42.0 (40.0)**	33.2	30.1
Paisley 34	Roadside	Passive	92	92	**45.4** (34.5)	**48.6** (35.8)	**46.5** (36.9)	35.4	36.9

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2016 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2012 (Bias Adj. Factor = 1.13)	2013 (Bias Adj. Factor = 1.12)	2014 (Bias Adj. Factor = 1.06)	2015 (Bias Adj. Factor = 0.94)	2016 (Bias Adj. Factor = 0.98)
Paisley 35	Roadside	Passive	100	100	**45.3 (45.3)**	**48.6 (48.6)**	**47.3 (46.5)**	30.5	34.4
Paisley 36	Roadside	Passive	100	100	**40.5 (40.5)**	39.8	38.7	29.8	27.4
Paisley 37	Roadside	Passive	-	-	39.9	**53.3**	32.1	Stopped	-
Renfrew 38	Roadside	Passive	92	92	27.0	34	32.3	24.5	23.1
Paisley 39	Special	Passive	100	8	22.8	23	21.3	18.1	23.4
Renfrew 40	Roadside	Passive	100	100	**45.5** (26.2)	36.5	38.5	27.6	28.1
Paisley 41	Roadside	Passive	92	92	**45.4** (38.3)	**45.5**	**48.8** (36.5)	37.9	33.8
Paisley 42	Roadside	Passive	100	42	37.3	**42.6**	29.1	17.7	15.7
Paisley 43	Roadside	Passive	92	92	39.1	**41.9**	**41.9 (41.9)**	32.1	30.0
Paisley 44	Roadside	Passive	100	100	**46.4 (46.4)**	38.7	29.5	21.8	21.5
Renfrew 45	Kerbside	Passive	100	100	33.8	34.6	30.2	23.6	23.2
Renfrew 46	Kerbside	Passive	-	-	26.4	25.2	23.0	Stopped	-
Renfrew 48	Roadside	Passive	100	100	35.7	**40.6 (47.3)**	35.2 (38.3)	28.7 (30.7)	29.0 (31.3)
Renfrew 49	Roadside	Passive	100	100	33.6	34.9	34.2	22.4	24.3
Paisley 50	Roadside	Passive	100	100	34.9	33.4	32.9	25.6	23.5
Linwood 51	Roadside	Passive	-	-	23.2	24.1	22.3	Stopped	-
Renfrew 52	Roadside	Passive	100	100	35.8	32.6	34.3	27.2	26.8
Inchinnan 53	Roadside	Passive	92	92	-	32.0	28.1	22.9	23.6
Kilbarchan 54	Roadside	Passive	100	100	-	31.0	29.9	20.7	22.4
Kilbarchan 55	Roadside	Passive	-	-	-	17.9	14.7	Stopped	-
Renfrew 56	Roadside	Passive	100	100	-	**43.9** (39.5)	39.3	30.2	30.6
Renfrew 57	Roadside	Passive	100	100	-	27.5	37.8	24.0	22.3
Renfrew 58	Roadside	Passive	92	92	-	25.7	26.5	18.5	20.7
Johnstone 59	Roadside	Passive	100	100	-	**64.1 (64.1)**	**57.0 (56.4)**	**45.3 (45.0)**	39.1
Paisley 60	Roadside	Passive	92	92	-	**52.2** (31.1)	**42.2** (28.9)	28.9	31.6
Kilbarchan 61	Roadside	Passive	100	100	-	**47.5 (47.5)**	**40.3** (39.7)	31.2	30.4
Cockels Loan 62	Roadside	Passive	100	100	-	**60.8(60.8)**	**46.4 (43.4)**	35.3	32.3
Paisley 63	Roadside	Passive	100	100	-	-	**40.1** (35.5)	29.7	31.2
Paisley 64	Roadside	Passive	100	100	-	-	32.3	27.8	26.0
Kilbarchan 65	Roadside	Passive	92	92	-	-	37.7	28.2	26.6
Kilbarchan 66	Roadside	Passive	100	100	-	-	21.5	18.7	18.1

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012 (Bias Adj. Factor = 1.13)	2013 (Bias Adj. Factor = 1.12)	2014 (Bias Adj. Factor = 1.06)	2015 (Bias Adj. Factor = 0.94)	2016 (Bias Adj. Factor = 0.98)
Kilbarchan 67	Roadside	Passive	100	100	-	-	19.1	14.7	14.3
Renfrew 68	Roadside	Passive	92	92	-	-	33.8	27.3	25.9
Renfrew 69	Roadside	Passive	100	100	-	-	**44.3 (44.0)**	31.8	39.7
Renfrew 70	Roadside	Passive	92	92	-	-	32.0	29.2	26.0
Renfrew 71	Roadside	Passive	100	100	-	-	38.5	28.9	28.1
Johnstone 72	Roadside	Passive	92	92	-	-	-	-	22.3
Paisley 73	Roadside	Passive	100	92	-	-	-	-	35.8
Paisley 74	Roadside	Passive	100	92	-	-	-	-	30.8
Renfrew 75	Roadside	Passive	100	92	-	-	-	-	23.7
BoW 76	Roadside	Passive	100	92	-	-	-	-	22.9
BoW 77	Roadside	Passive	100	92	-	-	-	-	24.1
Paisley 78	Roadside	Passive	100	92	-	-	-	-	28.8
Paisley 79	Roadside	Passive	100	100	-	-	-	-	34.4
Paisley 80	Roadside	Passive	100	92	-	-	-	-	23.1
Airport 81	Roadside	Passive	100	67	-	-	-	-	25.3
Paisley 82	Roadside	Passive	83	42	-	-	-	-	39.5
Paisley 83	Roadside	Passive	100	50	-	-	-	-	38.1
Paisley 84	Kerbside	Passive	100	25	-	-	-	-	32.9

Notes: Exceedances 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 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) annual 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.

(4) Distance corrected NO_2 annual means predicted at nearest relevant exposure are shown in brackets. Where the concentration increases, the receptor is closer to the kerbside than the monitor. Those sites that are still exceeding 40µg/m^3 following distance correction are shaded in rose.

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 2016 () [2]	NO_2 1-Hour Mean > 200µg/m^3 [3]				
					2012	2013	2014	2015	2016
Glasgow Airport	Special	Automatic	-	-	0	0	0	0 (396)	Stopped
Gordon Street, Paisley	Roadside	Automatic	99.35	99.35	9	**46** (304)	0	0	0
Cockels Loan	Roadside	Automatic	90.96	90.96	-	-	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 90, the 99.8th percentile of 1-hour means is provided in brackets.

Figure A.16 – Automatic Sites Annual Mean NO_2 Monitoring Trends

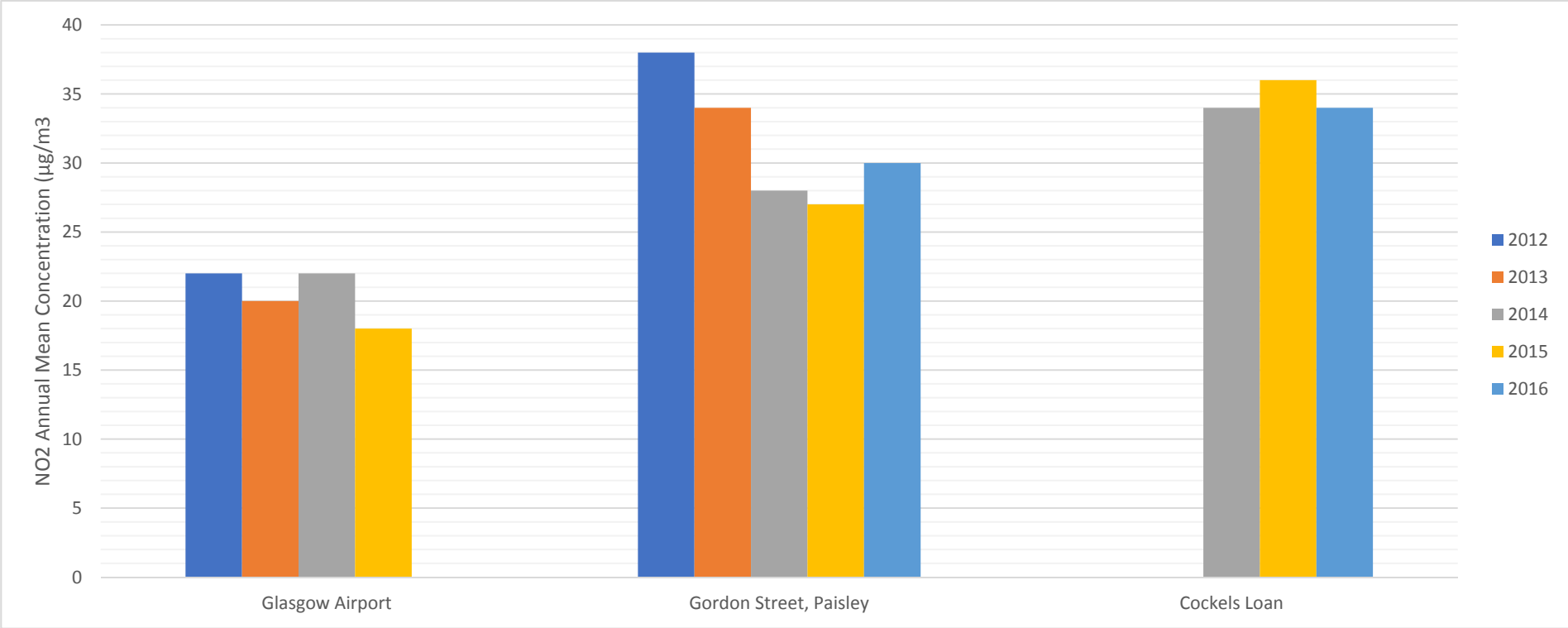


Figure A.17 – Non Automatic Annual Mean NO_2 Monitoring Trends

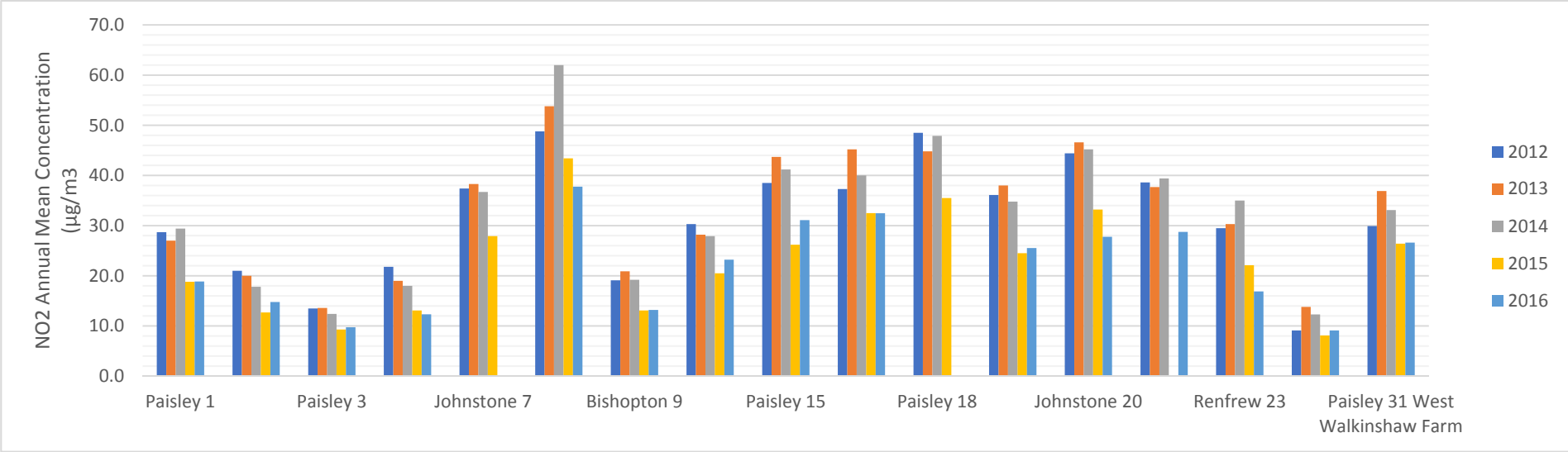


Figure A.18 – Non Automatic Annual Mean NO_2 Monitoring Trends

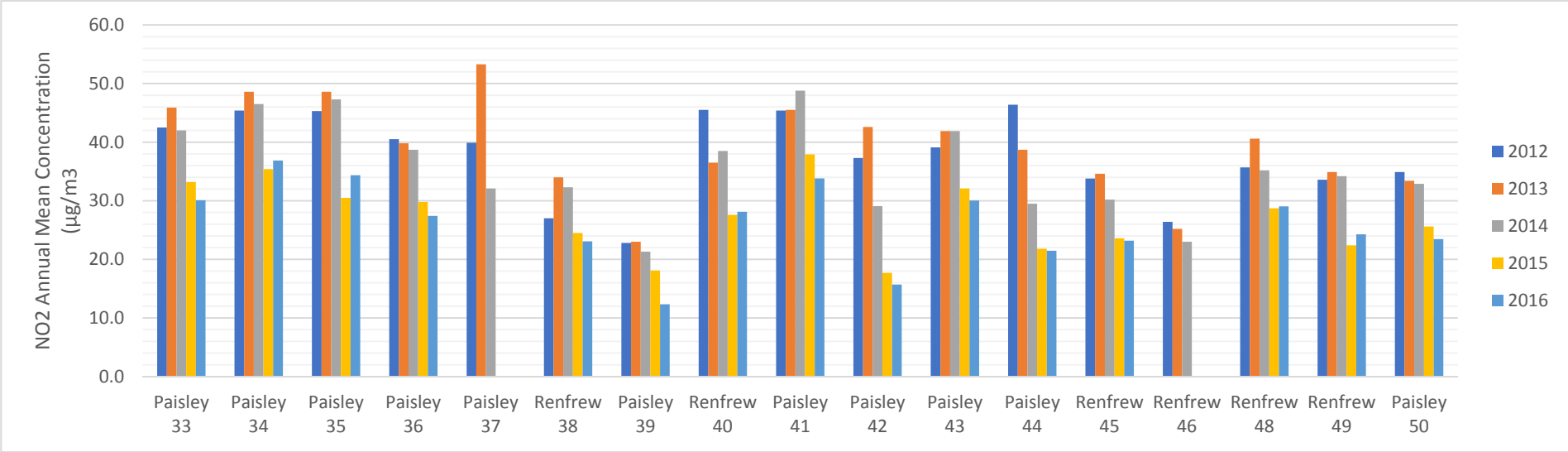


Figure A.19 – Non Automatic Annual Mean NO_2 Monitoring Trends

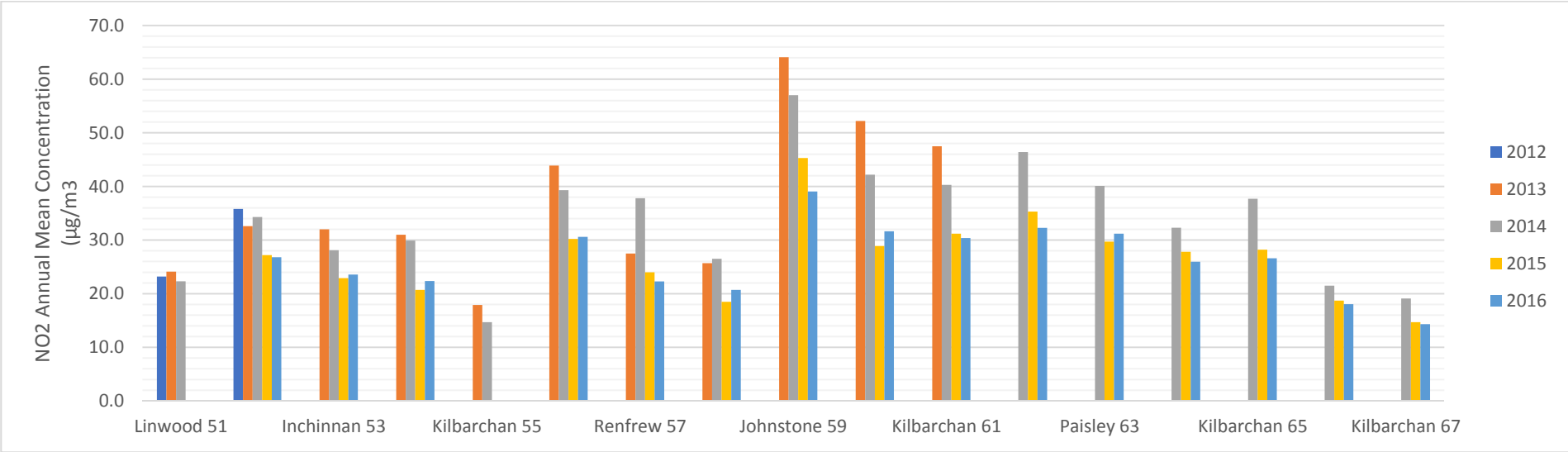


Figure A.20 – Non Automatic Annual Mean NO_2 Monitoring Trends

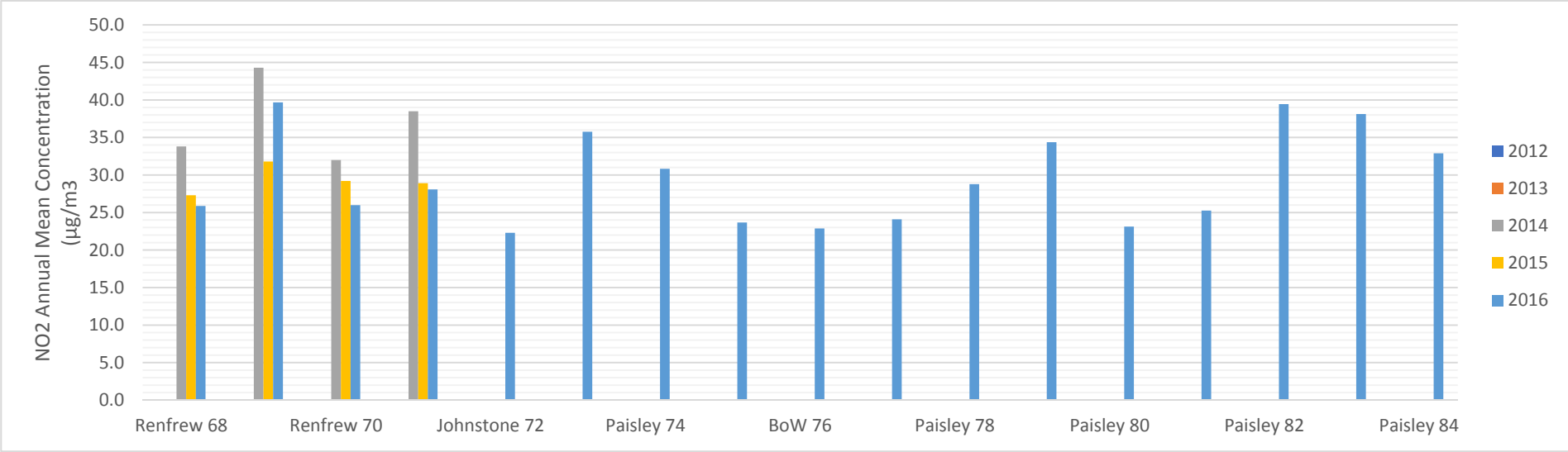


Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period () [1]	Valid Data Capture 2016 () [2]	PM_{10} Annual Mean Concentration (µg/m^3)				
				2012	2013	2014	2015	2016
Gordon Street	Roadside	91.3	91.3	15	17.9*	**21.2***	15.2**	14
St James Street	Roadside	99.17	99.17	15	14.5	14.8	13	13
Cockels Loan	Roadside	89.97	89.97	-	-	16.2*	13.1**	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).

*Annual means for previous years have been annualised following LAQM.TG(09).

** Annual means for previous years have been annualised following LAQM.TG(16).

Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period () [1]	Valid Data Capture 2016 () [2]	PM_{10} 24-Hour Mean > 50µg/m^3 [3]				
				2012	2013	2014	2015	2016
Gordon Street	Roadside	91.3	91.3	4 (43)	2 (40)	1 (49)	0 (33)	0
St James Street	Roadside	99.17	99.17	4	0	0 (42)	1	0
Cockels Loan	Roadside	89.97	89.97	-	-	0 (43)	3	1 (37)

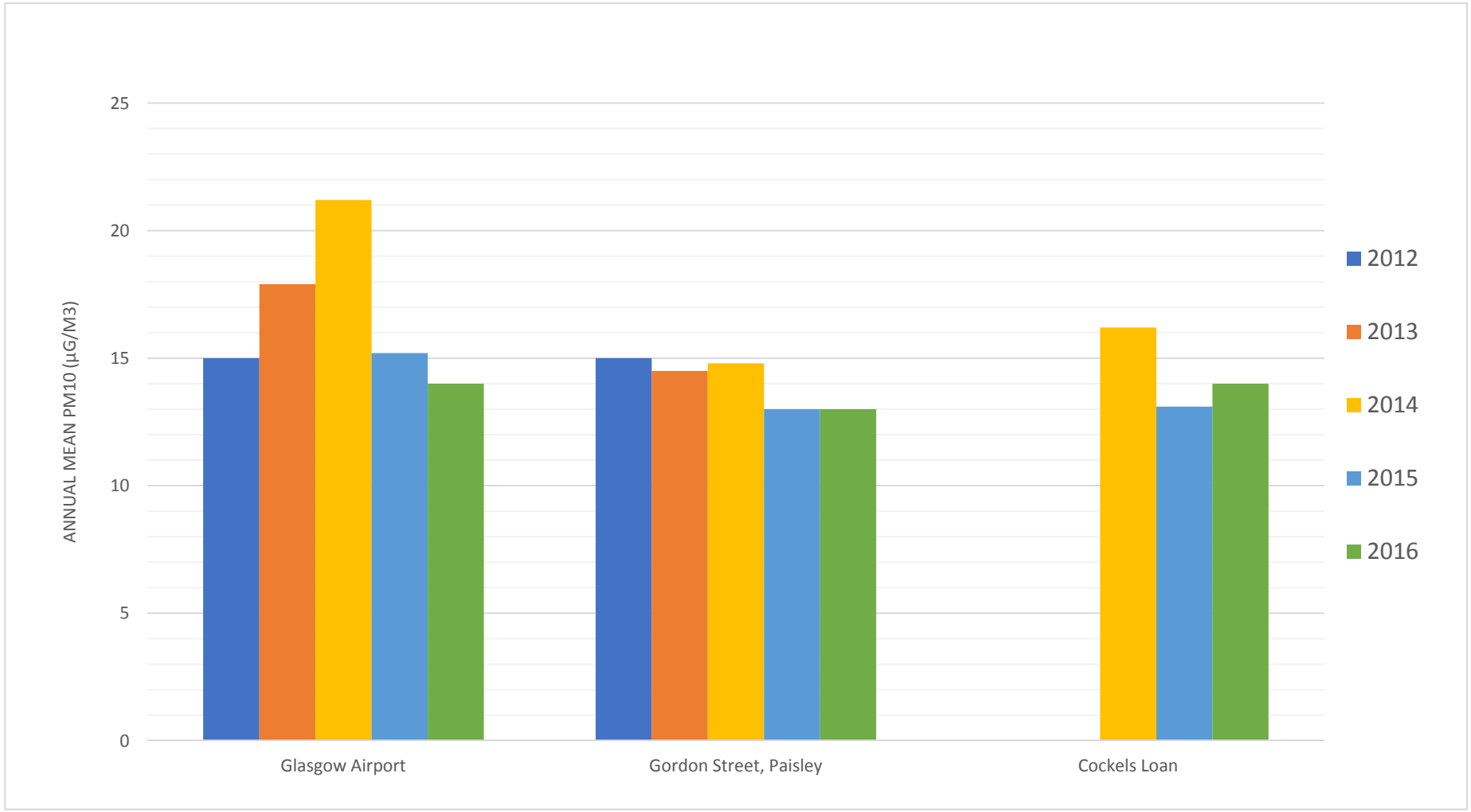
Notes: Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 7 times/year) are shown in **bold.**

(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 90, the 98th percentile of 24-hour means is provided in brackets.

Figure A.21 - Automatic Sites Annual Mean PM_{10} Monitoring Trends



Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO_2 Monthly Diffusion Tube Results for 2016

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)
Paisley 1	19.7	23.6	13.7	9.8	6.9	7.4	9.4	16.9	18	33	40.4	32.2	19.3	18.9
Paisley 2	13.4	19.9	13.8	11.2	3.7	10	3.5	10.8	11.1	24.9	34.4	24.2	15.1	14.8
Paisley 3	11.4	9.9	5.3	6.8	3.6	9.1	2	7.4	6.6	18.9	21	17.4	10.0	9.8
Paisley 4	12.6	-	-	-	-	-	-	-	-	-	-	-	12.6	12.4
Renfrew 8[2]	32.9	32	37.4	16.7	22.6	31.4	43.2	2	78.5	41.2	67.9	56.6	38.5	37.8
Bishopton 9	11.6	16.3	17.6	9.1	8.3	15	6.2	12.1	16.4	19.5	28.2	1.5	13.5	13.2
Paisley 13	22.8	29.7	23	14.4	14.9	23.5	16.8	26.1	17.3	27.6	40.5	27.5	23.7	23.2
Paisley 15	21.7	32.3	32.3	18.3	22.2	32.9	18.4	28.8	23.7	58.2	53.9	38	31.7	31.1
Renfrew 17	35.5	no return	36.8	16.7	12	24	24.3	29.7	36.5	44.2	53.4	51.5	33.1	32.5

[1] See Appendix C for details on bias adjustment

[2] There are 2 potentially invalid results in August (2 µg/m^3) and September (78.5 µg/m^3). Removal of both would give an annual mean of 38.2, bias corrected to 37.4 µg/m^3, removal of the August result would give an annual mean of 41.9 µg/m^3, bias corrected to 41 µg/m^3, removal of the September result would give an annual mean of 34.9 µg/m^3, bias corrected to 34.2 µg/m^3. This was the site of exceedance in 2015 and results demonstrate that it is still an area of potential concern. It is within the Renfrew Town Centre AQMA and subject to action plan measures for improvement.

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)
Paisley 19	24.3	20.1	23.9	12	16.4	22	14.9	25.7	30	40.2	46.5	36.7	26.1	25.5
Johnstone 20	28.3	23.1	34	21.1	16.5	6.4	20.7	28.8	27.5	48.1	54	31.7	28.4	27.8
Paisley 21(1)	26.6	31	31.9	19.6	23.7	31.6	19.9	28.8	27.8	38.4	54.3	44	31.5	28.8
Paisley 21(2)	21.7	24	19.4	16.8	17.6	29.6	18.2	27	27.5	39.9	53	37.2	27.7	
Paisley 21(3)	22.4	31.7	28.1	17.3	20.1	23.8	21.6	23.1	30.2	37.6	53.4	37.6	28.9	
Renfrew 23	21.6	21	18.3	14.7	17.4	15.4	12.2	no return	-	-	-	-	17.2	16.9
Bishopton 27	8.1	10.3	7.6	3.1	2.1	4.1	2.1	6.6	10.4	14.7	23.8	18.8	9.3	9.1
West Walkinshaw 31 (1)	19.9	27.7	32.7	17.7	14.2	6.2	23	22.4	23.7	27.2	41.8	42.5	24.9	26.6
West Walkinshaw 31 (2)	-	-	-	-	-	11.6	22.5	22.1	26.5	29.3	46	34.3	27.5	
West Walkinshaw 31 (3)	-	-	-	-	-	11.7	21	27.3	28.8	30.9	44.7	39.1	29.1	
Paisley 33	31.3	35.7	21.7	16.4	5.9	19.2	28	32	31.8	44.8	57.4	44.2	30.7	30.1

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)
Paisley 34	27	31.5	26.4	22.3	22.2	40.1	28.6	no return	35.5	58.9	73.4	48	37.6	36.9
Paisley 35	32.6	37.9	26.8	19.5	29.6	24.9	23.9	43	34.9	50.4	65.6	31.7	35.1	34.4
Paisley 36	12.1	27.4	18.1	24	13.4	15.5	22.2	32.2	31.6	41.9	58.9	38.5	28.0	27.4
Renfrew 38	25.1	no return	14.3	14.2	14.1	8.7	18.9	22.4	26.4	32.3	46.9	35.7	23.5	23.1
Paisley 39(1)	12.6	-	-	-	-	-	-	-	-	-	-	-	12.6	12.4
Paisley 39(2)	13.4	-	-	-	-	-	-	-	-	-	-	-	13.4	
Paisley 39(3)	17.2	-	-	-	-	-	-	-	-	-	-	-	17.2	
Renfrew 40	23.2	28.6	21.2	15.3	13.9	23.9	20	26.4	32.5	40	53.4	46	28.7	28.1
Paisley 41	28.2	47.2	29.7	21.4	20.2	14	no return	36.3	35.6	44.3	64.2	38.4	34.5	33.8
Paisley 42	21.4	24.2	14.6	10.8	9.2	-	-	-	-	-	-	-	16.0	15.7
Paisley 43	26.6	28.6	24.1	33	14.5	14.9	25.2	no return	36.4	38.9	54	40.9	30.6	30.0
Paisley 44	18.3	31.8	14.3	20.1	8	11.8	12.2	18.9	21.1	31.8	47.5	27	21.9	21.5
Renfrew 45	30.4	20.2	17.2	12.5	12	13.6	17	22.6	23	33.1	52	30.4	23.7	23.2
Renfrew 48	25.3	30.2	24.2	15	24.2	9.8	23.8	28.8	29	46	54.6	44.6	29.6	29.0
Renfrew 49	19.7	23.9	15.6	11.7	13.1	11.3	17.3	23.3	27.2	37.1	51.7	45.3	24.8	24.3

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)
Paisley 50	16.2	24.6	18.8	15.6	19.7	1.7	20.6	27.2	22.5	35.1	51.1	34.1	23.9	23.5
Renfrew 52	21.2	38	18.1	15.2	24.1	7.1	17.9	25.8	28.2	35.5	55	42.3	27.4	26.8
Inchinnan 53	24.1	29.4	21	11.1	16.4	11.4	18.6	19	24.6	26.7	45.7	40.8	24.1	23.6
Kilbarchan 54	24.7	25.4	22.2	16.6	16.5	14.7	14.5	18.5	22.9	21.5	42.4	33.8	22.8	22.4
Renfrew 56	30.3	33	27.9	18.8	27.8	17.5	21	31	29.2	41.9	55.5	41	31.2	30.6
Renfrew 57	20.9	28.2	18.4	9.9	9.6	10	16.2	21.5	26.6	32.8	44.2	34.6	22.7	22.3
Renfrew 58	22.7	no return	17.2	13.6	8.5	12.1	9.5	17.1	19.8	31.9	46.6	33.5	21.1	20.7
Johnstone 59	30.2	40.1	30.5	24.4	27.4	23.9	42.6	47.6	45.9	41.3	67.3	57	39.9	39.1
Paisley 60	64.5	28.5	25.9	15.6	12.7	14	27.4	34.8	43	42.7	no return	46	32.3	31.6
Kilbarchan 61	32.7	25.7	24.3	21.5	27.9	16.7	23.3	31.7	34.9	37.5	52.1	43.8	31.0	30.4
Cockels Loan 62 (1)	27.5	30.9	24.6	17.5	24.6	19.5	27.2	31.1	42.4	42.5	54.8	60.8	33.6	32.3
Cockels Loan 62 (2)	29.2	24.9	23.8	26.8	15.6	22.1	26.7	30.2	39.5	43.3	66.8	48.2	33.1	
Cockels Loan 62 (3)	40.6	26.4	28.8	19.3	16	19.8	25.9	31.3	38.5	31.6	54.3	52.7	32.1	

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)
Paisley 63	28.1	24.9	39.4	32	20.5	14.9	24	36.1	30.9	59.4	43.8	28.1	31.8	31.2
Paisley 64	21.6	14.2	22.2	16.8	17.2	8.8	18.3	27.5	22.1	46.5	50.1	52.7	26.5	26.0
Kilbarchan 65	34	no return	18.7	15.5	17.2	15.8	19.2	26.3	27.2	37	51.3	36.5	27.2	26.6
Kilbarchan 66	23.8	19.2	9.8	15.2	12.1	7.9	6.6	16.3	17.7	30.5	36.7	25.3	18.4	18.1
Kilbarchan 67	17.2	18.3	10.2	9.5	7	6	6.4	12.3	15.8	2.1	44.8	25.9	14.6	14.3
Renfrew 68	24.3	31.9	19.1	15.3	17.5	15.8	no return	21.7	27.4	37.6	48.5	31.4	26.4	25.9
Renfrew 69	37.6	104	24.8	23.9	29.1	16.1	17.5	56	28.9	42.2	70.5	35.3	40.5	39.7
Renfrew 70	26.5	29	23.9	18.4	28.2	4.7	16.1	25.9	26.2	38.4	54.5	no return	26.5	26.0
Renfrew 71	27.7	27.9	22.3	13.2	25.2	17	20	19	36.1	40.8	50.2	44.5	28.7	28.1
Johnstone 72	22	no return	20	17.5	18	13	11.2	21.3	21.5	37.1	39.7	29	22.8	22.3
Paisley 73	-	24.6	27.2	49.2	48.8	10.3	27.8	34.6	37.8	37.1	58.3	45.8	36.5	35.8
Paisley 74	-	22.9	23.3	21.7	32.2	28.4	15.9	30	33.9	44.5	56.3	36.9	31.5	30.8
Renfrew 75	-	21	16.2	12.5	9.2	19.7	10.8	21.4	29	41.4	47.2	37.4	24.2	23.7
BoW 76	-	17.4	20.2	8.8	20.2	40.9	11.6	20.1	23.8	25.1	41	27.8	23.4	22.9

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
BoW 77	-	24.1	19.9	12.9	20.9	21	19.8	21.1	31.5	23.8	41	34.4	24.6	24.1
Paisley 78	-	28.2	24	22.3	24.3	33.3	18	23	30	32.9	46.2	41	29.4	28.8
Paisley 79	23.1	25.1	23.8	16.9	33.5	29.2	30.8	36.3	38.9	47.5	70.1	45.8	35.1	34.4
Paisley 80	-	18.9	21.2	22.6	19.8	23.7	14.2	24.9	19.8	30.7	43.8	20	23.6	23.1
Airport 81	-	-	-	-	16.6	20.1	13.5	19.8	28	30.5	43.8	33.9	25.8	25.3
Paisley 82	-	-	-	-	-	-	11.9	29.9	22.6	no return	106	30.9	40.3	39.5
Paisley 83	-	-	-	-	-	-	29.6	28.1	36.9	38	61.8	39.1	38.9	38.1
Paisley 84	-	-	-	-	-	-	-	-	-	22	46.3	32.4	33.6	32.9

(1) See Appendix C for details on bias adjustment

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

Bias Correction Factor from Local Co-Location Studies

Three co-location studies were conducted within the Renfrewshire Council area during 2016 at sites where NO_2 concentrations were measured using automatic analysers. Bias factors have been calculated for each site. Details of the co-location factor calculations, including the precision checks are presented in Figures C.1 to C.2. A summary of the calculated factors is presented in Table C.1. The bias factor from the national database is presented in Figure C.3.

Figure C.1 Co-Location Study – Paisley 21 Gordon Street

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	07/01/2016	05/02/2016	26.6	21.7	22.4	24	2.7	11	6.6	35	100	Good	Good
2	05/02/2016	05/03/2016	31.0	24.0	31.7	29	4.3	15	10.6	38	100	Good	Good
3	05/03/2016	02/04/2016	31.9	19.4	28.1	26	6.4	24	15.9	31	99	Poor Precision	Good
4	02/04/2016	30/04/2016	19.6	16.8	17.3	18	1.5	8	3.7	27	100	Good	Good
5	30/04/2016	28/05/2016	23.7	17.6	20.1	20	3.1	15	7.6	22	100	Good	Good
6	28/05/2016	02/07/2016	31.6	29.6	23.8	28	4.1	14	10.1	24	98	Good	Good
7	02/07/2016	30/07/2016	19.9	18.2	21.6	20	1.7	9	4.2	17	98	Good	Good
8	30/07/2016	27/08/2016	28.8	27.0	23.1	26	2.9	11	7.2	22	100	Good	Good
9	27/08/2016	01/10/2016	27.8	27.5	30.2	29	1.5	5	3.7	21	99	Good	Good
10	01/10/2016	29/10/2016	38.4	39.9	37.6	39	1.2	3	2.9	34	100	Good	Good
11	29/10/2016	03/12/2016	54.3	53.0	53.4	54	0.7	1	1.7	49	99	Good	Good
12	03/12/2016	07/01/2017	44.0	37.2	37.6	40	3.8	10	9.5	37	100	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

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

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Paisley 21 (triplicate)

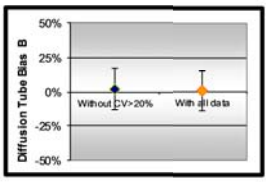
Precision: 11 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%

Bias calculated using 11 periods of data
Bias factor A: 1 (0.87 - 1.19)
Bias B: 0% (-16% - 15%)
Diffusion Tubes Mean: 30 µgm^{-3}
Mean CV (Precision): 9
Automatic Mean: 30 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 30 (26 - 35) µgm^{-3}

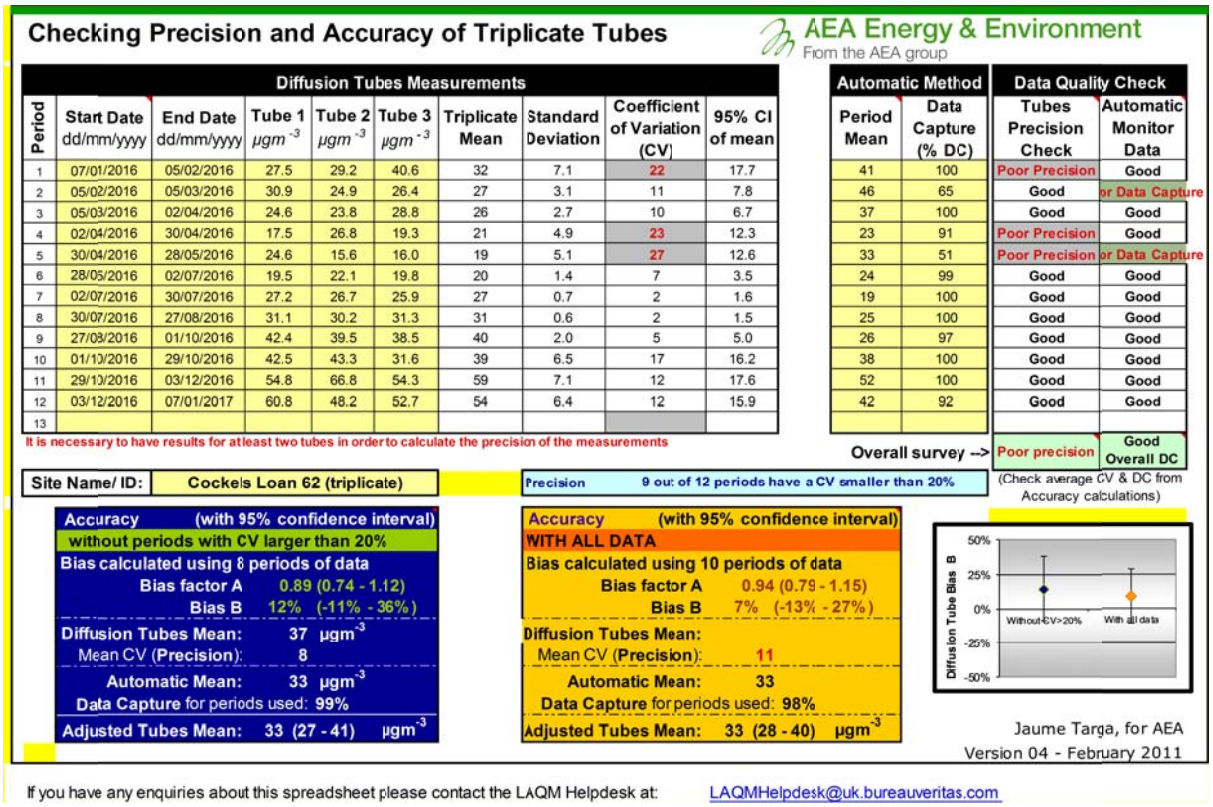
Accuracy (with 95% confidence interval) WITH ALL DATA

Bias calculated using 12 periods of data
Bias factor A: 1.01 (0.88 - 1.19)
Bias B: -1% (-16% - 13%)
Diffusion Tubes Mean:
Mean CV (Precision): 11
Automatic Mean: 30
Data Capture for periods used: 99%
Adjusted Tubes Mean: 30 (26 - 35) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Figure C.2 Co-Location Study – Cockels Loan



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	07/01/2016	05/02/2016	27.5	29.2	40.6	32	7.1	22	17.7
2	05/02/2016	05/03/2016	30.9	24.9	26.4	27	3.1	11	7.8
3	05/03/2016	02/04/2016	24.6	23.8	28.8	26	2.7	10	6.7
4	02/04/2016	30/04/2016	17.5	26.8	19.3	21	4.9	23	12.3
5	30/04/2016	28/05/2016	24.6	15.6	16.0	19	5.1	27	12.6
6	28/05/2016	02/07/2016	19.5	22.1	19.8	20	1.4	7	3.5
7	02/07/2016	30/07/2016	27.2	26.7	25.9	27	0.7	2	1.6
8	30/07/2016	27/08/2016	31.1	30.2	31.3	31	0.6	2	1.5
9	27/08/2016	01/10/2016	42.4	39.5	38.5	40	2.0	5	5.0
10	01/10/2016	29/10/2016	42.5	43.3	31.6	39	6.5	17	16.2
11	29/10/2016	03/12/2016	54.8	66.8	54.3	59	7.1	12	17.6
12	03/12/2016	07/01/2017	60.8	48.2	52.7	54	6.4	12	15.9
13									

It is necessary to have results for atleast 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
41	100	Poor Precision	Good
46	65	Good	or Data Capture
37	100	Good	Good
23	91	Poor Precision	Good
33	51	Poor Precision	or Data Capture
24	99	Good	Good
19	100	Good	Good
25	100	Good	Good
26	97	Good	Good
38	100	Good	Good
52	100	Good	Good
42	92	Good	Good
Overall survey -->		Poor precision	Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Cockels Loan 62 (triplicate)

Precision: 9 out of 12 periods have a CV smaller than 20%

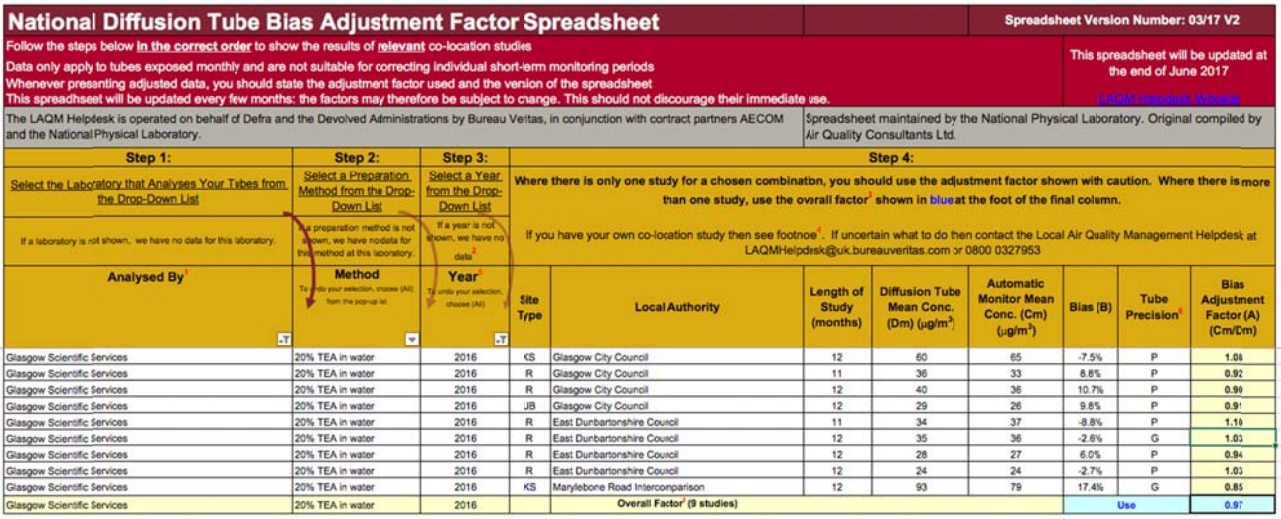
Accuracy (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 8 periods of data
Bias factor A 0.89 (0.74 - 1.12)
Bias B 12% (-11% - 36%)
Diffusion Tubes Mean: 37 µgm^{-3}
Mean CV (Precision): 8
Automatic Mean: 33 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 33 (27 - 41) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 10 periods of data
Bias factor A 0.94 (0.79 - 1.15)
Bias B 7% (-13% - 27%)
Diffusion Tubes Mean:
Mean CV (Precision): 11
Automatic Mean: 33
Data Capture for periods used: 98%
Adjusted Tubes Mean: 33 (28 - 40) µgm^{-3}

Jaume Targa, for AEA
Version 04 - February 2011

If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

Figure C.3 Glasgow Scientific Services – National average bias adjustment factor 2016



National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/17 V2

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 2017

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/m^3)	Automatic Monitor Mean Conc. (Cm) (µg/m^3)	Bias (B)	Tube Precision[4]	Bias Adjustment Factor (A) (Cm/Dm)
Glasgow Scientific Services	20% TEA in water	2016	KS	Glasgow City Council	12	60	65	-7.5%	P	1.08
Glasgow Scientific Services	20% TEA in water	2016	R	Glasgow City Council	11	36	33	8.8%	P	0.92
Glasgow Scientific Services	20% TEA in water	2016	R	Glasgow City Council	12	40	36	10.7%	P	0.90
Glasgow Scientific Services	20% TEA in water	2016	JB	Glasgow City Council	12	29	26	9.8%	P	0.91
Glasgow Scientific Services	20% TEA in water	2016	R	East Dunbartonshire Council	11	34	37	-8.8%	P	1.10
Glasgow Scientific Services	20% TEA in water	2016	R	East Dunbartonshire Council	12	35	36	-2.6%	G	1.03
Glasgow Scientific Services	20% TEA in water	2016	R	East Dunbartonshire Council	12	28	27	6.0%	P	0.94
Glasgow Scientific Services	20% TEA in water	2016	R	East Dunbartonshire Council	12	24	24	-2.7%	P	1.03
Glasgow Scientific Services	20% TEA in water	2016	KS	Marylebone Road Intercomparison	12	93	79	17.4%	G	0.85
Glasgow Scientific Services	20% TEA in water	2016		Overall Factor[3] (9 studies)				Use		0.97

Table C.1: Summary of bias adjustment factors at NO_2 automatic monitoring sites 2016

Co-location Site	Tube Precision	Automatic data quality	Bias Factor (excluding periods with CV >25%)	Bias Factor (using all periods of data)
Cockels Loan Renfrew	Poor Precision	Good Overall	0.89	0.94
Gordon Street, Paisley	Good Overall	Good Overall	1	1.01
			AVERAGE	**=0.98**
From National Studies take from sites with Good Precision			**AVERAGE**	**0.94**
From National Studies take All studies			**AVERAGE**	**0.97**

Discussion of Choice of Bias Adjustment Factor to Use

Diffusion tube bias adjustment factors for 2016 are available from two local co-location studies and the national database of co-location studies. Historically Renfrewshire Council have used an average of the local adjustment factors to adjust their diffusion tube results.

A summary of the local bias factors both excluding periods with a cv > 25%; and using all 12 periods are presented in Table A.1. When adjusting single tube measurements the factor calculated using all 12 periods should be used; it is therefore important that this is representative of the bias calculated using triplicate tube surveys with ‘good’ precision.

The average of the factors derived from the Gordon Street and Cockels Loan is 0.98.

The national adjustment factor is based on nine studies where seven are of poor precision and only two are of good precision. Taking the average of all national studies gives a bias correction factor of 0.97 while taking the value for the studies with good precision gives a factor of 0.94.

The use of a local bias correction factor is consistent with the approach taken by Renfrewshire Council in previous years and offers a conservative adjustment.

PM Monitoring Adjustment

All PM_{10} measurements were made using TEOM analysers fitted with FDMS units. The measurements are therefore considered gravimetric equivalent and no adjustments have been applied to the data.

All TEOM FDMS data were fully ratified by Ricardo Energy and Environment to AURN standards. The certificates of ratified data are included in Figures C.4 to C.6.

Figure C.4 Ratified Data from Ricardo Energy and Environment for Paisley Gordon Street

Air Pollution Report

Air Quality in Scotland

1st January to 31st December 2016

Paisley Gordon Street (Site ID: PAI3)

These data have been fully ratified

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

Pollutant	NO µg/m³	NO_2 µg/m³	NO_x as NO_2 µg/m³	PM_{10} µg/m³
Number Days Low	-	366	-	332
Number Days Moderate	-	0	-	0
Number Days High	-	0	-	0
Number Days Very High	-	0	-	0
Max Daily Mean	299	97	553	41
Annual Max	546	163	998	60
Annual Mean	34	30	82	14
98th Percentile of daily mean	-	-	-	30
90th Percentile of daily mean	-	-	-	22
99.8th Percentile of hourly mean	-	127	-	-
98th Percentile of hourly mean	192	88	374	37
95th Percentile of hourly mean	119	73	256	30
50th Percentile of hourly mean	20	25	56	12
% Annual data capture	**99.37%**	**99.35%**	**99.35%**	**91.30%**

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

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

1 / 3

Report produced by Ricardo Energy & Environment

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

Annual Graph

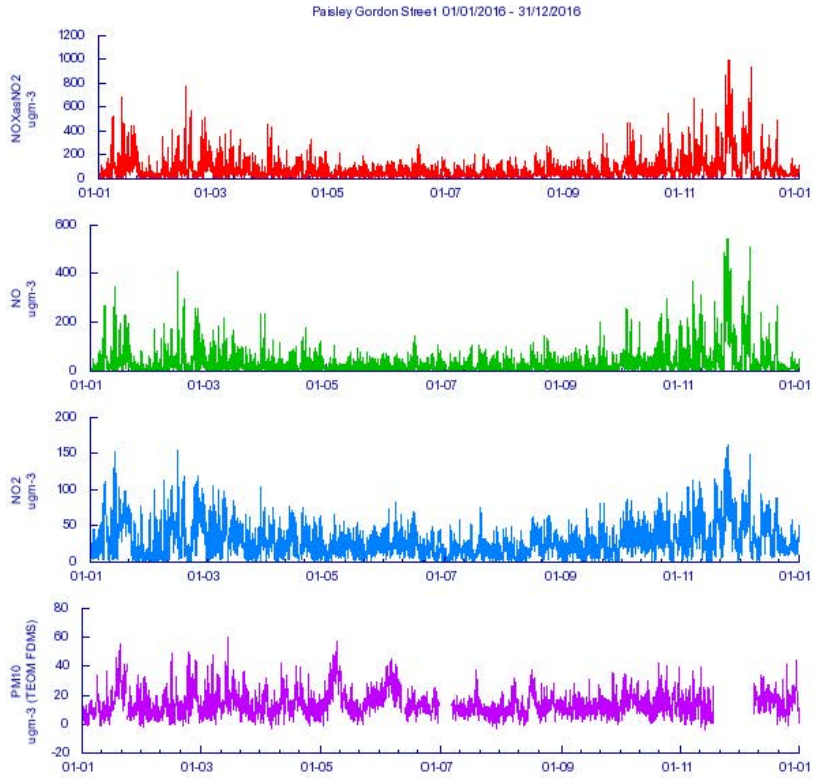


Figure C.5 Ratified Data from Ricardo Energy and Environment for Paisley St James Street

Air Pollution Report

Air Quality in Scotland

1st January to 31st December 2016

Paisley St James St (Site ID: PAI4)

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	PM_{10} µg/m³
Number Days Low	362
Number Days Moderate	0
Number Days High	0
Number Days Very High	0
Max Daily Mean	48
Annual Max	89
Annual Mean	13
98th Percentile of daily mean	34
90th Percentile of daily mean	21
98th Percentile of hourly mean	36
95th Percentile of hourly mean	29
50th Percentile of hourly mean	11
% Annual data capture	**99.17%**

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

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

1 / 3

Report produced by Ricardo Energy & Environment

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

Annual Graph

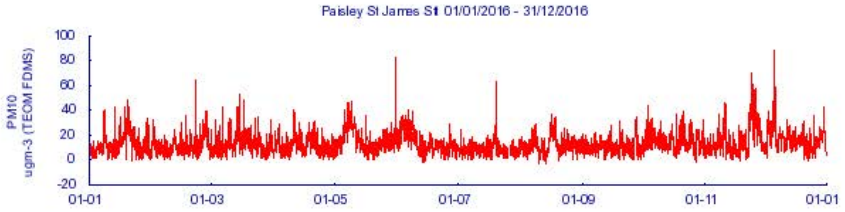


Figure C.6 Ratified Data from Ricardo Energy and Environment for Cockels Loan

Air Pollution Report

Air Quality in Scotland

1st January to 31st December 2016

Renfrew Cockels Loan (Site ID: REN1)

These data have been fully ratified

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

Pollutant	NO µg/m³	NO_2 µg/m³	NO_x as NO_2 µg/m³	PM_{10} µg/m³
Number Days Low	-	338	-	325
Number Days Moderate	-	0	-	1
Number Days High	-	0	-	0
Number Days Very High	-	0	-	0
Max Daily Mean	366	108	669	53
Annual Max	564	168	1,030	107
Annual Mean	30	34	80	14
98th Percentile of daily mean	-	-	-	36
90th Percentile of daily mean	-	-	-	23
99.8th Percentile of hourly mean	-	134	-	-
98th Percentile of hourly mean	219	95	429	43
95th Percentile of hourly mean	123	80	262	32
50th Percentile of hourly mean	14	29	51	12
% Annual data capture	**90.98%**	**90.96%**	**90.96%**	**89.97%**

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

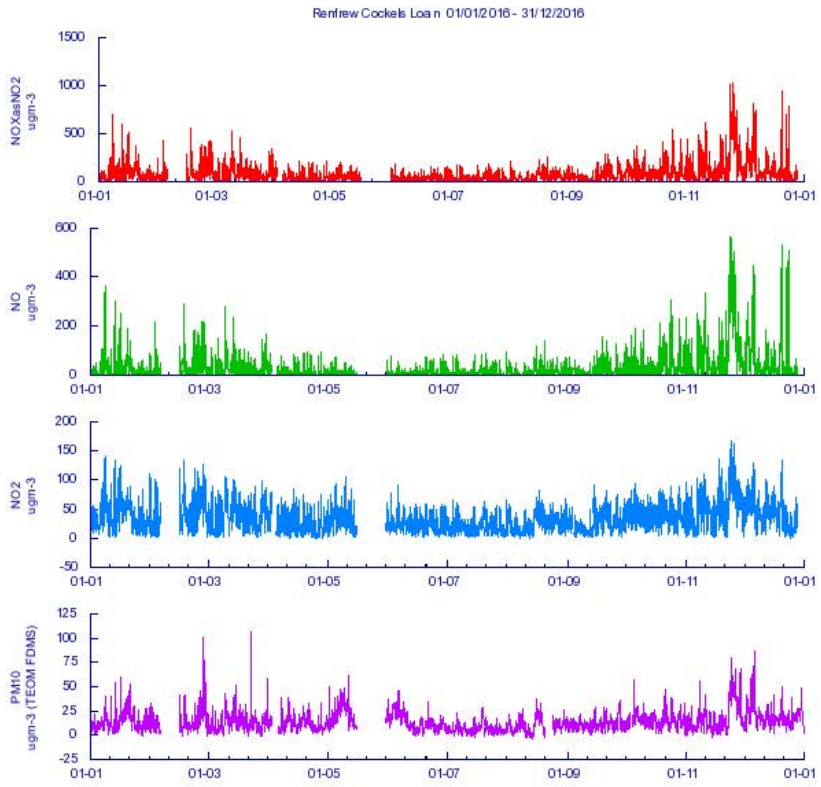
All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

1 / 3

Report produced by Ricardo Energy & Environment

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

Annual Graph



QA/QC of Diffusion Tube Monitoring

NO_2 diffusion tubes are supplied and analysed by Glasgow Scientific Services using a preparation mixture of 20 triethanolamine (TEA) in water. Glasgow Scientific Services is a UKAS accredited laboratory with documented Quality Assurance/Quality Control (QA/QC) procedures for diffusion tube analysis. The laboratory prepares the diffusion tubes using the 20 triethanolamine (TEA) in water method.

Glasgow Scientific Services have participated in recent AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be satisfactory during the previous five rounds in 2016 and 2017 based upon a z-score of <±2 were as follows:

- January to February 2016: 75
- April to May 2016: 100
- July to August 2016: 100
- October to November 2016: 100
- January to February 2017: 100

Over a rolling five round WASP window, it is expected that 95 of laboratory results should be ≤+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 up to the end of 2016 is 100.

Supplementary Screening Assessments for Biomass Application at 1 Blackstoun Farm Cottages, Blackstoun Road, Linwood, Paisley, PA3 3AF

Figure C.7 Screening Assessment for NO_x

Review and Assessment Tool for oxides of nitrogen emissions from biomass combustion stacks

Annual mean NO_2 objective

The target emissions of NO_x in g/s from biomass combustion source emissions are calculated for your given stack details. Greater emission rates may result in exceedence of the annual mean objective for NO_2

Enter required information in Cream Cells
Resulting Emission in Red Bold

Building height	5	m
Stack diameter	0.45	m
Stack height	6.7	m
Location {Scotland, Rest of UK}	Scotland	
NO_2 Annual mean background concentration (include roadside contribution at relevant receptors)	9.09	µg/m^3
Calculated Effective stack height	2.8	m
Target Emission Rate	0.1457	g/s

If the maximum stack emission rate is less than the target above then it is not likely that the annual mean limit value for NO_2 will be exceeded

Figure C.8 Screening Assessment for PM_{10}

Review and Assessment Tool for PM_{10} from biomass combustion stacks

The maximum emissions of PM_{10} in g/s from biomass combustion source emissions are calculated for your given stack details. Greater emission rates may result in exceedence of the 24 hour objective for PM10 in England, Wales and Northern Ireland or the annual mean objective in Scotland.

Enter required information in Cream Cells
Resulting Emission in Red Bold

Building height	5	m
Stack diameter	0.45	m
Stack height	6.7	m
Location {Scotland, Rest of UK}	Scotland	
PM_{10} Annual mean background concentration (include roadside contribution at relevant receptors)	10.88	$\mu g/m^3$
Calculated Effective stack height	2.8	m
Target Emission Rate	0.0336	g/s

If the maximum stack emission rate is less than the target above then it is not likely that the most stringent objective for PM_{10} will be exceeded

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
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

Air Quality in Scotland website (2016 data); www.scottishairquality.co.uk

Cleaner Air for Scotland (CAFS), The Scottish Government, November 2015.

Defra (2009) Local Air Quality Management Technical Guidance LAQM.TG(09), February 2009

Defra (2016) Local Air Quality Management Technical Guidance (TG16), April 2016

Defra (2016) UK Air Local Air Quality Management Support website, Summary of Laboratory Performance in AIR NO_2 Proficiency Testing Scheme (April2014-February2016); http://laqm.defra.gov.uk/

National Physical Laboratory (2017) National diffusion tube bias adjustment factor spread sheet (v 03/17 Final v2)

Renfrewshire Council (2012) Detailed Assessment – Renfrew

Renfrewshire Council (2013) LAQM Progress Report

Renfrewshire Council (2014) LAQM Progress Report

Renfrewshire Council Paisley Town Centre Air Quality Action Plan (2014)

Renfrewshire Council (2015) Updating and Screening Assessment Report

Renfrewshire Council (2016) Updating and Screening Assessment Report

Renfrewshire Council (2014) Carbon Management Plan 2014/15-2019/20

Ricardo-AEA Updated Detailed Assessment of Air Quality – High Street, Johnstone (October 2015) Ref: ED59712001- Issue Number 1

Ricardo-AEA Detailed Assessment of Air Quality – Renfrew Town Centre (January 2016) Ref: ED59712001- Issue Number 1 Ref: ED59712- Issue Number 6

Ricardo-AEA Source Apportionment Study – Paisley Town Centre (June 2016) Report reference ED59712001

Scottish Government (2016) Local Air Quality Management Policy Guidance – Scotland LAQM.PG(S)16, March 2016, ISBN 978178651699