

## Annual Progress Report (APR)



2016 Air Quality Annual Progress Report (APR) for  
Renfrewshire Council

In fulfilment of Part IV of the  
Environment Act 1995

Local Air Quality Management

June 2016

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## Executive Summary: Air Quality in Our Area

### Air Quality in Renfrewshire Council

This report provides an overview of air quality in Renfrewshire Council during 2015. 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.

Annual mean nitrogen dioxide (NO<sub>2</sub>) concentrations recorded at all automatic monitoring sites in 2015 were below the annual mean objective level.

There were no exceedances of the NO<sub>2</sub> hourly mean at any of the automatic monitoring sites.

There were no exceedances of the NO<sub>2</sub> annual mean objective (after bias adjustment and distance correction) at any of the diffusion tube monitoring locations within the existing Paisley Town Centre (PTC) Air Quality Management Area (AQMA). This is a significant improvement on the 5 locations of exceedance identified in 2014.

Exceedances of the annual mean objective outside of the AQMA (after bias adjustment and distance correction) were measured at the following diffusion tube monitoring locations:

- Renfrew 8 - Inchinnan Rd
- Johnstone 59 – High St

This compares with 7 locations of exceedance in 2014.

None of the exceedances were in excess of the 60 µg/m<sup>3</sup> threshold at which TG(16) recommends that there may be a risk of the NO<sub>2</sub> 1-hour mean objective being exceeded.

Annual mean PM<sub>10</sub> concentrations recorded at all automatic monitoring sites were below the annual mean objectives in 2015. However data capture for PM<sub>10</sub> at Paisley Gordon Street was only 61% and for a strict comparison against objective levels there must be a data capture of >90% throughout the calendar year. The result should therefore be considered in this context. The site is located within the existing

Paisley AQMA boundary. No exceedances of the PM<sub>10</sub> short-term objective have been recorded in 2015 at any of the automatic site locations.

In terms of the PTC AQMA there has been a significant improvement in air quality since 2014 and 2015 is the first time since declaration of the AQMA in 2009 that the results from all monitoring locations within the AQMA have complied with the objective levels.

Data were 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. The 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.

### ***Detailed Assessments During 2015***

Detailed Assessments were carried out in Paisley, Renfrew and Johnstone during 2015 and submitted to the Scottish Government for review. The studies were based on 2014 monitoring data. A summary of each study is provided below:

#### ***Paisley Town Centre***

The original PTC AQMA was declared in 2009 for exceedances of the PM<sub>10</sub> and NO<sub>2</sub> annual mean objectives and the NO<sub>2</sub> 1-hour mean objective. An Air Quality Action Plan (AQAP) was published in 2014 and the majority of action measures have been completed or are ongoing measures (a summary is provided in Section 2). Review and Assessment reports up to the Updating and Screening Assessment in 2015 identified continued exceedances of the annual mean NO<sub>2</sub> objective within the AQMA and so a detailed modelling study (including modelling at various heights) with an updated emissions inventory and a source apportionment exercise was undertaken in 2015. The study identified no exceedances of the Scottish PM<sub>10</sub> annual mean objective within the study area but confirmed potential exceedances still of the annual mean NO<sub>2</sub> objective at some locations within the AQMA. It was therefore decided to

model a number of possible emissions reduction measures across the town centre in order to determine the potential impacts on local air quality. The scenarios examined were:

- 10% reduction in congestion;
- 10% and 20% reduction in the volume of traffic; and
- the effect of all buses within the AQMA routes being of Euro 5 standard.

The modelling results for the three scenarios indicated that each option will provide a reduction in both annual mean NO<sub>2</sub> and PM<sub>10</sub> concentrations. However compliance with the NO<sub>2</sub> annual mean objective at all locations was only achievable by implementing the 20% reduction in traffic volume scenario. Given that a reduction in total vehicle numbers of 20% across the entire AQMA is considered unlikely then an alternative option would be for the Council to consider a combination of the mitigation scenarios. The Council will be undertaking an update of the Paisley Town Centre Air Quality Action Plan during 2016 and 2017 with a view to identifying new effective and feasible action plan measures. The findings from this PTC detailed modelling study will be used to inform this process.

#### *Renfrew Town Centre*

NO<sub>2</sub> diffusion tube monitoring in Renfrew during 2014 identified exceedances of the annual mean objective and the potential for exceedance of the 1-hour objective due to diffusion tube No 8 at Inchinnan Road recording an annual mean concentration in excess of 60µg/m<sup>3</sup>. NO<sub>2</sub> annual mean exceedances were also confirmed by the detailed assessment modelling results.

The assessment did not predict any modelled exceedances of the PM<sub>10</sub> objectives.

The Council will therefore be declaring an AQMA in Renfrew Town Centre later in 2016 for the NO<sub>2</sub> annual mean and 1-hour NO<sub>2</sub> objective.

It is the intention of Renfrewshire Council to relocate the Glasgow Airport continuous NO<sub>x</sub> monitor to a location within Renfrew Town Centre in order to confirm the predicted exceedances of the 1-hour NO<sub>2</sub> objective. Until such time, the Council will install a recently purchased mobile air monitor unit in this location that measures both NO<sub>x</sub> and particulates.

*Johnstone Town Centre*

The 2015 Detailed Assessment for Johnstone Town Centre confirmed exceedances of the annual mean NO<sub>2</sub> objective based on both modelling and the results from a small network of passive diffusion tube monitoring sites. The assessment also identified modelled exceedances of the annual mean PM<sub>10</sub> objective but there is currently no PM<sub>10</sub> monitoring undertaken within the area to verify the modelled data.

The Council will therefore be declaring an AQMA in the Johnstone High Street area later in 2016 for the NO<sub>2</sub> annual mean objective only. This is based on advice from the Scottish Government and their technical advisors that monitoring of PM<sub>10</sub> should be undertaken in this area prior to concluding whether declaration is required. Scottish Government funding for 2016/17 has been awarded to the Council in order to install a PM monitor in this location.

**Actions to Improve Air Quality**

***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 2016/2017 and funding will enable the Schools Idling Initiative to be implemented at all primary schools within the Council area raising awareness and encouraging walking to school and the use of more sustainable transport options.

There is also a programme of vehicle emissions testing undertaken twice per year in Paisley Town Centre. Where vehicles fail relevant emissions standards, the Council can take enforcement action and issue drivers with a fixed penalty notice (FPN). 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 that vehicle exhaust emissions have been retested and comply 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 of actions of Council personnel on local air quality. These include increasing the number of electric vehicles in the Council fleet including a pilot programme of electric pool cars for use by Environmental Health staff for work purposes, upgrading other vehicles to those with tighter Euro class emissions standards, implementing driver training programmes to encourage more efficient driving patterns and fuel efficiency and improving the access to green travel planning initiatives including cycling to work.

A new Council wide initiative introduced in 2015 is the Greener Transport Sub Group (GTSG). Group members include the Council, Community Planning Partners and third sector employers, for example, Glasgow Airport, SPT, UWS, SUSTRANS, NHS, Scotrail, INTU Braehead and Hillington Park. The purpose and remit of the group is to facilitate joint working with all members working towards a common goal of sustainable travel by maintaining green transport initiatives, learning from each other and sharing plans relating to transport, travel and staff commuting. A GTSG Action Plan has been developed which includes actions related to Greener Active Transport, Greener Public Transport, Greener Workplace Transport and a measure specifically relating to Air Quality Management within the Council area.

### **Priorities in LAQM for Renfrewshire Council in 2016/2017**

The next LAQM requirements for Renfrewshire Council are:

- Declare AQMAs for Renfrew and Johnstone for exceedances of the NO<sub>2</sub> objectives - August 2016;
- Commence action planning process for Renfrew and Johnstone AQMAs once declared;
- Update the Paisley Town Centre Air Quality Action Plan and consider merging with those being prepared for Renfrew & Johnstone to establish a Council wide AQAP - AQAP(s) to be complete by end of 2017;
- Install additional monitoring capability in Renfrew and Johnstone via relocation of Glasgow Airport NO<sub>x</sub> analyser to Renfrew Town Centre, installation of new PM monitor in Johnstone and use of the new mobile monitor where necessary at either location;

## **Renfrewshire Council**

- Undertake improvements to the SCOOT traffic management system within Renfrewshire - by March 2017;
- Implement ECO Stars Fleet Recognition Scheme within Renfrewshire - summer 2016;
- Continue Schools Idling Initiative to include all primary schools in Renfrewshire;
- Continue with vehicle emission testing twice per year within Paisley Town Centre; and
- Submit the 2017 Annual Progress Report.

### **How to Get Involved**

The general public can find out more about air quality management 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 2015. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Progress Report (APR) 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 <sub>2</sub> )	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m <sup>3</sup>	Annual mean	31.12.2005
Particulate Matter (PM <sub>10</sub> )	50 µg/m <sup>3</sup> , not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m <sup>3</sup>	Annual mean	31.12.2010
Particulate Matter (PM <sub>2.5</sub> )	10 µg/m <sup>3</sup>	Annual mean	31.12.2020
Sulphur dioxide (SO <sub>2</sub> )	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 µg/m <sup>3</sup>	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m <sup>3</sup>	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m <sup>3</sup>	Running 8-Hour mean	31.12.2003

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

## 2. Actions to Improve Air Quality

### 2.1 Air Quality Management Areas

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

A summary of the current AQMA declared by Renfrewshire Council in 2009 can be found in Table 2.1. Further information related to the AQMA, including a map of the AQMA boundary is available online at [https://uk-air.defra.gov.uk/aqma/local-authorities?la\\_id=382](https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=382) or by following the links in Table 2.1.

Renfrewshire Council propose to declare two new AQMAs in Renfrew Town Centre and Johnstone High Street (see monitoring section) during 2016.

**Table 2.1 – Declared Air Quality Management Areas**

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
Paisley Town Centre (PTC)	<ul style="list-style-type: none"> <li>• NO<sub>2</sub> annual mean</li> <li>• NO<sub>2</sub> 1-hour mean</li> <li>• PM<sub>10</sub> Annual Mean</li> </ul>	Paisley	Paisley Town Centre <a href="http://www.renfrewshire.gov.uk/media/1590/AQMA-Map/pdf/AQMAMap_2015.pdf">http://www.renfrewshire.gov.uk/media/1590/AQMA-Map/pdf/AQMAMap_2015.pdf</a>	Paisley Town Centre Air Quality Action Plan 2014 <a href="http://www.renfrewshire.gov.uk/media/1124/Paisley-Town-Centre-Air-Quality-Action-Plan-2014/pdf/AirQualityActionPlan2014.pdf">http://www.renfrewshire.gov.uk/media/1124/Paisley-Town-Centre-Air-Quality-Action-Plan-2014/pdf/AirQualityActionPlan2014.pdf</a>

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

Renfrewshire Council has taken forward a number of measures during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these

measures can be found in the air quality Action Plan relating to the AQMA. Key completed measures are:

- **Paisley Central Road Refurbishment** – reduced the number of buses and receptors within a previously enclosed bus stop area and no longer an area of relevant exposure;
- **Statutory Quality Bus Partnership Scheme (SQBPS)** - has resulted in the majority of all buses operating within Paisley Town Centre being a minimum of EURO 3 class but with a significant number now EURO 5 class thus reducing emissions across the town centre routes.
- **Public and Inter-Departmental Awareness Raising** – improvements to the Council air quality web pages, air quality training days for Council officers, publication of guidance notes e.g. on air quality and planning, biomass, dust emissions for use by Council departments, developers and the public; and publication of information leaflets and press campaigns has ensured air quality issues are well communicated.

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

- **SCOOT (Split Cycle Offset Optimisation Technique) Upgrades** - 2016/17 Scottish Government funding has been approved to undertake improvements to the existing traffic management system within PTC to help improve traffic flow and reduce congestion particularly at peak periods;
- **Masternaut fleet tracking telemetric system** - this is currently fitted to all Council vehicles but funding has been requested to update this system in 2016/17. The new system would provide various improvements including an easier reporting system and more focus on driver behaviour which would enable targeted training to be provided to those drivers who need it most to improve fuel efficiency etc. While all HGV drivers have received training, there are up to 4000 other employees who drive within Renfrewshire on Council business.
- **School Idling Initiative** – to be rolled out to all Renfrewshire Primary Schools due to receipt of Scottish Government funding for 2016/2017;

- **Vehicle Emissions Testing** – continuation of scheme twice a year during 2016/2017;
- **Green Travel Planning Initiatives** – Council cycle to work scheme opening to employees in 2016 and other strategies awaiting approval in 2016; and
- **ECO Stars** – 2016/17 Scottish Government funding has been provided to establish this emissions reduction fleet recognition scheme within Renfrewshire.

Table 2.2 – Progress on Measures to Improve Air Quality

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	<b>Central Rd Refurbishment</b>	Transport Planning and Infrastructure	Major infrastructure changes to this enclosed main bus stop location, making one way only and halving number of bus stops thus reducing volume of buses in area.	Dev't & Housing Services; Community Resources, Roads	Pre 2009	2009 -2010	Improved air quality levels, less congestion, improved overall environment & visual amenity.	Actual pollution reduction on completion - no. of NO <sub>2</sub> 1hr objective exceedances reduced from 760 in 2009 to just 2 in 2011. This was the first time since monitoring commenced here in Jan 2004 that the 1 hour NO <sub>2</sub> objective was complied with.	No longer considered area of relevant exposure due to removal of bus stops & therefore receptors as persons no longer in this location for up to an hour. Monitoring now ceased.	Completed April 2010	Central Rd was the subject of the Council's first AQMA declared in 2005 before being amended & extended to the rest of Paisley town centre in 2009. Only the 1hr NO <sub>2</sub> objective was applicable at Central Rd.



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No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
2	<b>Statutory Quality Bus Partnership Scheme (SQBPS)</b>	Promoting Low Emissions Transport	<p>A SQBPS to be implemented throughout Paisley town centre aimed at addressing concerns over the quantity and quality of buses which were adversely impacting on air quality in the town centre.</p> <p>The scheme came into force in March 2011 and required a phased introduction of buses meeting specific requirements with the following to be met by March 2013:-</p> <p>All buses operating on local services and within PTC shall be low floor buses and with a minimum of EURO 3 engines (or EURO 2 engines fitted with TFL approved CRT devices).</p>	Operated jointly by SPT & Renfrewshire Council (Dev't & Housing Services; Planning & Community Resources, Roads)	Pre 2011	Phased introduction from March 2011 to March 2013.	Reduction in emissions within the AQMA and surrounding area by removal of significant number of pre EURO standard buses operating within the town centre. It was estimated that these buses operated more than 4600 journeys per week throughout Paisley town centre. These buses have been replaced mainly by EURO 3 and EURO 5 standard buses.	Annual mean NO <sub>2</sub> concentration has declined at PTC diffusion tube sites since 2013 and is below the objective for all PTC sites in 2015.	Fully implemented.	Fully implemented	There are now two main bus operators within Paisley town centre and the majority of buses in operation are now EURO 3 and EURO 5 standard buses.

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No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
3	<p><b>SCOOT (Split Cycle Offset Optimisation Technique)</b></p> <p>- an adaptive urban Traffic Management System that responds automatically to fluctuations in traffic flow through the use of on-street detectors.</p>	Traffic Mang't	Improvements to original SCOOT system installed in 2008. A full upgrade of all traffic signal controllers is no longer considered cost effective. However, instead of removing the action measure entirely, the existing SCOOT system could be improved upon through other means including revalidation of the traffic signals, updates to traffic controllers and repair or replacement of on street detection sensors.	Community Resources, Roads		June 2016-March 2017	<p>Reduction in congestion on Paisley town centre ring road.</p> <p>An effective SCOOT system is typically thought to reduce traffic delay by an average of 20% in urban areas.</p>	<p>The AQAP source apportionment analysis confirmed that congestion contributed to pollutant levels to varying degrees dependant on location within the AQMA. Peak time congestion in particular is a major issue. It is recognised that if this could be reduced then traffic would flow more freely resulting in a reduction in air pollution levels.</p>	<p>Scottish Government funding of £300k was applied for in 2013 to upgrade traffic signal controllers within PTC but this was declined as not cost effective.</p> <p>Approximately £20k of Scottish Gov't 2016/17 funding has been awarded for other less costly improvements to SCOOT as listed within the 'Focus' section..</p>	Fully complete by March 2017.	

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No.	Measure	Category	Focus	Lead Authority	Plannin g Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
4	<p><b>Council Fleet Improvements</b></p> <p><b>1) Standard of Fleet</b></p> <p><b>2)Electric Vehicles</b></p> <p><b>3)Charging Infrastructure</b></p> <p><b>4)Retrofitting with Abatement Technology</b></p>	Vehicle Fleet Efficiency	<p>1) All fleet vehicles (440 in total) are EURO 5 standard. 2016/17 vehicle replacement programme will see 12 HGVs replaced with EURO 6 standard vehicles. Aim is to have all HGVs (100 in total) replaced with EURO 6 vehicles by 2022.</p> <p>2) Introduction of electric vehicles into fleet. Scottish Government AQAP funding used to purchase electric car for use as pool car by Env Health staff.</p> <p>3) Provision of electric charging points within Council area to compliment increasing number of council (&amp; private) electric vehicles. Scottish Government AQAP funding used to purchase fast charging point for Council HQ.</p> <p>4) Rev limiters fitted to Council HGV fleet in order to maximise fuel efficiency and ultimately reduce emissions.</p>	Community Resources, Transport		<p>1) All fleet upgraded to EURO 5 standard in 2009-2010. HGVs to be upgraded to EURO 6 by 2022.</p> <p>2) First electric vehicles purchased 2012. Pilot pool car scheme commenced May 2016.</p> <p>3) First council operated charging points installed 2012.</p> <p>4) Initial pilot scheme in 2013/14 proved successful and further funding obtained in 2014 to fit limiters on a further 50 vehicles.</p>	<p>1) Improves overall environmental impact of vehicles. Reduces number of polluting vehicles, operational running costs of vehicles and CO<sub>2</sub> emissions across entire Council area.</p> <p>2) By acting to reduce its own emissions through the uptake of low emissions technology and vehicles, the Council will hopefully encourage other vehicle users to consider greener fuel options. The pool cars funded through the Scottish Government AQAP fund are 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 a greener electric fleet where possible.</p> <p>4) Initial pilot scheme showed drop in fuel usage by 8-12% but up to 20% in certain vehicles.</p>	<p>Council's transport depot is located on AQMA boundary. All vehicles travelling to and from here will go through the AQMA, in addition to operating within it. Council's HQ also located within AQMA. Several thousand employees work from this location.</p> <p>The use of electric pool cars for work purposes within Env Health teams in replacement of diesel &amp; petrol cars will result in a reduction in emissions within the AQMA. The total mileage across the teams is in excess of 25,000 miles per year. This will include a significant number of low mileage short trips within the AQMA. As officers are based at HQ then all visits start and end within the AQMA. A review of mileage undertaken and emissions prevented will be undertaken after a year of use.</p>	<p>1) EURO 5 standard implemented. 12 HGVs will be upgraded to EURO 6 year 2016/17.</p> <p>2) Fleet currently contains 24 electric vehicles.</p> <p>3) There are 20 council operated charging points, 6 of which members of the public can use.</p> <p>4) There are currently 75 out of a total of 100 HGVs fitted with rev limiters.</p>	<p>All measures, whilst essentially complete, are also ongoing as the Council will continue to improve the standard of their fleet and introduce greener vehicles where opportunities and funding permits.</p> <p>The aim is for vehicles at end of their service life to be replaced with an improved EURO standard version or an electric alternative.</p>	<p>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 other greener means – train &amp; cycling.</p>

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No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5	<b>Masternaut</b> - fleet tracking telemetric system fitted to all Council vehicles	Vehicle Fleet Efficiency	<p>Masternaut allows the Council to monitor, manage and optimise the use of Council vehicles. It provides graphical real time evidence of vehicles being operated including fuel usage, fleet location, vehicle routes, speed &amp; whether moving or idling.</p> <p>The original Masternaut was installed in all council vehicles in 2009-10. Masternaut will be upgraded during 2016/17 to a newer version which will provide an easier reporting system and focuses in more detail on driver behaviour.</p>	Community Resources, Transport	Pre 2009	2009-2010 & 2016/2017	<p>Financial long term gain by reducing fuel consumption. Improves efficiency via optimising vehicle routes &amp; movements. The route 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.</p> <p>Reduction of idling is also seen as a key area to reduce fuel and maintenance costs &amp; to lower emissions produced by fleet vehicles. Masternaut is able to monitor the idling time of vehicles.</p>	The new system will provide an easier reporting system which may allow calculations to be undertaken on emissions reductions.	Currently implemented but due for upgrading 2016/17.	Ongoing	

## Renfrewshire Council

No.	Measure	Category	Focus	Lead Authority	Plannin g Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
6	<p><b>Vehicle Idling Awareness Raising</b></p> <p>- Regular targeted campaigns to raise awareness regarding idling vehicles &amp; 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</p>	Public Information	<p>Includes local advertising campaigns via various media - newspapers, website, leaflets, signage. The Council have also participated in the West of Scotland advertising campaign since 2012 and will continue this relationship in 2016-2017.</p> <p>A School Idling Initiative was launched Nov 2015. Six primary schools where idling is an issue were monitored over 4 weeks. Wardens worked with the schools, raising awareness through use of moveable banners, patrols and distribution of literature to drivers.</p> <p>All bus companies are written to annually to inform them of their responsibilities in relation to engine idling and what they can do to help improve air quality in Renfrewshire.</p>	Renfrewshire's Community Safety Partnership; Community Resources Wardens Service		From 2011	<p>Improves overall awareness of fuel efficiency &amp; environmental impacts of vehicles particularly at areas of sensitive receptors e.g. primary schools.</p> <p>15 vehicle idling complaints were received in 2014/15. This measure can be reviewed on an annual basis by Community Resources to determine if complaint numbers are decreasing albeit an effective awareness raising campaign may actually increase the number of complaints received.</p>	<p>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.</p>	<p>The success of the School Idling Initiative and the provision of 2016/17 Scottish Gov't funding will enable the School Initiative to be provided at every primary school in Renfrewshire</p>	<p>Ongoing measure subject to Scottish Gov't funding. £15,000 of funding received to continue vehicle idling &amp; emissions testing campaign in 2016/17.</p>	<p>Fixed Penalty Notices not issued, drivers are instead requested to turn their engines off &amp; invariably all drivers comply. It provides Wardens with a valuable opportunity to educate and engage with the public.</p>

## Renfrewshire Council

No.	Measure	Category	Focus	Lead Authority	Plannin g Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
7	<p><b>Vehicle Emissions Testing</b></p> <p>- programme of roadside vehicle emissions testing of private vehicles in accordance with the Road Traffic (Vehicle Emissions) (Fixed Penalty) (Scotland) Regulations 2003.</p>	Public Awareness	Testing programme undertaken over two days twice a year. Where vehicles fail relevant emissions standards, Council can take enforcement action and issue drivers with a fixed penalty notice (FPN). 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 that vehicle exhaust emissions have been retested and comply with current legislation.	Renfrewshire Community Safety Services & Police Scotland with assistance from Glasgow, East Renfrewshire & North Lanarkshire Council's taxi enforcement and emissions testing officers.		From 2011 to current.	Improves overall awareness of fuel efficiency & environmental impacts of vehicles. Reduces numbers of polluting vehicles.	<p>Measure is an effective awareness raising tool.</p> <p>Location of the testing is within the AQMA on the Paisley Town Centre ring road.</p> <p>All drivers stopped &amp; tested are given a Renfrewshire Council "Don't Be An Idler" information leaflet &amp; an explanatory letter.</p>	<p>Undertaken twice a year since 2011. Most recent testing carried out in March 2016 resulted in 356 vehicles tested and 6 FPNs served, an increase on 273 vehicles tested in Oct 2015.</p>	Ongoing measure subject to Scottish Gov't funding. £15,000 of funding received to continue vehicle idling & emissions testing campaign in 2016/17.	

## Renfrewshire Council

No.	Measure	Category	Focus	Lead Authority	Plannin g Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
8	<p><b>Green Travel Planning Initiatives within the Council</b></p> <p><b>1) Renfrewshire Cycle Strategy &amp; Action Plan</b> -currently under consultation to be submitted for Board approval later this year</p> <p><b>2) Cycle to Work Scheme</b></p> <p><b>3) Outdoor Access Strategy</b> -currently under consultation to be submitted for Board approval later this year</p>	Alternatives to private vehicle use	<p>1) The strategy identifies areas of improvement required on existing cycle routes, areas of potential expansion of the cycle network and methods to encourage increased cycle usage. Action measures associated with these have been identified, prioritised and timelines provided.</p> <p>2) Council employees can participate in this Government approved salary sacrifice scheme which allows them to purchase a bike with tax free benefits.</p> <p>3) Outdoor access is about how people get to and move around places. The strategy provides a way of reviewing existing outdoor access in Renfrewshire &amp; puts forward an agreed vision, aims &amp; actions to ensure good access to Renfrewshire's outdoors.</p>	Community Resources Roads Section	2014-2016	<p>1) To be approved by Board late 2016. Measures will then be implemented dependant on funding.</p> <p>2) Cycle to Work Scheme is currently open to Council employees May 2016 – August 2016.</p> <p>3) To be approved by Board late 2016. Measures will then be implemented dependant on funding</p>	<p>1) Further information will be available once the Strategy is approved and published but given the existing low level of everyday cycle use within Renfrewshire the PI focus is on a small number of key targets to be achieved by 2025. For example % of adults travelling to work by bicycle, % of children travelling to school by bicycle, % of primary schools offered Bikeability Level 2 training.</p> <p>2) Number of employees participating in scheme and who regularly use their bike to travel to work.</p> <p>3) An Action Plan detailing actions, timescales and priority outcomes is included within the Strategy. Some key actions include - By 2020 increase the number of Renfrewshire's residents that actively travel to work by cycle to 3% &amp; use walking as a means of transport on more than one day per week by 5%.</p>	<p>1) Further information may be available once Strategy is published.</p> <p>2) Given that the Council's HQ building is within the Paisley AQMA then there will be emission reduction benefits from staff opting to cycle to work rather than travelling by car. A survey could be undertaken once the cycle to work scheme is fully implemented and operational for a year to determine the number of car trips that have been replaced by cycle usage and therefore the emission reductions achieved.</p> <p>3) Further information may be available once Strategy is published</p>	<p>1) Cycle Strategy &amp; Action Plan to be published this year (2016).</p> <p>2) Cycle to Work Scheme is currently open to Council employees May 2016 – August 2016.</p> <p>3) Outdoor Access Strategy &amp; Action Plan to be published this year (2016).</p>	<p>1) The Action Plan sets out a programme of activities and network interventions for the coming ten years subject to funding availability.</p> <p>2) Ongoing</p> <p>3) Ongoing</p>	

## Renfrewshire Council

No.	Measure	Category	Focus	Lead Authority	Plannin g Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
9	<p><b>Green Travel Planning Initiatives Involving Other Employers within Renfrewshire</b></p> <p>- Establishment of the Greener Transport Sub Group (GTSG) to bring together Community Planning Partners and third sector employers within Renfrewshire Council. The GTSG reports to the Greener Renfrewshire Thematic Council Board.</p>	Alternatives to private car use	<p>The purpose &amp; remit of the GTSG - Help maintain green transport initiatives</p> <ul style="list-style-type: none"> <li>- Learn and share plans relating to transport, travel &amp; staff commuting</li> <li>- Facilitate joint working with Community Planning Partners through learning, project working &amp; funding opportunities.</li> </ul>	<p>Renfrewshire Community Planning Partnership</p> <p>The GTSG has various members including Renfrewshire Council, Glasgow Airport, SPT, UWS, SUSTRANS, NHS, WCS, Scotrail, INTU Braehead, Renfrewshire Leisure Ltd &amp; Hillington Park.</p>		2015	<p>A GTSG Action Plan has been developed which includes actions related to Greener Active Transport, Greener Public Transport, Greener Workplace Transport &amp; a measure specifically relating to Air Quality Management within the Council area.</p> <p>The Action Plan details Progress to Date, Future Steps and priority outcomes for each measure.</p>	<p>This is a new Council wide initiative which provides a great opportunity for the Council and employers to work together towards a common goal of sustainable travel.</p>	<p>Action Plan has been produced and priority outcomes will be reported on at the end of each financial year.</p>	<p>Ongoing. An annual Progress Report requires to be produced detailing progress with the Action Plan &amp; Local Outcome Improvement Plan.</p>	<p>The group also provides a platform for the Council &amp; employers to collaborate on specific projects. A recent example being discussions within the group of the feasibility of a cycle hub within the Council area.</p>
10	<p><b>Awareness raising of air quality issues to general public</b></p> <p>- improvements to air quality information available on Council website</p>	Public Awareness	<p>The air quality information on the Council's website will be updated and improved upon.</p> <p>Links to the Scottish Governments air quality webpage will be provided to enable the public to view current air quality levels at the Council's automatic monitoring sites.</p> <p>Information on Biomass &amp; Smoke Control Areas will also be provided.</p>	Community Resources		2016	<p>May reduce number of queries being received in relation to air quality issues if sufficient information is provided on-line.</p>	<p>Minimal. Measure is more an awareness raising and information providing tool to hopefully encourage people to think about more sustainable low emissions transport and energy.</p>		Completed May 2016.	<p>The entire council website has recently been updated and improved upon so it is more transactional and demanded to encourage increased public use.</p>



## Renfrewshire Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
11	<b>Eco Driver Training</b>	Vehicle Fleet Efficiency	<p>Masternaut tracks Council drivers' efficiency and produces a score for each individual driver.</p> <p>Drivers of HGVs and those that are not driving in an efficient manner will be targeted for Eco Driver Training. The training is either on a one to one basis or as a group and is delivered by external companies.</p>	Community Resources, Transport		2013 – ECO Driver training provided to HGV drivers.	Training will help employees to drive with greater efficiency therefore reducing fuel consumption & emissions. Financial long term gain via reduced fuel consumption.	The new system will provide an easier reporting system which may allow calculations to be undertaken on emissions reductions.	All HGV drivers (approximately 140 drivers) have undertaken the training.	Ongoing	

## Renfrewshire Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
12	<b>Parking Controls</b>  <b>1) increase in tariffs</b>  <b>2) extension of the controlled parking zone within Paisley town centre</b>	Traffic Mang't	The Council regularly reviews, creates and manages their traffic orders for parking control. It is thought that by managing these within Paisley town centre there may be some control over peoples parking habits within the town centre by making it more or less appealing to park in certain areas.	Community Resources, Roads Section		2008-2010		It is not possible to quantify the emission reduction within the AQMA as a result of this measure.	Parking charges were increased in Paisley in April 2010.  The controlled parking zone was implemented 2008-2010	Both measures now complete and no further changes proposed.	This measure will likely be removed from any future AQAP updates. Reporting of effectiveness of this measure is made more difficult by the fact there are privately operated multi storey car parks within Paisley town centre and so the effect of any traffic controls is reduced.

## Renfrewshire Council

No.	Measure	Category	Focus	Lead Authority	Plannin g Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
13	<p><b>Awareness raising of air quality issues to Planners including the potential impacts from development &amp; planning.</b></p> <p><b>1) develop air quality guidance document for Environmental Health and Planning staff</b></p> <p><b>2) Update GIS system with AQ information for Planners to access.</b></p> <p><b>3)Provide AQ training to Env Health &amp; Planning staff</b></p>	Policy Guidance & Dev't Control	<p>Long term air quality improvements achieved via the planning system by improving knowledge on AQ issues and establishing an effective joined up approach between Council Services.</p> <p>1) Aim of the document is to provide technical guidance and to ensure developments with a potential negative impact, especially those affecting the AQMA, are assessed and mitigation implemented where necessary.</p> <p>2) GIS system updated to include AQMA boundary to ensure Env Health are consulted on any applications falling within this area in terms of air quality.</p> <p>3) Two training seminars for Planners &amp; Env Health staff. One on general air quality matters and impacts from development and the other a more technical seminar on biomass.</p>	Community Resources, Environmental Health; Dev't & Housing; Dev't Mang't		<p>1) Early 2016</p> <p>2) 2015</p> <p>3) Feb &amp; March 2016</p>		It is not possible to quantify emissions reductions as a consequence of these measures but the main aim of these measures were to highlight and educate council staff to ensure that air quality is considered in terms of development and biomass both inside and outside the AQMA		All measures have now been completed however they will continue to be updated as necessary e.g. where there is new guidance, new GIS info. There are also quarterly meetings between Planning & Environmental Managers and the intention is to ensure that AQ issues remain on the agenda and a priority for Planning staff.	

## Renfrewshire Council

No.	Measure	Category	Focus	Lead Authority	Plannin g Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
14	<b>Construction/ Demolition Sites– Dust Mitigation Plans (DMP)</b>	Policy Guidance & Dev't Control	The original intention was for <i>all</i> developments within or adjacent to the AQMA to have DMPs in place. However on review of this, given the broad range of potential planning applications, officers now risk assess these in accordance with the IAQM document ' <b>Guidance on the Assessment of Dust from Demolition and Construction</b> '. Where it is considered dust may be a potential issue, officers will recommend a planning condition requiring the provision of a DMP.	Community Resources, Environmental Health		2016	Overall reduction in dust generation across the Council area not just within the AQMA. Short term health benefits. Help prevent complaints and nuisance investigations.		Implemented	Implemented	Although originally aimed at planning applications for construction/ demolition developments within or close to the Council's AQMA, the guidance is also applicable for other developments elsewhere in the Council area that are of significant scale in terms of size and/or duration.

## Renfrewshire Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
15	<b>Biomass Guidance Document</b>	Policy Guidance & Dev't Control	<p>Guidance document in response to the increasing uptake of biomass both domestically and commercially and to ensure that emissions are not detrimental to local air quality.</p> <p>The document shall be used primarily as guidance for Env Health and Planning staff to refer to when considering biomass planning applications within Renfrewshire but it also includes a shorter technical note that can be issued to developers, individuals and the industry in relation to planning and environmental issues which should be considered when proposing biomass installations.</p>	Community Resources with document produced by external consultancy.		<p>Dec 2015.</p> <p>Scottish Government air quality funding provided to assist in developing this guidance document which was prepared by external consultancy on behalf of the Council</p>	Record of all planning applications for biomass installations seeking approval being kept.	Limited as majority of biomass applications are out with the AQMA area.	All applications for biomass installations now being referred to Env Health for consultation	Completed Dec 2015.	

## Renfrewshire Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	KPI	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
16	<p><b>Fuel Poverty Strategy</b></p> <p><b>1) Domestic Emissions &amp; Fuel Consumption Awareness Raising</b></p> <p><b>2) Provision of Fuel Poverty Information</b></p>	<p>Promoting low emissions plants</p> <p>Public Awareness</p>	<p>The Council's 2010 Fuel Poverty Strategy set out a framework for fuel poverty actions in Renfrewshire. Actions included encouraging local residents to install efficient domestic heating systems, upgrades to domestic heating systems in social housing owned by the Council, the provision of free phone energy advice to all residents in Renfrewshire and general awareness raising of fuel poverty issues through seminars, briefings, information and stakeholder events.</p>	<p>Renfrewshire Council's Development &amp; Housing Energy Management section in conjunction with external organizations such as the Energy Savings Trust Scotland &amp; the Local Energy Savings Scotland Advice Centre (ESSAC)</p>			<p><b>Free Energy Advocacy Service</b> - It has been estimated that from June 2014 to January 2016 this measure has achieved a saving of 55,000 kg CO<sub>2</sub> arising from domestic energy use.</p> <p><b>Renfrewshire Council Universal Home Insulation Scheme</b> - From 2010 until March 2012, Renfrewshire Council secured £977,953 of funding from the Scottish Government for no cost insulation measures. During 2012/13 Renfrewshire's UHIS assisted 1805 homes, saving over 529 tonnes of CO<sub>2</sub> per year.</p>	<p>Whilst the main target of these measures is a reduction in CO<sub>2</sub> levels, they may also have a positive effect on reducing combustion emissions across the entire Council area.</p>	<p>Free Energy Advocacy Service implemented 2012, proved very successful. Funding of £259,000 has been provided to continue this measure.</p>	<p>Actions have now been implemented and are either complete or ongoing measures. The Council's 2010 Fuel Poverty Strategy has also now been superseded by the 2014 Fuel Poverty Strategy</p>	

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

#### **3.1 Summary of Monitoring Undertaken**

The monitoring undertaken during 2015 was a continuation of the 2014 programme with the exception that 4 diffusion tube sites were discontinued due to consistently low measurements over previous years of annual mean NO<sub>2</sub>. These were at:

- Paisley 37
- Renfrew 46
- Linwood 51
- Kilbarchan 55

Automatic monitoring continued at 4 sites as detailed in Section 3.1.1, however the Glasgow Airport Site was discontinued during July 2015. There are plans to relocate this equipment to Renfrew Town Centre during 2016/2017.

Nine new diffusion tube sites have been introduced in early 2016 and the results from these locations will be included in the Annual Progress Report 2017. The new sites are highlighted in green in Table A.2.

#### **3.1.1 Automatic Monitoring Sites**

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

Renfrewshire Council undertook automatic (continuous) monitoring at 4 sites during 2016. Table A.1 in Appendix A shows the details of the 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.3. 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<sub>2</sub> at 52 sites during 2016. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix A in Figures A.4 to A.17. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

### 3.2 Individual pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for annualisation and bias. Further details on adjustments are provided in Appendix C.

#### 3.2.1 Nitrogen Dioxide (NO<sub>2</sub>)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>.

Annual mean nitrogen dioxide (NO<sub>2</sub>) concentrations recorded at all automatic monitoring sites in 2015 were below the annual mean objective level.

There were no exceedances of the NO<sub>2</sub> annual mean objective (after bias adjustment and distance correction) at any of the diffusion tube monitoring locations within the existing Paisley Town Centre (PTC) Air Quality Management Area (AQMA). This is a significant improvement on the 5 locations of exceedance in 2014.

Exceedances of the annual mean objective outside of the AQMA (after bias adjustment and distance correction) were measured at the following diffusion tube monitoring locations:

- Renfrew 8 - Inchinnan Rd (43.2 µg/m<sup>3</sup>)
- Johnstone 59 – High St (45 µg/m<sup>3</sup>)

This compares with 7 locations of exceedance of the annual mean NO<sub>2</sub> objective outside the AQMA in 2014. These two locations are consistent with areas of exceedance identified in previous years and with the results of modelling in the 2015 detailed assessments carried out for Renfrew and Johnstone. The 2015 results confirm Renfrewshire Council's proposal to declare AQMAs in these locations for exceedance of the NO<sub>2</sub> objectives.



None of the exceedances were in excess of the 60 µg/m<sup>3</sup> threshold at which TG(16) recommends that there may be a risk of the NO<sub>2</sub> 1-hour mean objective being exceeded. This is an improvement upon the 2014 NO<sub>2</sub> diffusion tube monitoring whereby a diffusion tube at Inchinnan Road in Renfrew was recording an annual mean concentration in excess of 60µg/m<sup>3</sup>.

For diffusion tubes, the full 2015 dataset of raw monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year. There were no exceedances of the NO<sub>2</sub> hourly mean at any of the automatic monitoring sites.

The trend is towards continually reducing NO<sub>2</sub> concentrations within the PTC AQMA and, for the first time since declaration of the AQMA in 2009, compliance with all of the objectives was achieved in 2015. Renfrewshire Council will maintain the current programme of monitoring NO<sub>2</sub> in Paisley for at least two to three years before any consideration is given to revoking the AQMA or changing the boundary or level of monitoring undertaken.

### **3.2.2 Particulate Matter (PM<sub>10</sub>)**

Table A.5 in Appendix A compares the ratified and adjusted monitored PM<sub>10</sub> annual mean concentrations for the past 5 years with the air quality objective of 18µg/m<sup>3</sup>.

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

Annual mean PM<sub>10</sub> concentrations recorded at all automatic monitoring sites were below the annual mean objectives in 2015.

However data capture for PM<sub>10</sub> at Paisley Gordon Street was only 61% and for Cockels Loan was 71%. The annual mean concentrations for these sites have therefore been annualised using data from neighbouring continuous monitoring sites as shown in Appendix C. The results show a decrease in annual mean at all sites since 2014. Due to the low data capture at a site within the AQMA, no consideration can be given to revoking the PTC AQMA or changing the boundary or level of monitoring undertaken within it.

No exceedances of the PM<sub>10</sub> short-term objective have been recorded in 2015 at any of the automatic site locations.

### **3.2.3 Particulate Matter (PM<sub>2.5</sub>)**

Renfrewshire Council does not currently monitor PM<sub>2.5</sub> annual mean concentrations at any location. However 2016/17 Scottish Government funding for a PM<sub>2.5</sub> monitor has been approved and so procurement for this will commence in 2016 with a view to having this installed in a suitable location within 2017.

### **3.2.4 Sulphur Dioxide (SO<sub>2</sub>)**

Renfrewshire Council does not currently measure sulphur dioxide within the council area. Historically SO<sub>2</sub> 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**

The following section has been completed based on consultation with other relevant Council services including Community Resources Roads & Transport, Planning & Housing as well as local knowledge.

### **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.
- New roads constructed or proposed
- Roads with significantly changed traffic flows.
- Bus or coach stations.

#### 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
15/0244/PP Site on Eastern Boundary of Glencoats Primary School, Blackstoun Rd, Paisley - Erection of Primary School including Installation of Biomass Burner	Completed "Biomass Boiler Information Request Form" from the Renfrewshire Council website	Unit Conversion and Screening Tool	Maximum Contribution to Annual mean <1% of air quality standards in an area of low background concentrations – no further assessment required by Council
15/0026/PP Royal Alexandra Hospital, 35 Corsebar Road, Paisley, Installation of Biomass Boiler to allow connection to existing chimney.	D1 Stack Height Calculation	None	D1 stack height lower than existing stack height being used therefore considered acceptable for dispersion

<p>14/0876/PP Erection of Residential Development comprising 12 dwelling houses, Land at Hillington Road, Mossland Rd, Renfrew</p>	<p>Detailed Dispersion Modelling Assessment by external consultant</p>	<p>None</p>	<p>Conclusions of the assessment accepted and permission without further planning conditions for air quality granted</p>
<p>14/0473/PP Façade retention scheme comprising demolition of remaining building and erection of residential development comprising 11 flats with commercial units at ground floor, Former Arnotts site Gauze Street, Paisley</p>	<p>Detailed Dispersion Modelling Assessment by external consultant</p>	<p>None</p>	<p>Conclusions of the assessment accepted and permission granted with planning conditions for mechanical ventilation at dwellings facing Lawn Street /Gauze street junction within the PTC AQMA</p>

## 6. Conclusions and Proposed Actions

### 6.1 Conclusions from New Monitoring Data

Annual mean nitrogen dioxide (NO<sub>2</sub>) concentrations recorded at all automatic monitoring sites in 2015 were below the annual mean objective level.

There were no exceedances of the NO<sub>2</sub> annual mean objective (after bias adjustment and distance correction) at any of the diffusion tube monitoring locations within the existing Paisley Town Centre (PTC) Air Quality Management Area (AQMA). This is a significant improvement on the 5 locations of exceedance in 2014 and is the first time since declaration of the AQMA in 2009 that compliance with all objectives at monitoring locations has been achieved.

Exceedances of the annual mean objective outside of the AQMA (after bias adjustment and distance correction) were measured at the following diffusion tube monitoring locations:

- Renfrew 8 - Inchinnan Rd (43.2 µg/m<sup>3</sup>)
- Johnstone 59 – High St (45 µg/m<sup>3</sup>)

This compares with 7 locations of exceedance of the annual mean NO<sub>2</sub> objective outside the AQMA in 2014. The locations are consistent with areas of exceedance identified in previous years and with the results of modelling in the 2015 detailed assessments carried out for Renfrew and Johnstone. The 2015 results confirm Renfrewshire Council's proposal to declare AQMAs in these locations for exceedances of the NO<sub>2</sub> objectives.

None of the exceedances were in excess of the 60 µg/m<sup>3</sup> threshold at which TG(16) recommends that there may be a risk of the NO<sub>2</sub> 1-hour mean objective being exceeded.

For diffusion tubes, the full 2015 dataset of raw monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year. There were no exceedances of the NO<sub>2</sub> hourly mean at any of the automatic monitoring sites.

The trend is towards continually reducing NO<sub>2</sub> concentrations within the PTC AQMA and, for the first time since declaration of the AQMA in 2009, compliance with all of the objectives was achieved in 2015. Renfrewshire Council will maintain the current programme of monitoring NO<sub>2</sub> in Paisley for at least two to three years before any consideration is given to revoking the AQMA or changing the boundary or level of monitoring undertaken.

Annual mean PM<sub>10</sub> concentrations recorded at all automatic monitoring sites were below the annual mean objectives in 2015.

However data capture for PM<sub>10</sub> at Paisley Gordon Street was only 61% and for Cockels Loan was 71%. The annual mean concentrations for these sites have therefore been annualised using data from neighbouring continuous monitoring sites as shown in Appendix C. The results show a decrease in annual mean at all sites since 2014. Due to the low data capture at a site within the AQMA, no consideration can be given to revoking the PTC AQMA or changing the boundary or level of monitoring undertaken within it.

No exceedances of the PM<sub>10</sub> short-term objective have been recorded in 2015 at any of the automatic site locations.

## 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:

- Declare AQMAs for Renfrew and Johnstone for exceedances of the NO<sub>2</sub> objectives - August 2016;
- Commence action planning process for Renfrew and Johnstone AQMAs once declared;
- Update the Paisley Town Centre Air Quality Action Plan and consider merging with those being prepared for Renfrew & Johnstone to establish a Council wide AQAP - AQAP(s) to be complete by end of 2017;
- Install additional monitoring capability in Renfrew and Johnstone via relocation of Glasgow Airport NO<sub>x</sub> analyser to Renfrew Town Centre, installation of new PM<sub>2.5</sub> monitor in Johnstone and use of the new mobile monitor where necessary at either location;
- Undertake improvements to the SCOOT traffic management system within Renfrewshire - by March 2017;
- Implement ECO Stars Fleet Recognition Scheme within Renfrewshire - summer 2016;
- Continue Schools Idling Initiative to include all primary schools in Renfrewshire;
- Continue with vehicle emission testing twice per year within Paisley Town Centre; and



- Submit the 2017 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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
	Glasgow Airport	Special	248297	666545	NO <sub>2</sub>	N	Chemiluminescence	N (60m to nearest residential property)	40m	Was c. 2.4m before removal
	Gordon Street/ Causeyside St, Paisley	Roadside	248316	663612	NO <sub>2</sub> , PM <sub>10</sub>	Y	Chemiluminescence / FDMS-TEOM	Y (-6.5m)	10m	2.2m NO <sub>x</sub> 2.4m PM <sub>10</sub>
	St James St, Paisley	Roadside	248173	664320	PM <sub>10</sub>	Y	FDMS-TEOM	Y (0m)	4m	2.35m
	Cockels Loan	Roadside	250463	665934	NO <sub>2</sub> , PM <sub>10</sub>	N	Chemiluminescence / FDMS-TEOM	Y (0m)	18m	2.7m NO <sub>x</sub> 2.8m PM <sub>10</sub>

(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.3.

Figure A.16 – Paisley Automatic Monitoring Sites

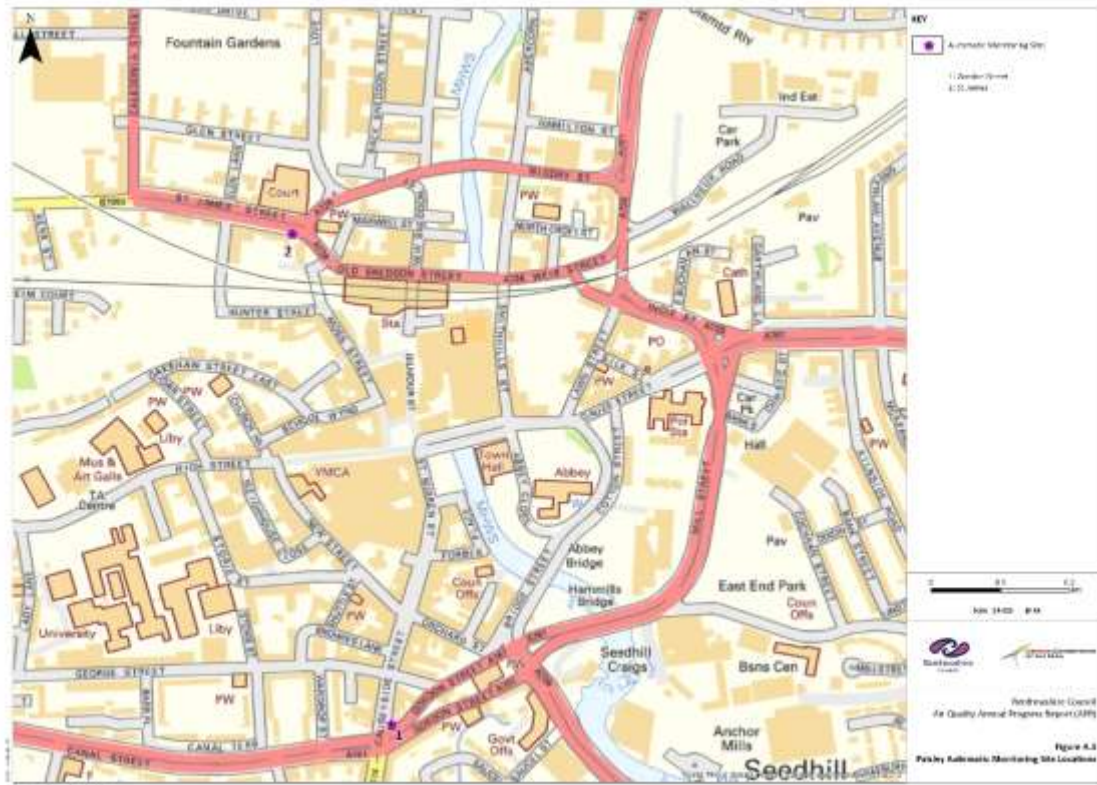


Figure A.17 – Glasgow Airport Automatic Monitoring Site



Figure A.18 – Cockels Loan Renfrew Automatic Monitoring Site

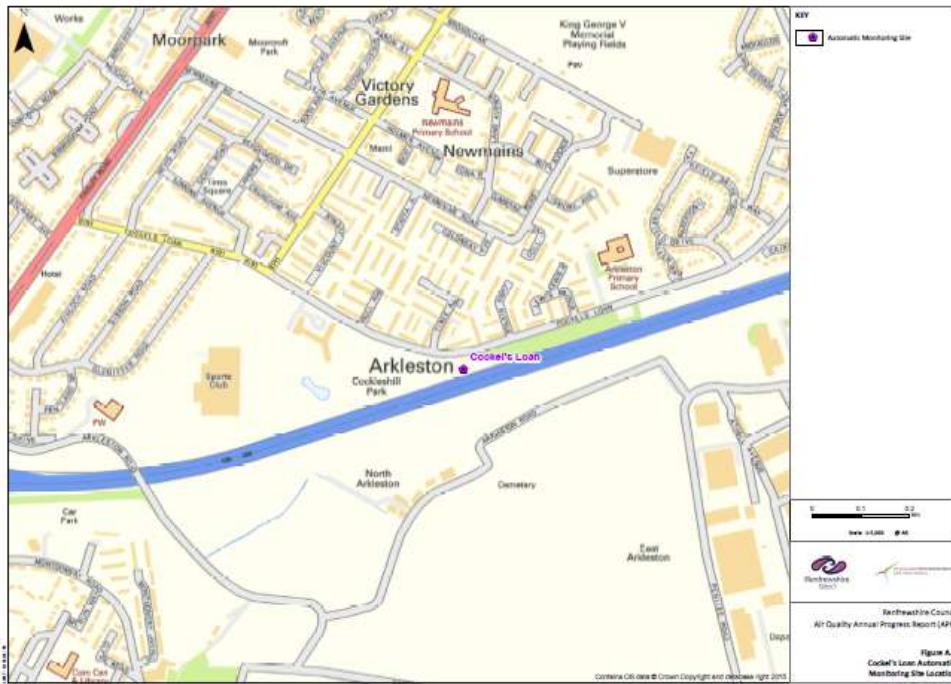


Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
1	Gilmour Street, Paisley	Urban Centre	248350	664082	NO <sub>2</sub>	Y	N	68m	N
2	Oakshaw Street, Paisley	Urban Background	247925	664052	NO <sub>2</sub>	Y	11m	35m	N
3	Lochfield Drive, Paisley	Urban Background	249004	662142	NO <sub>2</sub>	N	8m	1.5m	N
4	Regent Street, Paisley	Urban Background	249665	664364	NO <sub>2</sub>	N	9m	2m	N
7	High Street, Johnstone	Kerbside	242914	663198	NO <sub>2</sub>	N	1.6m	0m	N
8	15 Inchinnan Road, Renfrew	Kerbside	250589	667547	NO <sub>2</sub>	N	0.1m	2.6m	N
9	Station Road, Bishopston	Roadside	243975	670545	NO <sub>2</sub>	N	13m	3m	N
13	Greenock Road, Paisley	Urban Background	247371	665674	NO <sub>2</sub>	N	-12m	23m (M8)	N
14	Arkleston Road, Paisley	Urban Background	247347	665796	NO <sub>2</sub>	N	15m	2m	N

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Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
15	Montgomery Drive, Paisley	Urban Background	249185	665713	NO <sub>2</sub>	N	4.3m	1.6m (11.5m to M8 slip)	N
17	Tanar Way, Renfrew	Roadside	251524	666287	NO <sub>2</sub>	N	-5m	29m to M8	N
18	Incle Street, Paisley	Roadside	248631	664208	NO <sub>2</sub>	Y	1.5m	5.5m	N
19	Linwood Road, Paisley	Roadside	245701	663604	NO <sub>2</sub>	N	5m	2.5m	N
20	High Street, Johnstone	Kerbside	242675	663286	NO <sub>2</sub>	N	1.6m	0.1m	N
21	Causeyside Street, Paisley (Triplicate)	Roadside	248316	663612	NO <sub>2</sub>	Y	-6.3m	9.9m	Y
23	Hillington Road, Renfrew	Roadside	251869	666628	NO <sub>2</sub>	N	12m	7m	N
27	Rossland Gardens, Bishopston	Suburban	243183	671188	NO <sub>2</sub>	N	6m	2m	N
31	West Walkinshaw	Roadside	246189	666141	NO <sub>2</sub>	N	-14m	17m (M8)	N
33	76 Causeyside	Roadside	248277	663524	NO <sub>2</sub>	Y	1.1m	2.9m	N

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Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
	Street, Paisley								
34	63 Causeyside Street, Paisley	Roadside	248303	663566	NO <sub>2</sub>	Y	3m	0.7m	N
35	Old Sneddon Street, Paisley	Roadside	248360	664272	NO <sub>2</sub>	Y	0.4m	3.4m	N
36	Caledonia Street, Paisley	Roadside	247948	664774	NO <sub>2</sub>	Y	4.5m	3.3m	N
38	99 Paisley Road, Renfrew	Roadside	250108	666856	NO <sub>2</sub>	N	0.6m	2.5m	N
39	Glasgow Airport, Paisley (Triplicate)	Special	248293	666542	NO <sub>2</sub>	N	60m to nearest house	40m	Y
40	Hairst Street, Renfrew	Roadside	250763	667631	NO <sub>2</sub>	N	0.25m	6.2m	N
41	Smithhills Street (West), Paisley	Roadside	248463	664175	NO <sub>2</sub>	Y	16m	5m	N
42	Central Road (West),	Roadside	248371	664187	NO <sub>2</sub>	Y	50m	1.5m	N

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Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
	Paisley								
43	Smithhills Street (East), Paisley	Roadside	248481	664153	NO <sub>2</sub>	Y	0m	2.5m	N
44	Love Street, Paisley	Roadside	248209	664474	NO <sub>2</sub>	Y	0.2m	2.2m	N
45	Xscape, Renfrew	Kerbside	251803	667365	NO <sub>2</sub>	N	18m	2m	N
48	Glen Sax Drive, Renfrew	Roadside	251264	666217	NO <sub>2</sub>	N	-9m	45m	N
49	Tanar Way 2, Renfrew	Roadside	251462	666326	NO <sub>2</sub>	N	9m	85m	N
50	Renfrew Road, Paisley	Roadside	248985	665494	NO <sub>2</sub>	N	7m	12m	N
52	Glasgow Road 2, Renfrew	Roadside	251515	666955	NO <sub>2</sub>	N	4m	3m	N
53	Old Greenock Rd, Inchinnan	Roadside	248154	668832	NO <sub>2</sub>	N	9m	1.5m	N
54	Easwald Bank, Kilbarchan	Roadside	241059	662743	NO <sub>2</sub>	N	4.5m	1.2m	N
56	Paisley Road, Renfrew	Roadside	250579	667488	NO <sub>2</sub>	N	3.5m	4.5m	N
57	Paisley Road,	Roadside	250597	667473	NO <sub>2</sub>	N	1.2m	6m	N



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Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
	Renfrew								
58	Glebe Street, Renfrew	Roadside	250667	667448	NO <sub>2</sub>	N	4.5m	2.8m	N
59	High Street, Johnstone	Roadside	242656	663281	NO <sub>2</sub>	N	0.1m	1.7m	N
60	Underwood Rd, Paisley	Roadside	247525	664326	NO <sub>2</sub>	Y	7.8m	0.5m	N
61	High Barholm, Kilbarchan	Roadside	240584	663007	NO <sub>2</sub>	N	0.1m	1.1m	N
62	Cockels Loan, Renfrew	Roadside	250463	665934	NO <sub>2</sub>	N	0m	18m	Y
63	Renfrew Road, Paisley	Roadside	249159	665710	NO <sub>2</sub>	N	6.8m	3.7m	N
64	Montgomery Road, Paisley	Roadside	249202	665708	NO <sub>2</sub>	N	8.8m	0.15m	N
65	High Barholm, Kilbarchan	Roadside	240599	663000	NO <sub>2</sub>	N	0.4m	2m	N
66	High Barholm, Kilbarchan	Roadside	240573	663021	NO <sub>2</sub>	N	0.4m	1.6m	N
67	High Barholm, Kilbarchan	Roadside	240512	663027	NO <sub>2</sub>	N	1.8m	3 m	N
68	Paisley Road, Renfrew	Roadside	250522	667419	NO <sub>2</sub>	N	0.2m	3m	N
69	Inchinnan Road, Renfrew	Roadside	250537	667602	NO <sub>2</sub>	N	0.1m	2.9m	N

Renfrewshire Council

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
70	Inchinnan Road, Renfrew	Roadside	250599	667561	NO <sub>2</sub>	N	4.5m	3.7m	N
71	Braille Drive, Renfrew	Roadside	251729	666360	NO <sub>2</sub>	N	0 (equivalent distance to nearby housing)	25m (M8)	N
72	High St, Johnstone	Roadside	243080	663140	NO <sub>2</sub>	N	0.45m	3m	N
73	Lawn Street, Paisley	Roadside	248566	664072	NO <sub>2</sub>	Y	0.19m	1.95m	N
74	Causeyside Street, Paisley	Roadside	248313	663621	NO <sub>2</sub>	Y	0.19m	3.3m	N
75	Canal Street, Renfrew	Roadside	250853	667747	NO <sub>2</sub>	N	0.17m	5m	N
76	Main Road, Bridge of Weir	Roadside	238899	665488	NO <sub>2</sub>	N	0.15m	4.73m	N
77	Main Road/Houston Rd, Bridge of Weir	Roadside	238570	665892	NO <sub>2</sub>	N	0.15m	2.26m	N
78	Neilston Road, Paisley	Roadside	248339	662575	NO <sub>2</sub>	N	0.15m	2.63m	N
79	Incle Street, Paisley	Roadside	248632	664212	NO <sub>2</sub>	Y	0.18m	2.8m	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
80	Glasgow Road, Paisley	Roadside	249653	664123	NO <sub>2</sub>	N	1.9m	2.1m	N
81	Glasgow Airport	Roadside	247346	665805	NO <sub>2</sub>	N	32m	33m	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 early 2016.

The locations of the non-automatic monitoring sites are shown in maps in Figures A.4 to A.17

Figure A.19 – Paisley (central) Diffusion Tube Sites

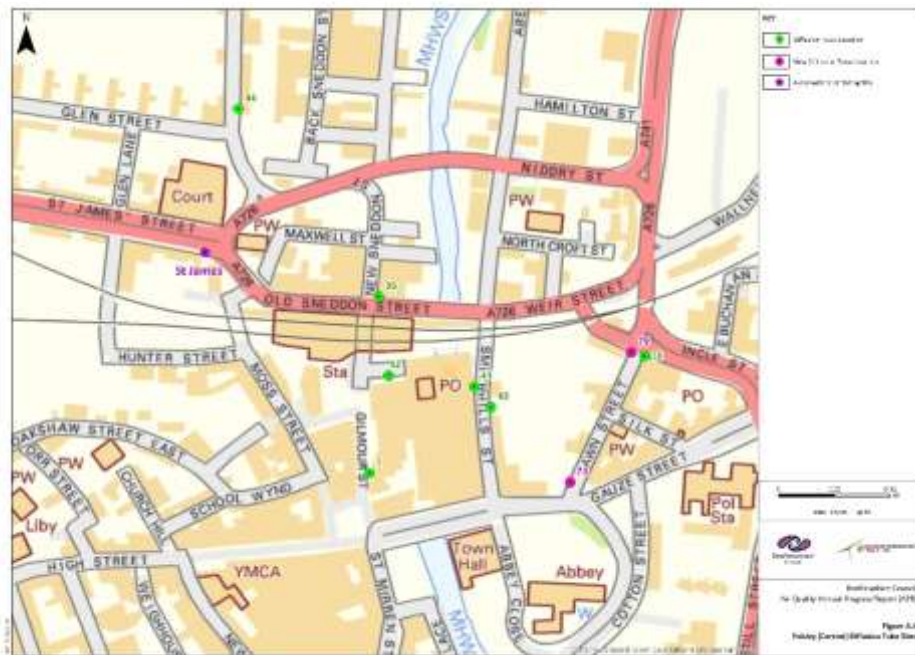


Figure A.20 – Paisley (west) Diffusion Tube Sites

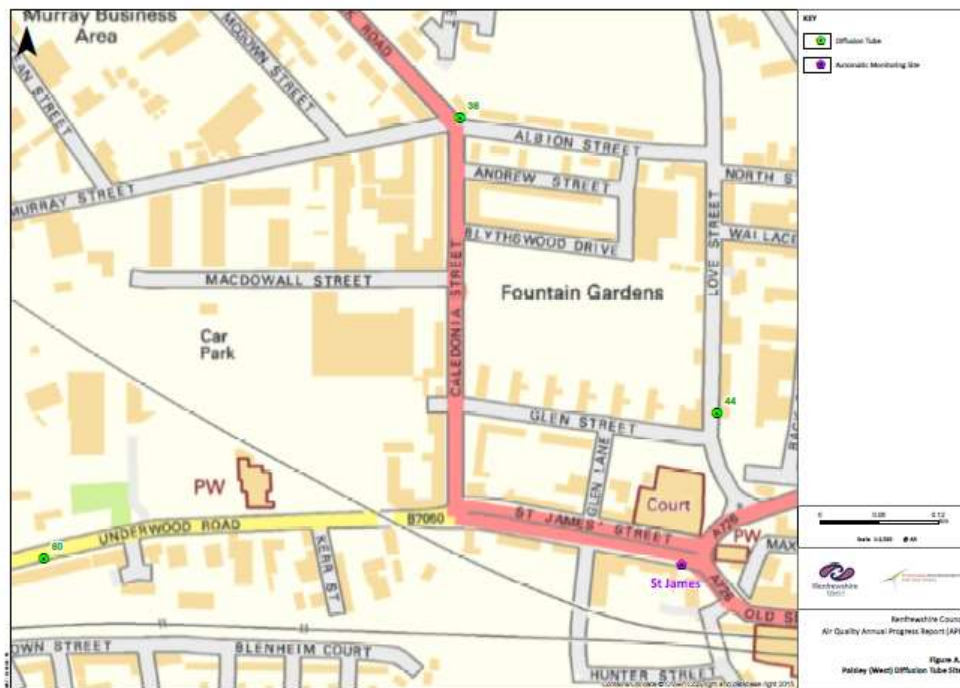


Figure A.21 – Paisley (north) Diffusion Tube Sites



Figure A.22 – Paisley (south) Diffusion Tube Sites

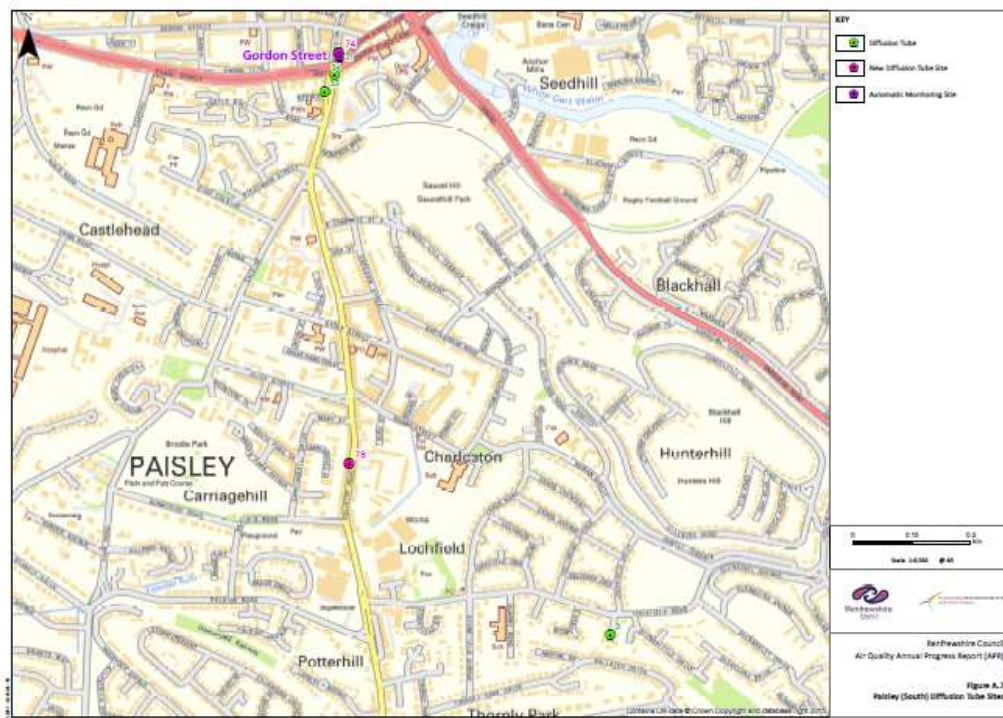


Figure A.23 – Paisley (south west) Diffusion Tube Sites



Figure A.24 – Renfrew (central) Diffusion Tube Sites

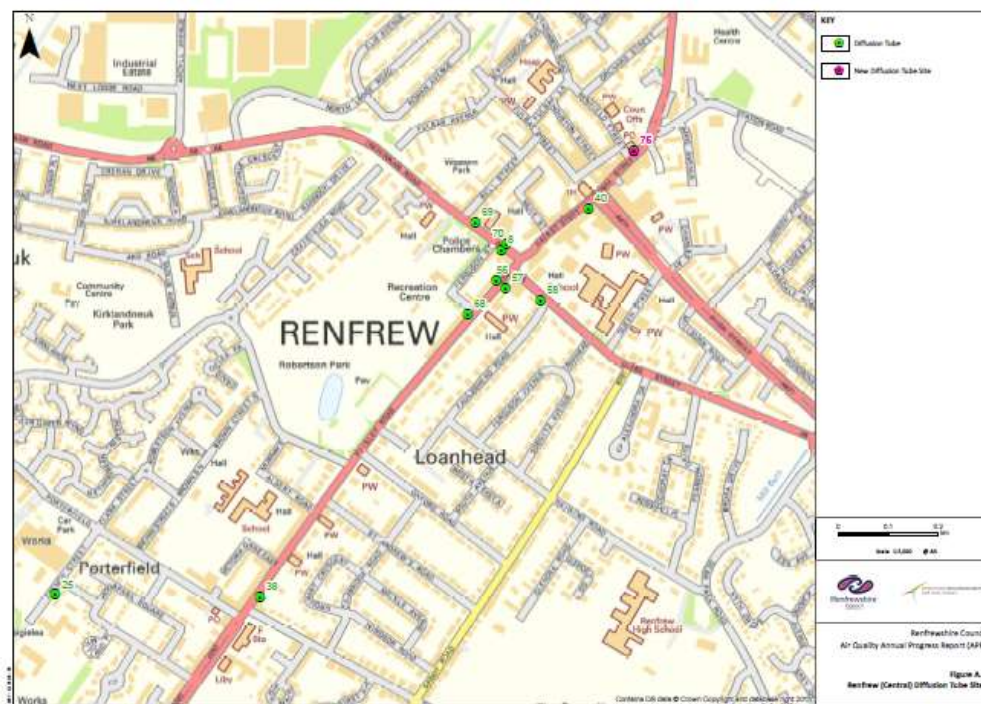


Figure A.25 – Renfrew (east) Diffusion Tube Sites

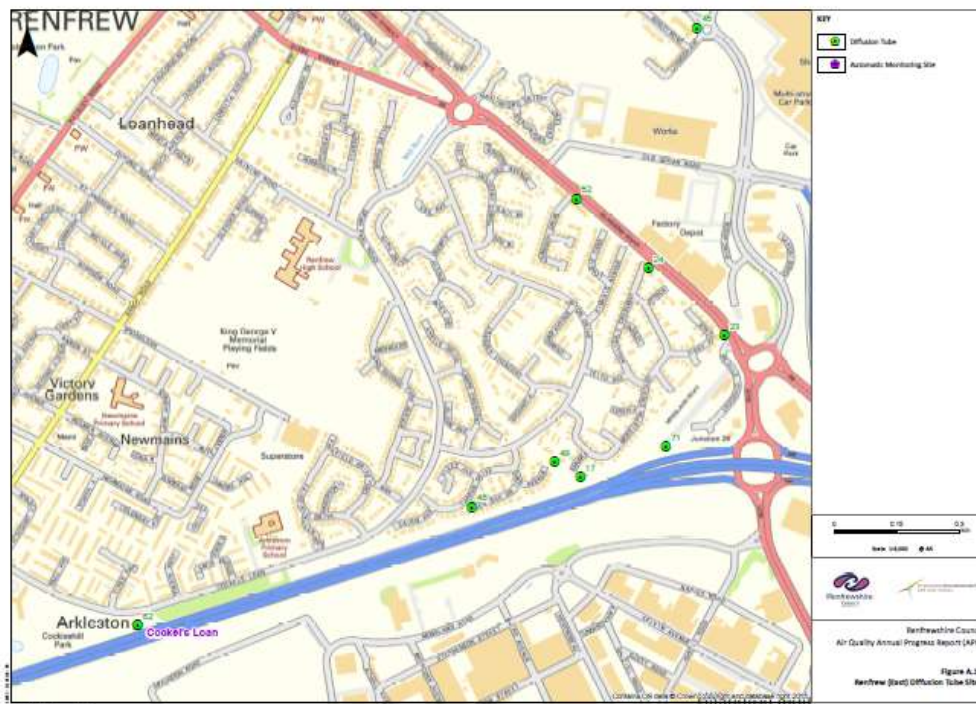


Figure A.26 – Johnstone Diffusion Tube Sites

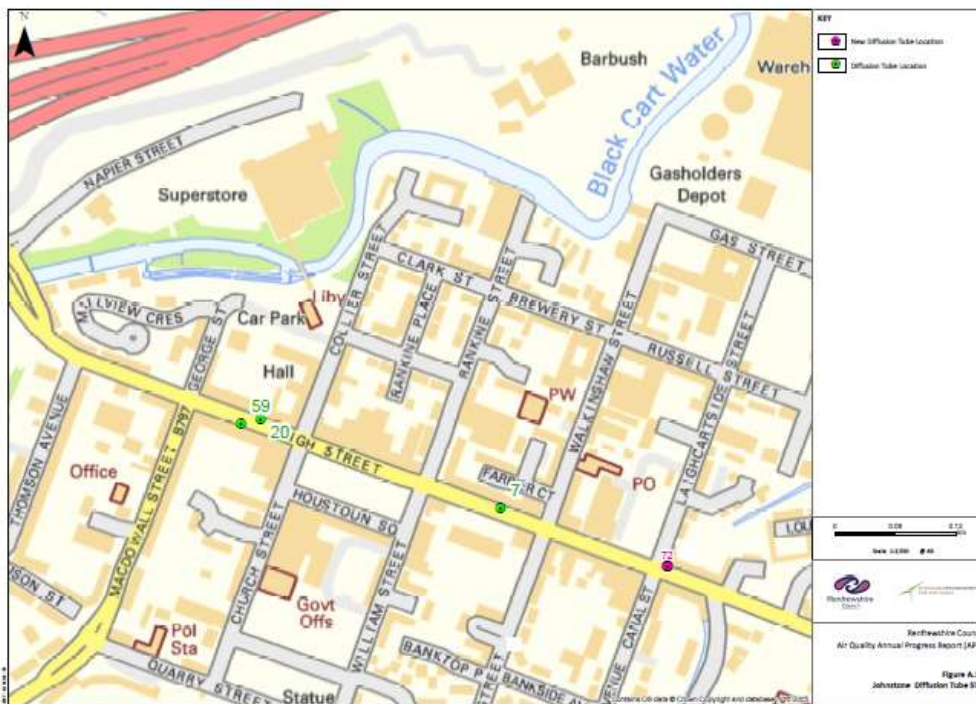


Figure A.27 – West Walkinshaw Diffusion Tube Site



Figure A.28 – Kilbarchan Diffusion Tube Sites

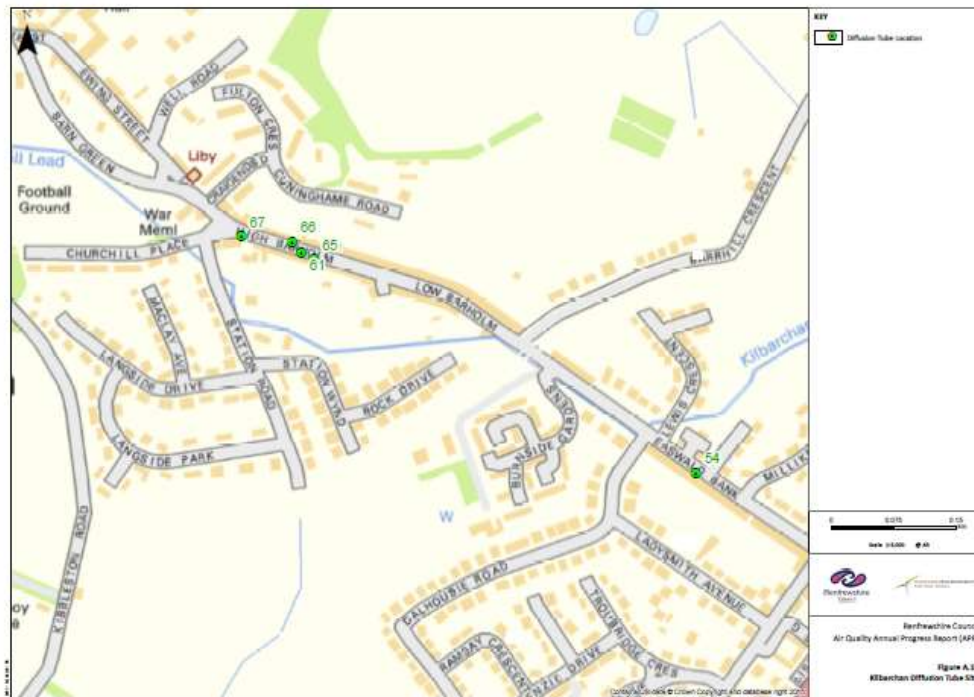




Figure A.29 – Bishopton Diffusion Tube Sites

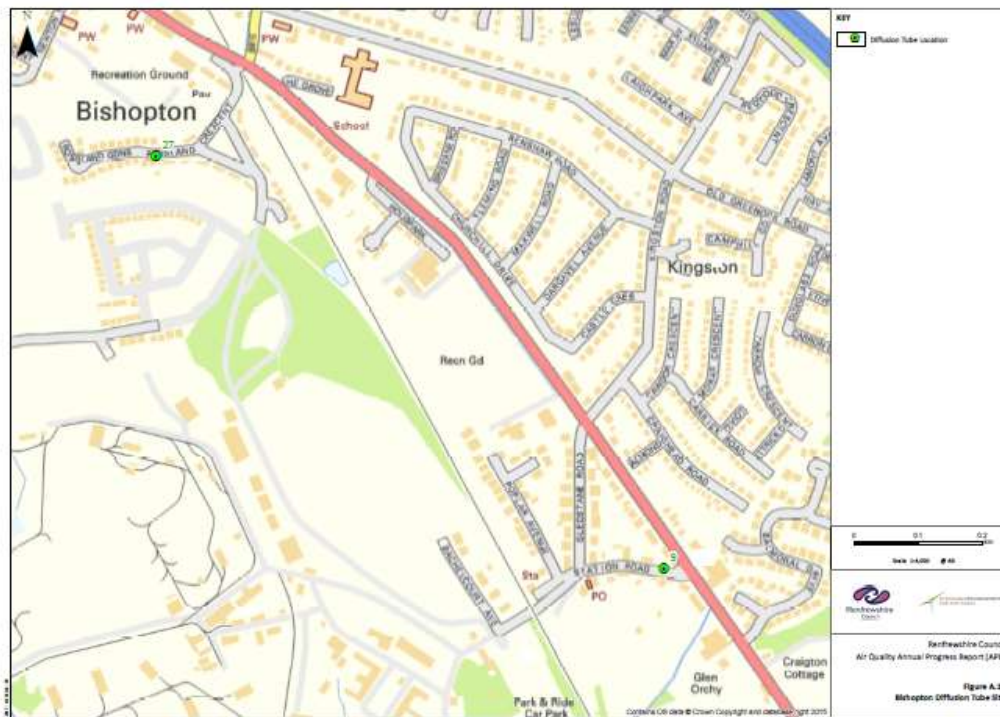


Figure A.30 – Inchinnan Diffusion Tube Sites



Figure A.16 – Paisley (east) Diffusion Tube Sites



Figure A.17 – Bridge of Weir Diffusion Tube Sites

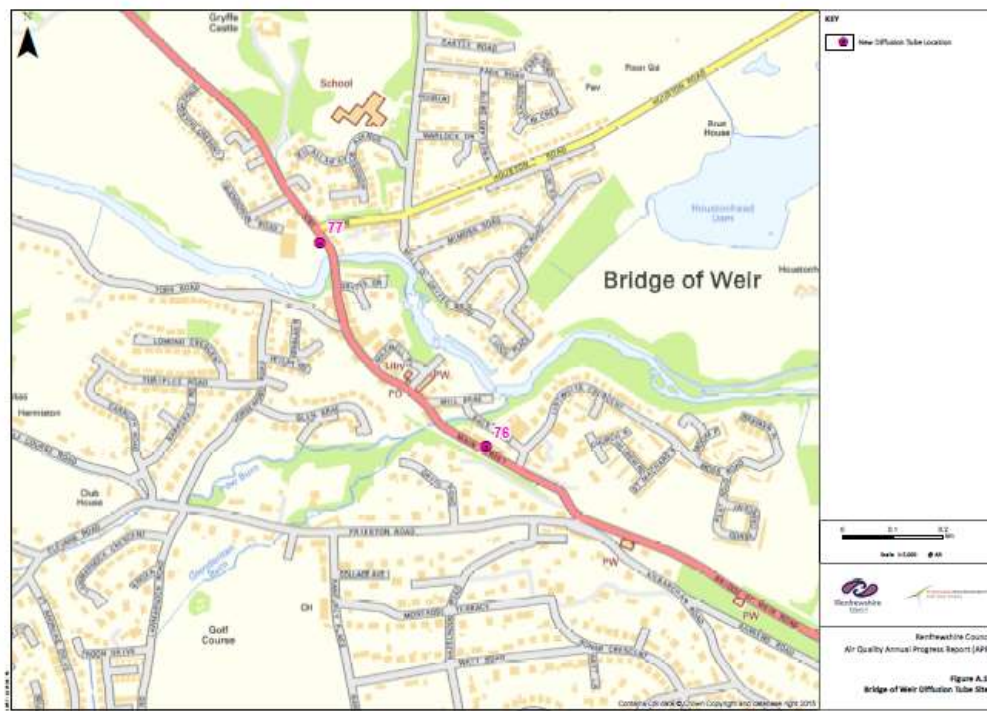


Table A.3 – Annual Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2011 (Bias Adj. Factor = 1.09)	2012 (Bias Adj. Factor = 1.13)	2013 (Bias Adj. Factor = 1.12)	2014 (Bias Adj. Factor = 1.06)	2015 (Bias Adj. Factor = 0.94)
Glasgow Airport	Special	Automatic	52.7	52.7	23	22	20	22	18
Gordon Street, Paisley	Roadside	Automatic	93.7	93.7	43*	38	34*	28	27
Cockels Loan	Roadside	Automatic	96.1	96.1	-	-	-	34	36
Paisley 1	Urban Centre	Passive	100	100	32.6	28.7	27.0	29.4	18.8
Paisley 2	Urban Background	Passive	100	100	19.1	21.0	20.0	17.8	12.7
Paisley 3	Urban Background	Passive	100	100	14.7	13.5	13.6	12.4	9.3
Paisley 4	Urban Background	Passive	100	100	20.5	21.8	19.0	18.0	13.1
Johnstone 7	Kerbside	Passive	75	75	33.4	37.4	38.3	36.7	27.9
Renfrew 8	Kerbside	Passive	92	92	54.4	48.8	53.8 (53.8)	62.0 (61.6)	43.4 (43.2) <sup>(4)</sup>
Bishopton 9	Roadside	Passive	100	100	22	19.1	20.9	19.2	13.1
Paisley 13	Roadside	Passive	100	100	28.5	30.3	28.2	27.9 (30.6)	20.5 (21.3)
Paisley 15	Roadside	Passive	83	83	35.7	38.5	43.7 (42.1)	41.2 (36.2)	26.2
Renfrew 17	Roadside	Passive	92	92	41.9	37.3	45.2 (42.6)	40.0 (42.1)	32.5 (34.1)
Paisley 18	Roadside	Passive	92	92	49.7	48.5 (41.7)	44.8 (35.4)	47.9 (45.8)	35.5
Paisley 19	Roadside	Passive	100	100	34.2	36.1	38.0	34.8	24.5
Johnstone 20	Kerbside	Passive	92	92	43.2	44.4 (33.2)	46.6 (34.3)	45.2	33.2
Paisley 21	Roadside	Passive	100	100	40.7	38.6	37.7	39.4 (48.1)	28 (31.6)
Renfrew 23	Roadside	Passive	100	100	35.5	29.5	30.3	35.0	22.1
Bishopton 27	Suburban	Passive	100	100	13.3	9.1	13.8	12.3	8.1
Paisley 31 West Walkinshaw Farm	Roadside	Passive	100	100	34.9	29.9	36.9	33.1 (44.6)	26.4 (32.8)
Paisley 33	Roadside	Passive	100	100	46	42.5 (41.7)	45.9 (44.9)	42.0 (40.0)	33.2
Paisley 34	Roadside	Passive	100	100	49.7	45.4 (34.5)	48.6 (35.8)	46.5 (36.9)	35.4
Paisley 35	Roadside	Passive	100	100	51.1	45.3 (45.3)	48.6 (48.6)	47.3 (46.5)	30.5

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Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2011 (Bias Adj. Factor = 1.09)	2012 (Bias Adj. Factor = 1.13)	2013 (Bias Adj. Factor = 1.12)	2014 (Bias Adj. Factor = 1.06)	2015 (Bias Adj. Factor = 0.94)
Paisley 36	Roadside	Passive	100	100	35.7	<b>40.5 (40.5)</b>	39.8	38.7	29.8
Paisley 37	Roadside	Passive			<b>46.2</b>	39.9	<b>53.3</b>	32.1	Stopped
Renfrew 38	Roadside	Passive	92	92	31.1	27.0	34	32.3	24.5
Paisley 39	Special	Passive	100	100	24	22.8	23	21.3	18.1
Renfrew 40	Roadside	Passive	100	100	<b>47.2</b>	<b>45.5 (26.2)</b>	36.5	38.5	27.6
Paisley 41	Roadside	Passive	100	100	<b>48.9</b>	<b>45.4 (38.3)</b>	<b>45.5</b>	<b>48.8 (36.5)</b>	37.9
Paisley 42	Roadside	Passive	100	100	<b>43.1</b>	37.3	<b>42.6</b>	29.1	17.7
Paisley 43	Roadside	Passive	92	92	<b>43.9</b>	39.1	<b>41.9</b>	<b>41.9 (41.9)</b>	32.1
Paisley 44	Roadside	Passive	100	100	37.8	<b>46.4 (46.4)</b>	38.7	29.5	21.8
Renfrew 45	Kerbside	Passive	100	100	31.9	33.8	34.6	30.2	23.6
Renfrew 46	Kerbside	Passive			23.6	26.4	25.2	23.0	Stopped
Renfrew 48	Roadside	Passive	100	100	<b>40.6</b>	35.7	<b>40.6 (47.3)</b>	<b>35.2 (38.3)</b>	<b>28.7 (30.7)</b>
Renfrew 49	Roadside	Passive	100	100	36.5	33.6	34.9	34.2	22.4
Paisley 50	Roadside	Passive	100	100	34.1	34.9	33.4	32.9	25.6
Linwood 51	Roadside	Passive			26	23.2	24.1	22.3	Stopped
Renfrew 52	Roadside	Passive	100	100	38	35.8	32.6	34.3	27.2
Inchinnan 53	Roadside	Passive	92	92	-	-	32.0	28.1	22.9
Kilbarchan 54	Roadside	Passive	100	100	-	-	31.0	29.9	20.7
Kilbarchan 55	Roadside	Passive			-	-	17.9	14.7	Stopped
Renfrew 56	Roadside	Passive	100	100	-	-	<b>43.9 (39.5)</b>	39.3	30.2
Renfrew 57	Roadside	Passive	100	100	-	-	27.5	37.8	24.0
Renfrew 58	Roadside	Passive	92	92	-	-	25.7	26.5	18.5
Johnstone 59	Roadside	Passive	100	100	-	-	<b>64.1 (64.1)</b>	<b>57.0 (56.4)</b>	<b>45.3 (45.0)</b>
Paisley 60	Roadside	Passive	100	100	-	-	<b>52.2 (31.1)</b>	<b>42.2 (28.9)</b>	28.9
Kilbarchan 61	Roadside	Passive	100	100	-	-	<b>47.5 (47.5)</b>	<b>40.3 (39.7)</b>	31.2
Cockels Loan 62	Roadside	Passive	100	100	-	-	<b>60.8(60.8)</b>	<b>46.4 (43.4)</b>	35.3
Paisley 63	Roadside	Passive	100	100	-	-	-	<b>40.1 (35.5)</b>	29.7
Paisley 64	Roadside	Passive	92	92	-	-	-	32.3	27.8
Kilbarchan 65	Roadside	Passive	100	100	-	-	-	37.7	28.2
Kilbarchan 66	Roadside	Passive	92	92	-	-	-	21.5	18.7
Kilbarchan 67	Roadside	Passive	92	92	-	-	-	19.1	14.7

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2011 (Bias Adj. Factor = 1.09)	2012 (Bias Adj. Factor = 1.13)	2013 (Bias Adj. Factor = 1.12)	2014 (Bias Adj. Factor = 1.06)	2015 (Bias Adj. Factor = 0.94)
Renfrew 68	Roadside	Passive	92	92	-	-	-	33.8	27.3
Renfrew 69	Roadside	Passive	92	92	-	-	-	<b>44.3 (44.0)</b>	31.8
Renfrew 70	Roadside	Passive	75	75	-	-	-	32.0	29.2
Renfrew 71	Roadside	Passive	100	100	-	-	-	38.5	28.9

Notes: Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG(16) if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(4) Distance corrected NO<sub>2</sub> 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<sup>3</sup> following distance correction are shaded in rose.

Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> 1-Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
					2011	2012	2013	2014	2015
Glasgow Airport	Special	Automatic	52.7	52.7	0	0	0	0	0 (396)
Gordon Street, Paisley	Roadside	Automatic	93.7	93.7	1(149)	9	<b>46</b> (304)	0	0
Cockels Loan	Roadside	Automatic	96.1	96.1	-	-	-	0	0

Notes: Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> 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 99.8<sup>th</sup> percentile of 1-hour means is provided in brackets.

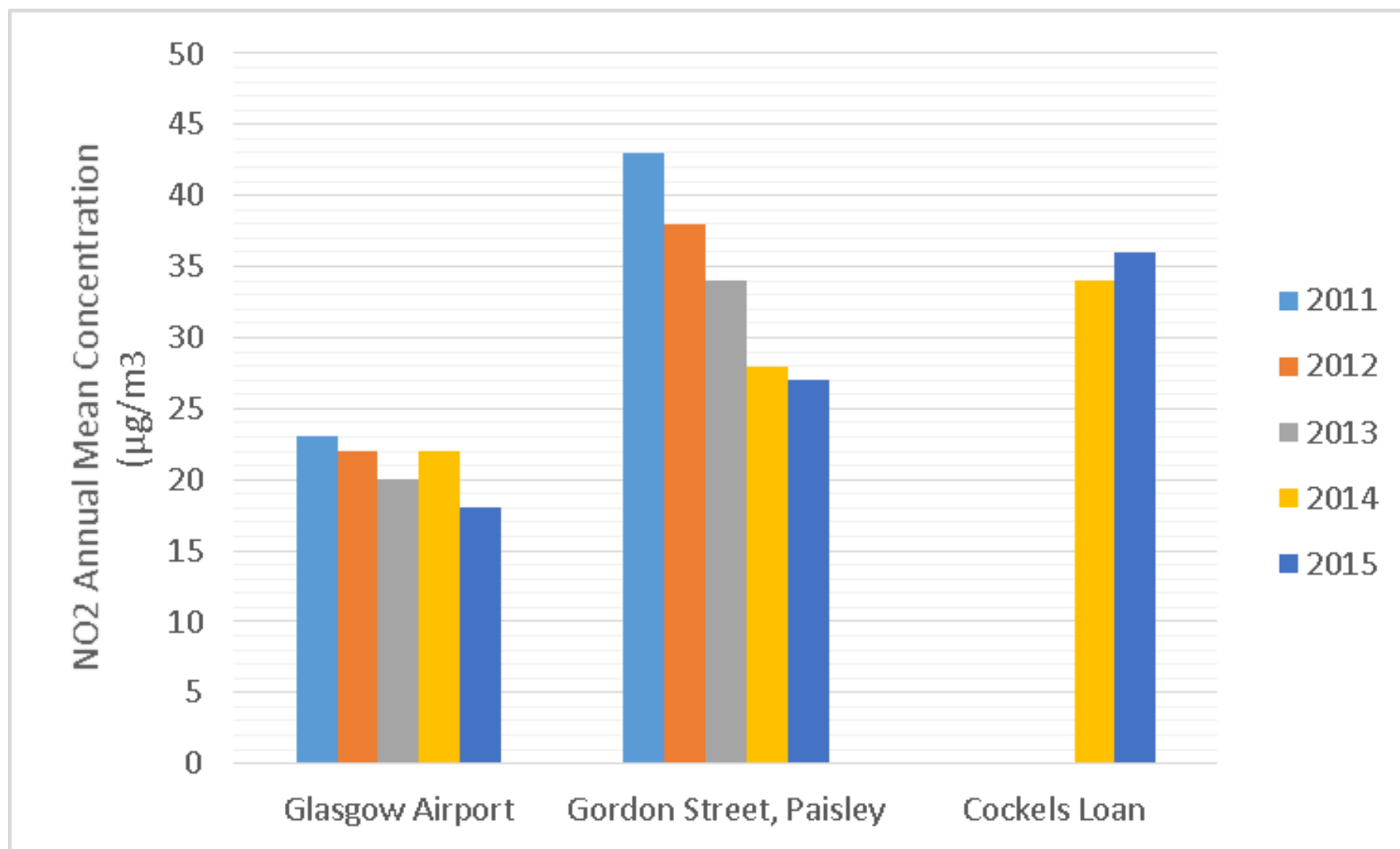
Figure A.18 – Automatic Sites Annual Mean NO<sub>2</sub> Monitoring Trends

Figure A.19 – Non Automatic Annual Mean NO<sub>2</sub> Monitoring Trends

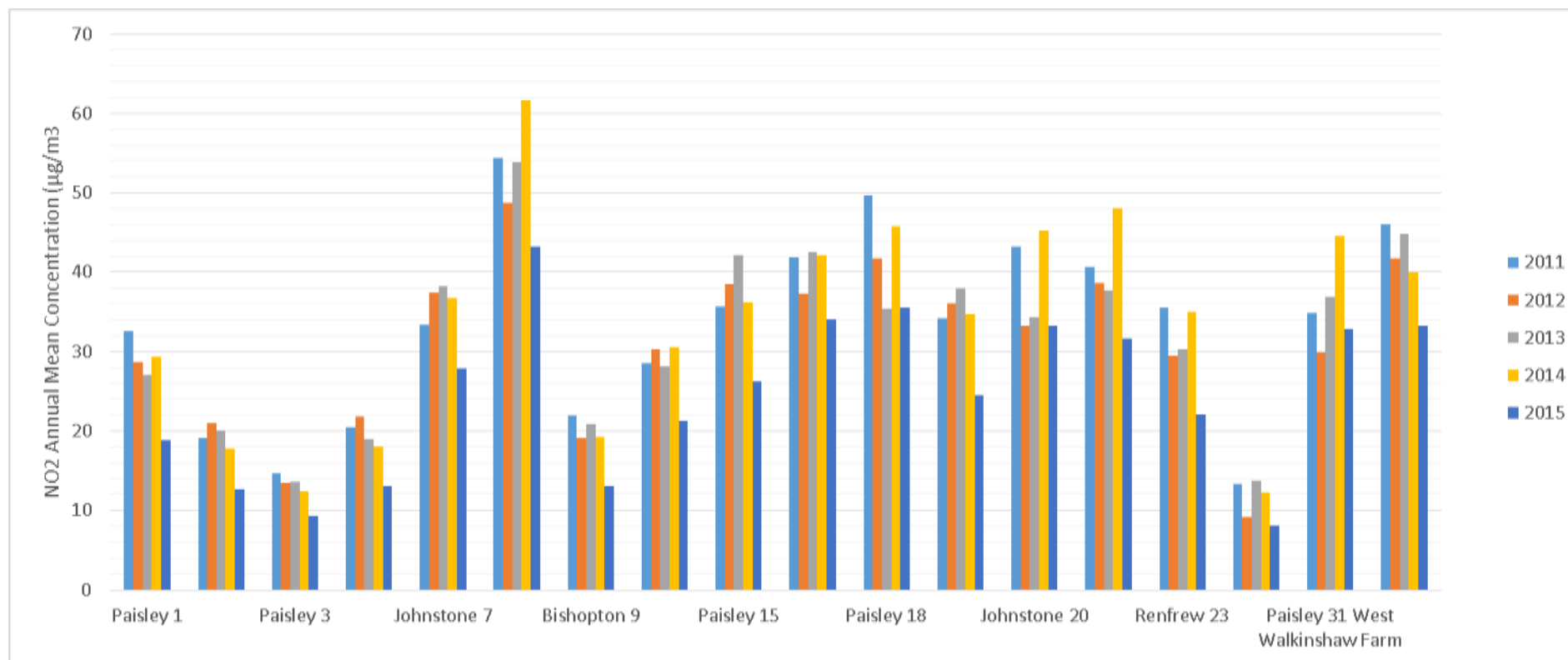




Figure A.20 – Non Automatic Annual Mean NO<sub>2</sub> Monitoring Trends

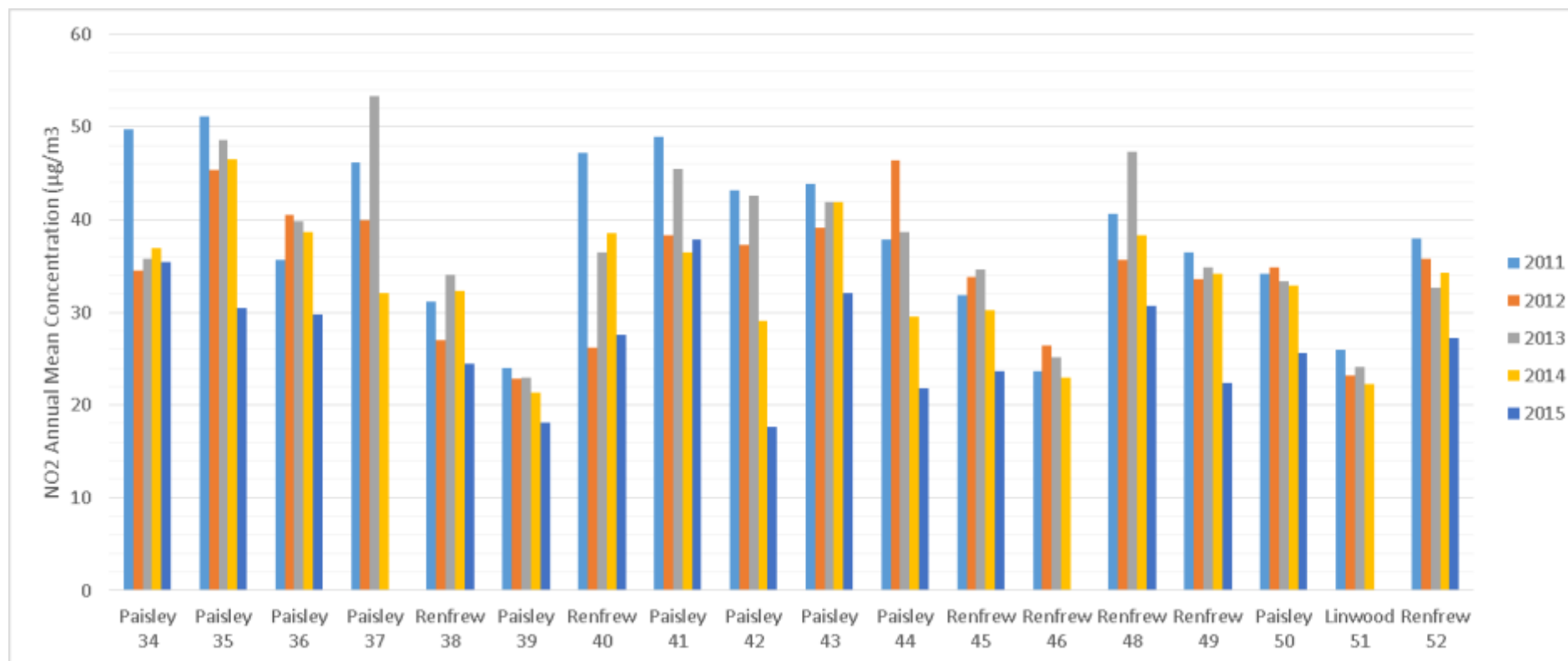


Figure A.21 – Non Automatic Annual Mean NO<sub>2</sub> Monitoring Trends

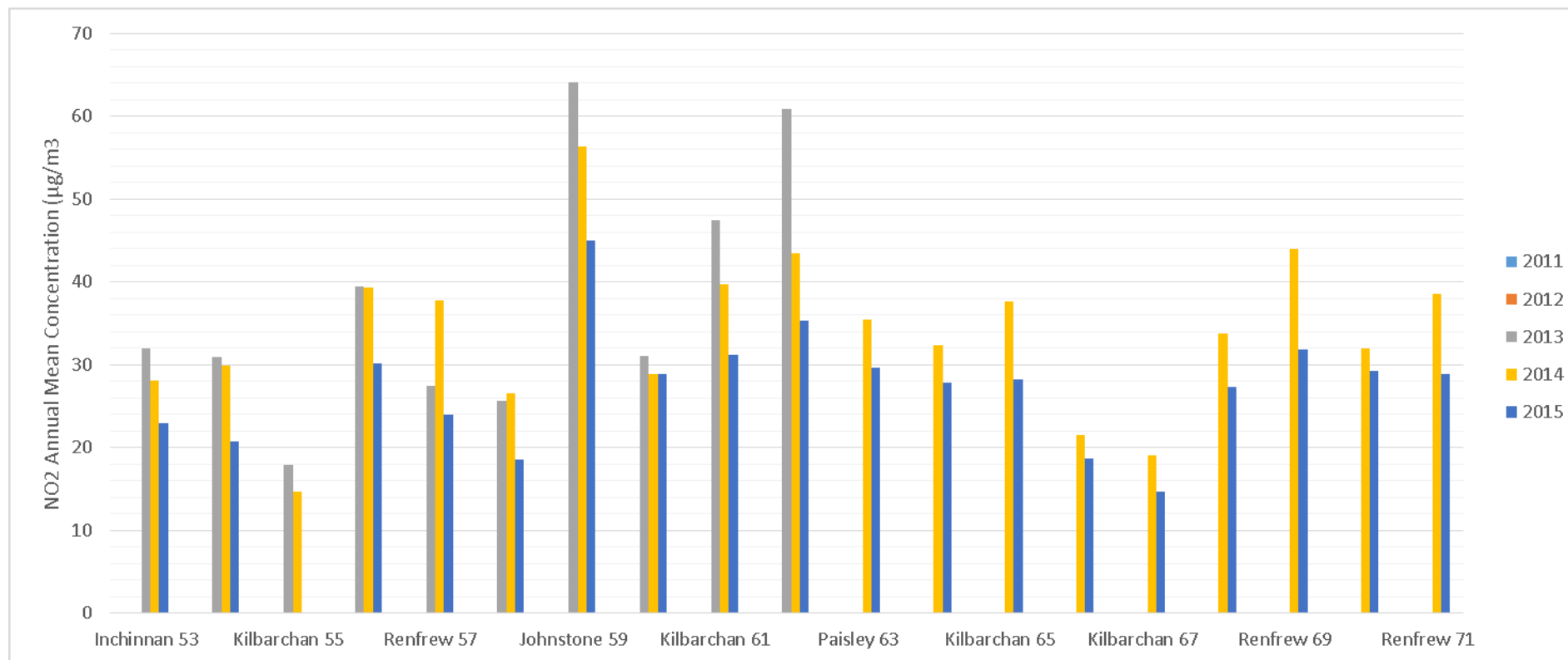


Table A.5 – Annual Mean PM<sub>10</sub> Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	PM <sub>10</sub> Annual Mean Concentration (µg/m <sup>3</sup> )				
				2011	2012	2013	2014	2015
Gordon Street	Roadside	61.2	61.2	16	15	17.9*	<b>21.2*</b>	15.2 <sup>(3)</sup>
St James Street	Roadside	91.1	91.1	17	15	14.5	14.8	13
Cockels Loan	Roadside	70.1	70.1	-	-	-	16.2*	13.1 <sup>(3)</sup>

Notes: Exceedances of the PM<sub>10</sub> annual mean objective of 18µg/m<sup>3</sup> are shown in **bold**.

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

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

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

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

Table A.6 – 24-Hour Mean PM<sub>10</sub> Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM <sub>10</sub> 24-Hour Means > 50µg/m <sup>3</sup> (3)				
				2011	2012	2013	2014	2015
Gordon Street	Roadside	61.2	61.2	6	4 (43)	2 (40)	1 (49)	0 (33)
St James Street	Roadside	91.1	91.1	4	4	0	0 (42)	1
Cockels Loan	Roadside	70.1	70.1	-	-	-	0 (43)	3

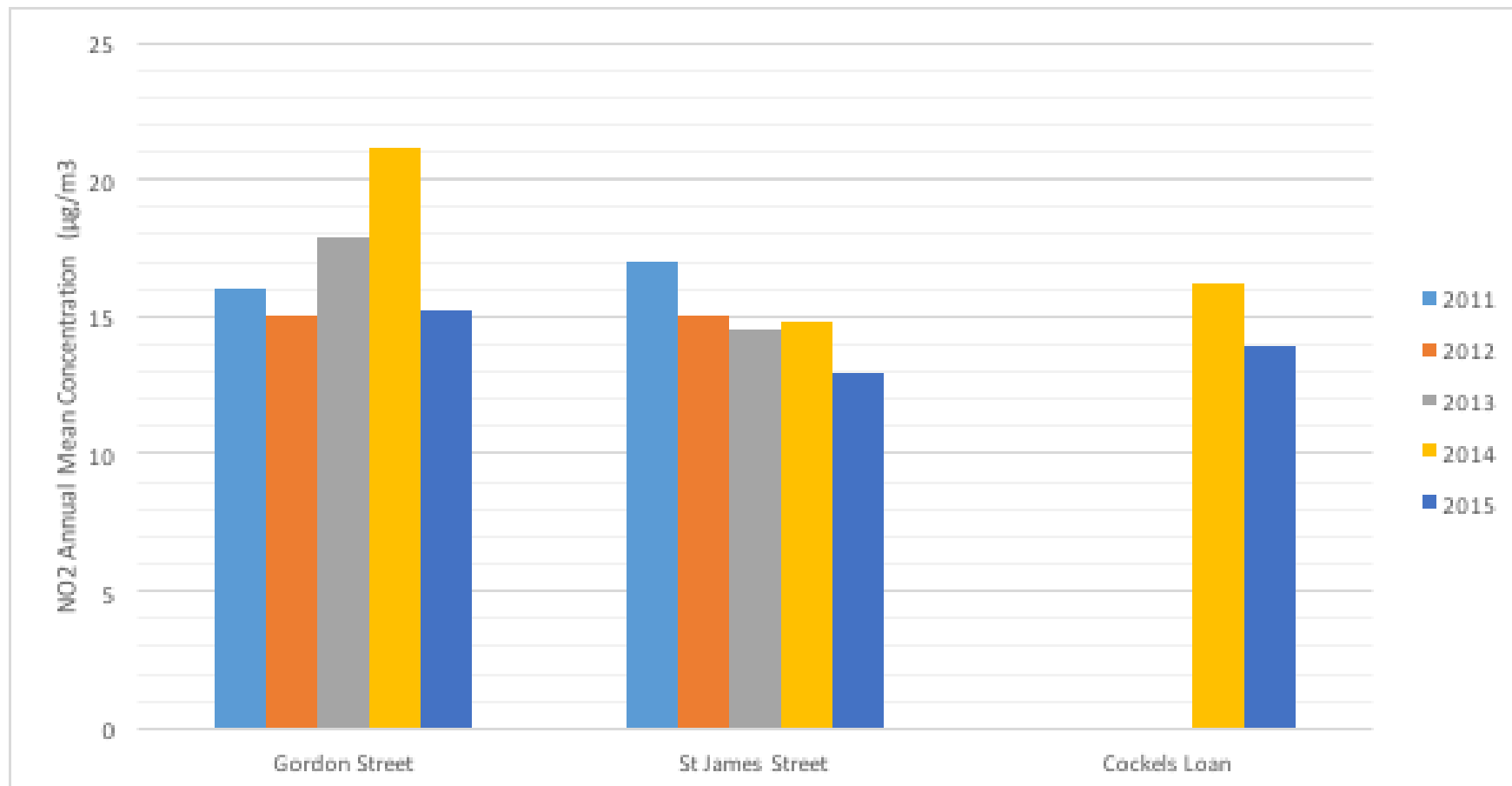
Notes: Exceedances of the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> not to be exceeded more than 7 times/year) are shown in **bold**.

(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 98.08<sup>th</sup> percentile of 24-hour means is provided in brackets.

Figure A.22 - Automatic Sites Annual Mean PM<sub>10</sub> Monitoring Trends



## Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results for 2015

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													Annual Mean	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted <sup>(1)</sup>	
<b>Paisley 1</b>	28.1	25.5	24.2	10.6	9	11.6	14.9	14.4	20.3	30.5	23.1	27.4	20.0	18.8	
<b>Paisley 2</b>	19.5	20.9	16.3	9.1	5.5	6.2	10.9	8.9	15	23.3	12.9	13.3	13.5	12.7	
<b>Paisley 3</b>	14.8	14.9	10.8	4	3.2	4.3	6.8	6.1	8.5	18.1	15	12.7	9.9	9.3	
<b>Paisley 4</b>	17.8	24.4	16.4	6.9	6.3	6.7	9.5	9.4	14.3	23	16.5	15.6	13.9	13.1	
<b>Johnstone 7</b>	33.2	34.6	15.7	22.9	14.3	22.1	21.2	25.7	no return	75	31.6	no return	29.6	27.9	
<b>Renfrew 8</b>	62	65.3	not analysed	23.8	37.6	31.9	45.4	44.1	48.9	55.7	52.2	41	46.2	43.4	
<b>Bishopton 9</b>	13	22.4	14.4	6.1	6	10.2	9	10.7	11.9	23.1	25.5	14.9	13.9	13.1	
<b>Paisley13</b>	28.7	29.9	27.9	14.6	15.4	20.9	5.9	18	25.3	31.3	26	17.8	21.8	20.5	
<b>Paisley15</b>	30.4	39.7	35.7	13.2	22.5	27.9	22.9	no return	31.5	34.4	no return	20.5	27.9	26.2	
<b>Renfrew17</b>	39	51.6	47.5	24	18.4	23.5	not analysed -spider	33.7	28.4	47.2	34.9	31.8	34.5	43.4	
<b>Paisley18</b>	46.9	46.9	49.7	14.2	no return	29.1	32.9	34.1	31.5	42.4	49.8	37.9	37.8	35.5	

Renfrewshire Council

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													Annual Mean	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted <sup>(1)</sup>	
	<b>Paisley19</b>	37.2	34.5	32.9	16.3	10.1	19	24	28.6	16.7	37.6	33.3			22.2
<b>Johnstone 20</b>	43.1	38.7	45.7	21.2	16.8	24.6	24.2	33.3	34.4	66.3	40.6	no return	35.4	33.2	
<b>Paisley 21(1)</b>	39.3	37.9	40.7	20.8	14.9	23.8	28.6	26.5	31.6	2.1	79.6	31.8	31.5	29.6	
<b>Paisley 21(2)</b>	40.4	39.9	37.5	12.7	17.7	15.9	23.3	28.1	24.9	42.6	41.2	25.3	29.1	27.4	
<b>Paisley 21(3)</b>	34.5	36.5	37	14.8	12.1	18.5	29.3	27.8	30.5	41	31.8	32.1	28.8	27.1	
<b>Renfrew 23</b>	26.9	36.3	24.5	11	10.3	14.5	13.7	21	23.4	34.9	32.4	33.3	23.5	22.1	
<b>Bishopton 27</b>	12.7	12.2	9.7	4.2	3	4.3	1.9	5.8	8.3	15.4	15.5	9.8	8.6	8.1	
<b>West Walkinshaw 31</b>	32	38.6	32	18.7	17.2	22.1	22.9	28.4	34.1	37	29.2	24.2	28.0	26.4	
<b>Paisley 33</b>	46.1	38.5	47	32.5	17.8	31.4	37	30.9	35.6	45.4	32.9	28.1	35.3	33.2	
<b>Paisley 34</b>	46.1	53.7	19.2	22.5	31.6	22.7	38.2	40.8	41.5	64.2	43.5	27.8	37.7	35.4	
<b>Paisley 35</b>	38	44.3	44.1	18.4	18.6	26.4	30.7	31	32	45.3	43.6	17.4	32.5	30.5	
<b>Paisley 36</b>	38.5	42.6	34	24.9	13.1	26.9	26.3	24.1	35.3	42	46.8	26.1	31.7	29.8	
<b>Renfrew 38</b>	31.5	39	31	14.5	12.1	21	23.8	27.1	28	35.6	22.9	no return	26.0	24.5	
<b>Paisley 39(1)</b>	26.5	27.5	25.1	13.5	7.8	13.1	15.9	16.6	18.3	25.5	26.9	23.9	20.1	18.8	
<b>Paisley 39(2)</b>	25.2	29.5	21.8	12.2	9.1	12.7	14.6	18.2	19.6	33.5	18.1	18.5	19.4	18.3	
<b>Paisley 39(3)</b>	24.3	25.7	23.3	9.1	9.8	12	16.6	15.8	20.7	27.5	16.8	16.7	18.2	17.1	

Renfrewshire Council

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													Annual Mean	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted <sup>(1)</sup>	
	<b>Renfrew 40</b>	39.1	37.8	37.4	13.4	16	23.9	25.4	31.9	33.2	39.4	33.7	21.4	29.4	27.6
<b>Paisley 41</b>	55.1	47.2	49.1	18.7	20.5	32.4	31.8	39.3	39.8	42.6	54.8	51.9	<b>40.3</b>	37.9	
<b>Paisley 42</b>	23.8	26.4	24	10.4	8.4	11.4	14.2	16.1	22.3	30.3	21.7	17.3	18.9	17.7	
<b>Paisley 43</b>	45.9	41.2	45.8	no return	19	35.4	32.1	27.2	31.3	49.8	32	15.4	34.1	32.1	
<b>Paisley 44</b>	26.5	28.9	26.8	12.6	10.6	16.2	19.3	19.4	25.1	48.7	27.2	17.5	23.2	21.8	
<b>Renfrew45</b>	no return	no return	no return	no return	10.9	17.3	22.1	21.1	23.9	50.2	37.8	17.2	25.1	23.6	
<b>Renfrew48</b>	40.3	50.1	39.6	16	12.5	21.1	23.9	22	24.9	51.6	36.5	27.3	30.5	28.7	
<b>Renfrew 49</b>	34	22.2	35.9	14	9.2	18.3	19.9	11.1	24.6	38	32.5	26.2	23.8	22.4	
<b>Paisley 50</b>	41.4	37.4	34.7	16.7	15.4	12.9	24.3	24.3	27	35.4	28.5	28.6	27.2	25.6	
<b>Renfrew 52</b>	37.6	38.8	34.4	18.2	17.4	13.2	28.1	31.8	34.2	39.3	26.4	28.4	29.0	27.2	
<b>Inchinnan 53</b>	41	33.6	29.5	11.2	12.6	9.6	20.8	24.3	no return	31.8	29.5	23.6	24.3	22.9	
<b>Kilbarchan 54</b>	31.8	25.2	30.1	13.3	8.1	11.9	18.1	21.6	22.1	30.6	28.1	23.2	22.0	20.7	
<b>Renfrew 56</b>	43.3	46.2	34.5	17.3	16.9	18.7	29.6	32.6	36.6	38.5	44.7	26.6	32.1	30.2	
<b>Renfrew 57</b>	32.3	36.9	33.1	14.5	11	19.1	21.4	24.9	26.3	34.7	30.4	22.2	25.6	24.0	
<b>Renfrew 58</b>	29.5	32.4	21.8	13.7	10.2	14.3	19.2	<b>2.1</b>	24.3	34.5	14.6	19.4	19.7	18.5	
<b>Johnstone 59</b>	63.8	61.7	68.9	24	25.2	41.7	43.1	42.9	50.7	58.5	57	41.3	<b>48.2</b>	<b>45.3</b>	



## Renfrewshire Council

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													Annual Mean	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted <sup>(1)</sup>	
	<b>Paisley 60</b>	37.8	38	38.2	17.2	13.2	24.4	29.7	31.4	25.4	46.2	38.5			28.5
<b>Kilbarchan 61</b>	42.3	44.4	39.2	23.2	19	26.4	30.9	35.8	34.4	38.1	44.1	20.7	33.2	31.2	
<b>Cockels Loan 62 (1)</b>	45.4	54.2	48.7	18.6	25.6	31.7	35.2	29.9	36.3	44.1	53.5	32.4	38.0	35.7	
<b>Cockels Loan 62 (2)</b>	44.7	44.8	47.1	17.4	17.7	29.7	32.5	29	33.6	55.7	43	35.7	35.9	33.8	
<b>Cockels Loan 62 (3)</b>	48.8	53.9	48.5	19.9	19.7	31.9	29.5	33.8	32.1	59.7	46.5	39.8	38.7	36.4	
<b>Paisley 63</b>	41.9	30.4	32.6	21.9	19.2	27.4	29.9	29.5	36.8	44.4	37.9	27.4	31.6	29.7	
<b>Paisley 64</b>	38.8	36.4	37.7	16.1	12.6	20.3	31.4	no return	30.8	36.1	38.6	26.3	29.6	27.8	
<b>Kilbarchan 65</b>	31.8	40.6	36.9	19.8	18.1	26.3	27.3	27.1	32.7	37.8	33	28.6	30.0	28.2	
<b>Kilbarchan 66</b>	25.5	22.1	22.7	no return	8.8	11.5	16.3	16.3	23.6	29.3	24.7	18.5	19.9	18.7	
<b>Kilbarchan 67</b>	21.1	21.4	20.2	no return	6.4	10.5	12.1	13.2	5	27.5	17.1	17.5	15.6	14.7	
<b>Renfrew 68</b>	19.1	42.9	35.6	18.1	12	no return	26.8	27.1	31.6	50.2	33.6	22.7	29.1	27.3	
<b>Renfrew 69</b>	40.1	43.7	29.3	no return	15.7	18.4	27.2	27.3	32.3	51.6	41.3	45.4	33.8	31.8	
<b>Renfrew 70</b>	33.5	45	36.2	25.6	11.7	no return	27.2	no return	no return	38.2	37.7	24.3	31.0	29.2	
<b>Renfrew 71</b>	44.5	48.9	37.5	11.7	10.9	18	29	30.2	33.1	39.4	34.3	31.5	30.8	28.9	

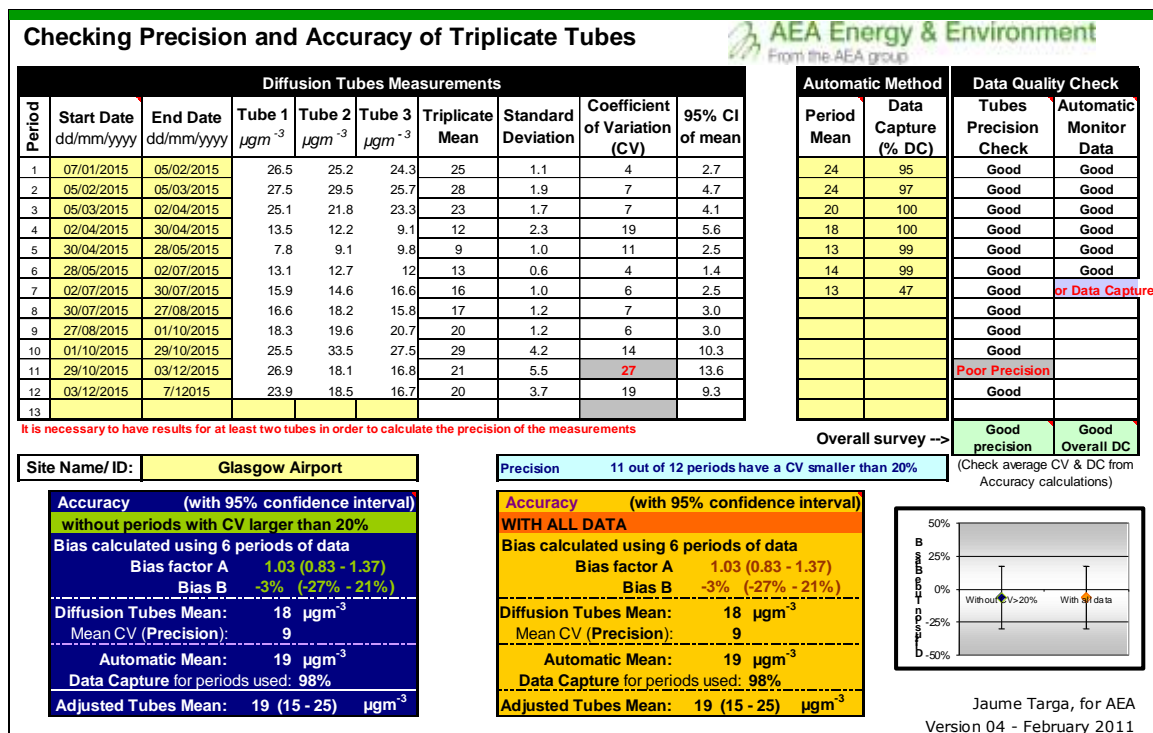
(1) See Appendix C for details on bias adjustment

## 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 2015 at sites where NO<sub>2</sub> 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.4. A summary of the calculated factors is presented in Table C.1. The bias factor from the national database is presented in Figure C.5.

Figure C.1 Co-Location Study – Glasgow Airport



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

Figure C.2 Co-Location Study – Paisley Gordon Street with Rogue Result Included (Tube 1, month 11)

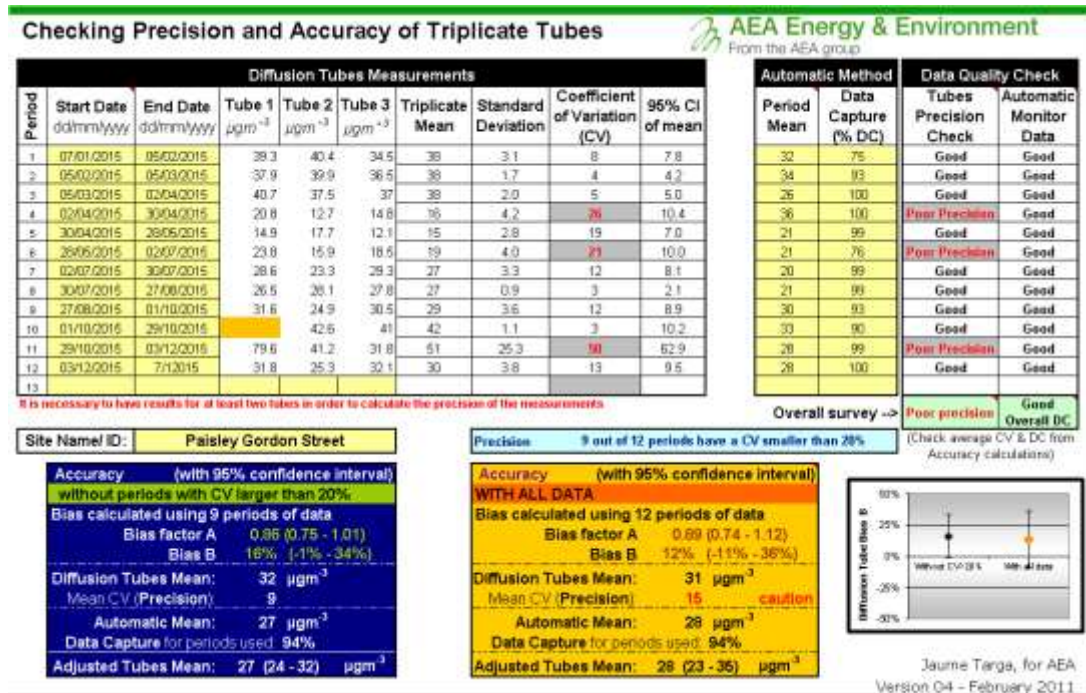
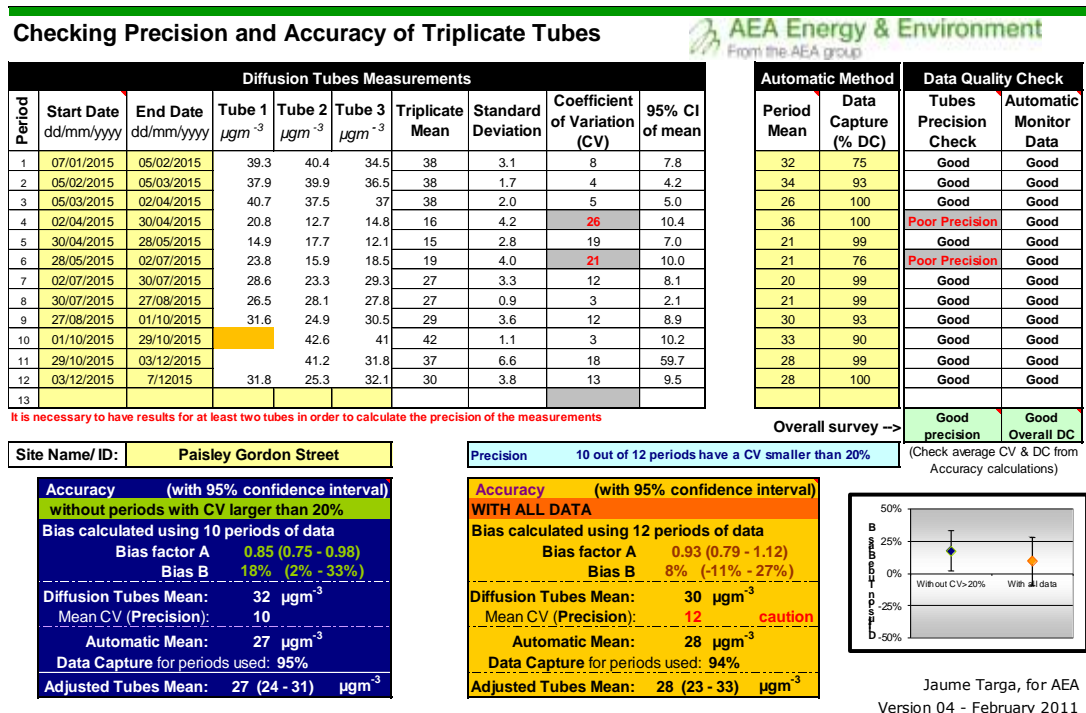
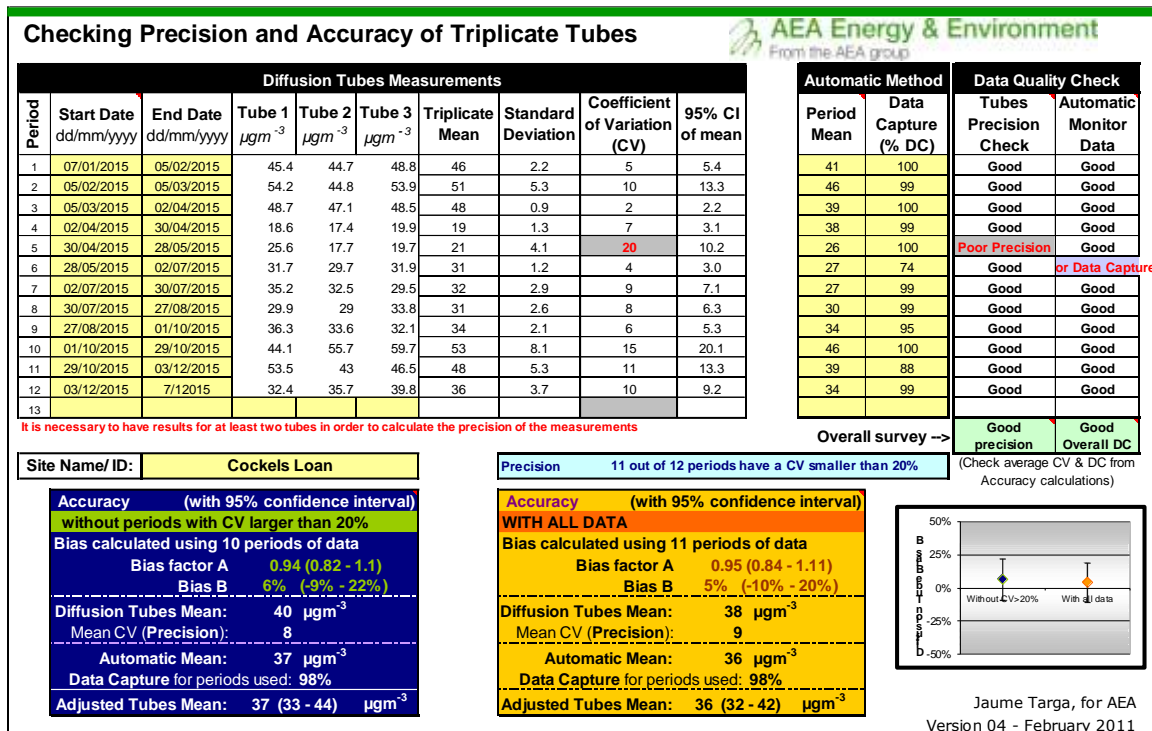


Figure C.3 Co-Location Study – Paisley Gordon Street with Rogue Result Removed (Tube 1, month 11)



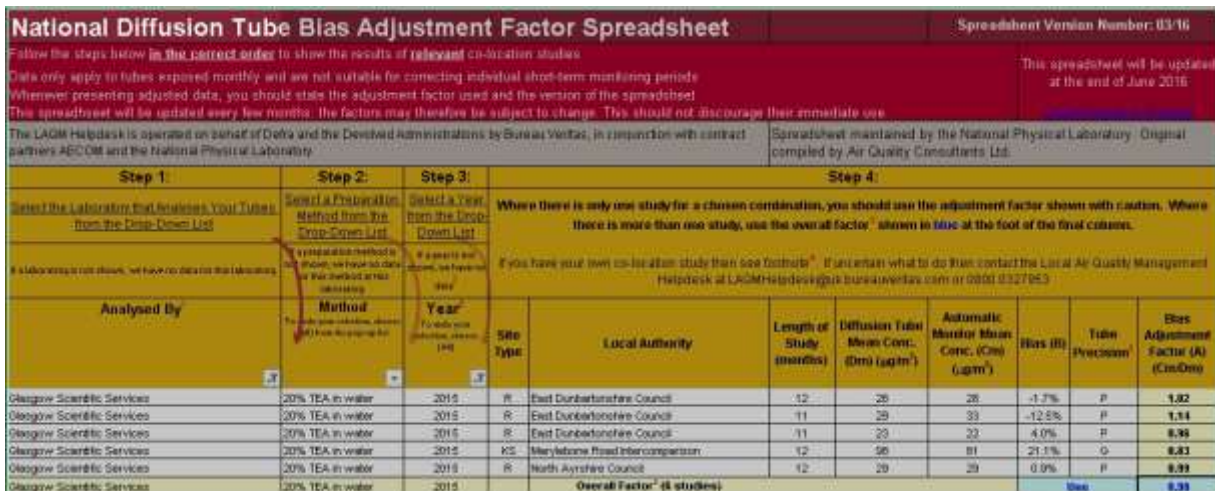
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Figure C.4 Co-Location Study – Cockels Loan



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Figure C.5 Glasgow Scientific Services – National average bias adjustment factor 2015



**Table C.1: Summary of bias adjustment factors at NO<sub>2</sub> automatic monitoring sites 2015**

<b>Co-location Site</b>	<b>Tube Precision</b>	<b>Automatic data quality</b>	<b>Bias Factor (excluding periods with CV &gt;20%)</b>	<b>Bias Factor (using all periods of data)</b>
Glasgow Airport (6 months only)	Good Overall	Good Overall	1.03	1.03
Gordon Street, Paisley (include rogue result)	Poor Precision	Good Overall	0.86	0.89
Cockels Loan Renfrew	Good Overall	Good Overall	0.94	0.95
			<b>AVERAGE</b>	<b>=0.96</b>
Gordon Street, Paisley (include rogue result)	Poor Precision	Good Overall	0.86	0.89
Cockels Loan Renfrew	Good Overall	Good Overall	0.94	0.95
			<b>AVERAGE</b>	<b>0.92</b>
Gordon Street, Paisley (rogue result removed)	Good Precision	Good Overall	0.85	0.93
Cockels Loan Renfrew	Good Overall	Good Overall	0.94	0.95
			<b>AVERAGE</b>	<b>0.94</b>
From National Studies take from sites with Good Precision			<b>AVERAGE</b>	<b>0.92</b>
From National Studies take All studies			<b>AVERAGE</b>	<b>0.98</b>

### **Discussion of Choice of Bias Adjustment Factor to Use**

Diffusion tube bias adjustment factors for 2015 are available from three 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 > 20%; 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.

During 2015, co-location data was only available for 6 months for Glasgow Airport. This site has been excluded from the calculation of overall local bias factor.

The average of the factors derived from the Gordon Street (including rogue result) and Cockels Loan is 0.89.

The average of the factors derived from the Gordon Street (with rogue result removed) and Cockels Loan co-location studies is 0.94.

The national adjustment factor is based on five studies where four are of poor precision and only one is of good precision. Taking the average of all national studies gives a bias correction factor of 0.98 while taking the value for the study with good precision gives a factor of 0.92. Basing the bias factor on only one site with good precision was not considered suitable.

The use of a local bias correction factor is consistent with the approach taken by Renfrewshire Council in previous years. Using the factor of 0.94 is between the values returned by the national studies and while lower than the factor used in previous years due to the discontinuation of the Central Road site which was previously included in bias correction assessments, is considered to be the most appropriate choice in terms of quality for the 2015 data.

### **PM Monitoring Annualisation**

Due to the data capture for annual mean PM<sub>10</sub> being below 75% at Paisley Gordon Street and Cockels Loan, the annual mean concentrations were annualised in accordance with the technical guidance (TG.16). The results are shown in Tables C.2 and C.3.

Table C.2: Annualisation of PM<sub>10</sub> Concentration at Paisley Gordon Street 2015

Month	Gordon St Paisley	St James Paisley	Waulkimillglen	Dunbarton Road	Nithsdale Road
jan		14	11	16	13
feb		15	12	20	16
mar		19	15	23	22
apr		13	14	22	17
may	14	11	5	15	13
jun	13	11	10	16	13
jul	12	11	9	13	10
aug	13	11	10	13	11
sep	15	12	10	17	13
oct	18	17	12	20	18
nov	13	14	13	15	13
dec	13	14	10	15	12
Annual Mean		13.5	10.9	17.1	14.3
Period Mean	13.9	12.6	9.9	15.5	12.9
Ratio Am/Pm		1.1	1.1	1.1	1.1
<b>Average Ratio</b>					<b>1.10</b>
<b>Annualised Means</b>					
<b>Gordon Street</b>	<b>15.2</b>				

Table C.3: Annualisation of PM<sub>10</sub> Concentration at Cockles Loan 2015

Month	St James Paisley	Cockles Loan Renfrew	Waulkimillglen	Dunbarton Road	Nithsdale Road
jan	14	12	11	16.00	13.00
feb	15	16	12	20.00	16.00
mar	19	19	15	23.00	22.00
apr	13	17	14	22.00	17.00
may	11	12	5	15.00	13.00
jun	11	10	10	16.00	13.00
jul	11		9	13.00	10.00
aug	11		10	13.00	11.00
sep	12	13	10	17.00	13.00
oct	17	15	12	20.00	18.00
nov	14	13	13	15.00	13.00
dec	14	13	10	15.00	12.00
Annual Mean	13.50		10.92	17.08	14.25
Period Mean	14.40	14.3	11.40	19.20	16.20
Ratio Am/Pm	0.94		0.96	0.89	0.88
<b>Average Ratio</b>					<b>0.92</b>
<b>Annualised Means</b>					
<b>Cockles Loan</b>		<b>13.1</b>			



## PM Monitoring Adjustment

All PM<sub>10</sub> 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.6 to C.9.

### Figure C.6 Ratified Data from Ricardo Energy and Environment for Paisley Gordon Street

# Air Pollution Report

Produced by Ricardo Energy and Environment on behalf of the Scottish Government

## PAISLEY GORDON STREET 01 January to 31 December 2015

These data have been fully ratified by Ricardo Energy and Environment

POLLUTANT	PM <sub>10</sub> <sup>+</sup>	NO <sub>2</sub>	NO <sub>x</sub>
Maximum hourly mean	158 µg m <sup>-3</sup>	141 µg m <sup>-3</sup>	712 µg m <sup>-3</sup>
Maximum daily mean	48 µg m <sup>-3</sup>	82 µg m <sup>-3</sup>	303 µg m <sup>-3</sup>
98.08th percentile of daily means	33 µg m <sup>-3</sup>	-	-
Average	14 µg m <sup>-3</sup>	27 µg m <sup>-3</sup>	67 µg m <sup>-3</sup>
Data capture	61.2 %	93.7 %	93.7 %

+ PM<sub>10</sub> as measured by a FDMS using a gravimetric factor of 1

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure.

NO<sub>x</sub> mass units are NO<sub>x</sub> as NO<sub>2</sub> µg m<sup>-3</sup>

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM <sub>10</sub> Particulate Matter (Gravimetric)	Daily mean > 50 µg m <sup>-3</sup>	0	0
PM <sub>10</sub> Particulate Matter (Gravimetric)	Annual mean > 18 µg m <sup>-3</sup>	0	-
Nitrogen Dioxide	Annual mean > 40 µg m <sup>-3</sup>	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m <sup>-3</sup>	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Figure C.7 Ratified Data from Ricardo Energy and Environment for Paisley St James Street

# Air Pollution Report

Produced by Ricardo Energy and Environment on behalf of the Scottish Government

## PAISLEY ST JAMES ST 01 January to 31 December 2015

These data have been fully ratified by Ricardo Energy and Environment

POLLUTANT	PM <sub>10+</sub>
Maximum hourly mean	220 µg m <sup>-3</sup>
Maximum daily mean	54 µg m <sup>-3</sup>
Average	13 µg m <sup>-3</sup>
Data capture	91.1 %

+ PM<sub>10</sub> instruments:

FDMS using a gravimetric factor of 1 from 1 January 2015

Particulate matter concentrations are reported at ambient temperature and pressure.

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM <sub>10</sub> Particulate Matter (Gravimetric)	Daily mean > 50 µg m <sup>-3</sup>	1	1
PM <sub>10</sub> Particulate Matter (Gravimetric)	Annual mean > 18 µg m <sup>-3</sup>	0	-

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Figure C.8 Ratified Data from Ricardo Energy and Environment for Glasgow Airport

# Air Pollution Report

Produced by Ricardo Energy and Environment on behalf of the Scottish Government

## PAISLEY GLASGOW AIRPORT 01 January to 31 December 2015

These data have been fully ratified by Ricardo Energy and Environment

POLLUTANT	NO <sub>2</sub>	NO <sub>x</sub>
Maximum hourly mean	138 µg m <sup>-3</sup>	554 µg m <sup>-3</sup>
Maximum daily mean	63 µg m <sup>-3</sup>	238 µg m <sup>-3</sup>
99.8th percentile of hourly means	84 µg m <sup>-3</sup>	388 µg m <sup>-3</sup>
Average	18 µg m <sup>-3</sup>	31 µg m <sup>-3</sup>
Data capture	52.7 %	52.7 %

All gaseous pollutant mass units are at 20°C and 1013mb.

NO<sub>x</sub> mass units are NO<sub>x</sub> as NO<sub>2</sub> µg m<sup>-3</sup>

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m <sup>-3</sup>	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m <sup>-3</sup>	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

**Figure C.9 Ratified Data from Ricardo Energy and Environment for Cockels Loan**

# Air Pollution Report

Produced by Ricardo Energy and Environment on behalf of the Scottish Government

## RENFREW COCKELS LOAN 01 January to 31 December 2015

These data have been fully ratified by Ricardo Energy and Environment

POLLUTANT	PM <sub>10</sub> <sup>+</sup>	NO <sub>2</sub>	NO <sub>x</sub>
Maximum hourly mean	195 µg m <sup>-3</sup>	168 µg m <sup>-3</sup>	732 µg m <sup>-3</sup>
Maximum daily mean	57 µg m <sup>-3</sup>	103 µg m <sup>-3</sup>	339 µg m <sup>-3</sup>
98.08th percentile of daily means	48 µg m <sup>-3</sup>	-	-
Average	14 µg m <sup>-3</sup>	36 µg m <sup>-3</sup>	79 µg m <sup>-3</sup>
Data capture	70.1 %	96.1 %	96.1 %

+ PM<sub>10</sub> as measured by a FDMS using a gravimetric factor of 1

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure.

NO<sub>x</sub> mass units are NO<sub>x</sub> as NO<sub>2</sub> µg m<sup>-3</sup>

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM <sub>10</sub> Particulate Matter (Gravimetric)	Daily mean > 50 µg m <sup>-3</sup>	3	3
PM <sub>10</sub> Particulate Matter (Gravimetric)	Annual mean > 18 µg m <sup>-3</sup>	0	-
Nitrogen Dioxide	Annual mean > 40 µg m <sup>-3</sup>	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m <sup>-3</sup>	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

### QA/QC of Diffusion Tube Monitoring

NO<sub>2</sub> 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<sub>2</sub> PT rounds and the percentage (%) of results submitted which were subsequently determined to be satisfactory during the previous five rounds in 2014 and 2015 based upon a z-score of <±2 were as follows:

- October to November 2014: 100%
- January to February 2015: 100%
- April to May 2015: 100%
- July to August 2015: 100%
- October to November 2015: 100%

Over a rolling five round WASP window, it is expected that 95% of laboratory results should be  $\leq +2$ . 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 2015 is 100%.

**Supplementary Screening Assessments for Biomass Application at  
Glencoates Primary School**

**Figure C.10 Screening Assessment for NO<sub>x</sub>**

Screening Tool for annual mean PM and NO <sub>x</sub> from biomass combustion stacks								
<b>This spreadsheet provides a screening tool to calculate the contribution from stack emissions to maximum annual mean ground level concentrations</b>								
Enter required information in Cream Cells Resulting ground level concentration in Red Bold								
Proposed stack height	14		m					
List the buildings within a distance of 70.0 m of the chimney Include any building to which the chimney is attached								
Building	Height, m	Width, m	K	T				
A Main School Building	9.07	59.2	9.07	22.675				
B Blackstoun Rd Housing	6	16	6	15				
C								
D								
E								
F								
G								
Calculated Effective stack height	8.2		m					
Proposed stack diameter	0.18		m					
Location {Scotland, Rest of UK}	Scotland							
Maximum emission rate	0.0067		g/s					
Maximum contribution to annual mean	<table border="1"> <tr> <td style="color: red;"><b>0.808</b></td> <td>µg m<sup>-3</sup></td> </tr> <tr> <td style="color: red;"><b>#N/A</b></td> <td>µg m<sup>-3</sup></td> </tr> </table>		<b>0.808</b>	µg m <sup>-3</sup>	<b>#N/A</b>	µg m <sup>-3</sup>	Biomass nomographs Industrial nomographs	
<b>0.808</b>	µg m <sup>-3</sup>							
<b>#N/A</b>	µg m <sup>-3</sup>							

Figure C.11 Screening Assessment for PM<sub>10</sub>

**Screening Tool for annual mean PM and NO<sub>x</sub> from biomass combustion stacks**

**This spreadsheet provides a screening tool to calculate the contribution from stack emissions to maximum annual mean ground level concentrations**

Enter required information in Cream Cells  
Resulting ground level concentration in Red Bold

Proposed stack height  m

List the buildings within a distance of  m of the chimney  
Include any building to which the chimney is attached

Building	Height, m	Width, m	K	T
A Main School Building	9.07	59.2	9.07	22.675
B Blackstoun Rd Housing	6	16	6	15
C				
D				
E				
F				
G				

Calculated Effective stack height  m

Proposed stack diameter  m

Location {Scotland, Rest of UK}

Maximum emission rate  g/s

Maximum contribution to annual mean

<b>0.0121</b>	µg m <sup>-3</sup>	Biomass nomographs
<b>#N/A</b>	µg m <sup>-3</sup>	Industrial nomographs

## 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 <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide



## References

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