

# Annual Progress Report (APR)



2017 Air Quality Annual Progress Report (APR) for  
Aberdeen City Council

In fulfilment of Part IV of the  
Environment Act 1995

Local Air Quality Management

June 2017

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## **Executive Summary: Air Quality in Our Area**

### **Air Quality in Aberdeen City**

The Annual Progress Report has been undertaken to fulfil Aberdeen City Council's duty to annually review and assess air quality. The report provides the latest monitoring results and discusses the implications for air quality management in Aberdeen.

The main pollutants of concern in Aberdeen City are Nitrogen Dioxide (NO<sub>2</sub>) and Particulate matter (PM<sub>10</sub>), related to road traffic emissions.

In 2016 the annual mean NO<sub>2</sub> level continued to exceed the national air quality objective across the City Centre and Wellington Road Air Quality Management Area (AQMA). However the general trend is that levels are going down. Pockets of exceedances were also recorded within the Anderson Drive/Haudagain Roundabout/Auchmill Road AQMA.

Levels of NO<sub>2</sub> recorded at Skene Square suggest an exceedance of the annual mean objective. This area is not within an AQMA and additional monitoring is to be undertaken. Major transportation infrastructure measures with an anticipated commencement date of 2019 will be implemented around this area to improve travel connectivity, reduce congestion and impact on air quality at this location.

There were no exceedances of the NO<sub>2</sub> one hour objective at any of the monitoring locations.

There were no exceedances of the annual or 24 hour mean PM<sub>10</sub> objectives. The trend in annual mean PM<sub>10</sub> levels monitored across the City suggests concentrations continue to go down.

There were no exceedances of the PM<sub>2.5</sub> annual mean objective. PM<sub>2.5</sub> monitoring equipment was installed at Wellington Road towards the end of 2016 and the PM<sub>2.5</sub> monitoring network is to be extended in 2017 with the installation of further monitoring equipment at the King Street monitoring site.

The Local Transport Strategy (LTS) Costed Action and Delivery Plan were adopted in August 2016. The Active Travel Action Plan was launched in January 2017.

## **Actions to Improve Air Quality**

Aberdeen City Council has been making progress in a number of areas.

### **Active Travel**

Strategic and local walking and cycle networks continue to grow. The Aberdeen Active Travel Action Plan was adopted in January 2017, setting out a series of policies and actions that the Council will abide by and work towards in order to make Aberdeen a more walking and cycling friendly City. The Plan also identifies the active travel network priorities to be pursued over the next 4-5 years.

Delivery of the Aberdeen City Centre Masterplan continues, with the Broad Street part-pedestrianisation and public realm improvement scheme now under construction and due for completion in late in 2017.

A series of Community Street Audits (in Middlefield, Heathryfold, Powis and Torry) have also taken place in recent months in order to identify actions that would make local neighbourhoods more walk- and cycle-friendly.

In terms of promotional and awareness-raising activities to support infrastructure improvements:

- An I Bike officer has been recruited to deliver targeted and intensive cycling training and promotion to schools in the Bridge of Don area of Aberdeen;
- Events have taken place throughout the year, often tying in with national and European campaigns such as Bike Week and European Mobility Week. The Council worked with Cycling Scotland to deliver the fourth annual Pedal for Scotland cycle ride in Aberdeen and held our annual In Town Without My Car Day event in September, where a series of City Centre streets are closed to allow members of the public to experience these streets in a different manner, without the noise, danger and distraction of motor traffic;
- Worked with the Aberdeen Business Improvement District and West End Traders to close a street in the West End of the City Centre in order to trial a market. This helped to demonstrate to local residents and the business community alike that traffic-free streets are much more pleasant and can create additional opportunities to enable activities that will draw people into an area.

- The Love to Ride Workplace Cycle Challenge took place throughout Aberdeen City and Aberdeenshire in September 2016, with an emphasis on encouraging new cyclists;
- 8 primary schools are engaged with the Living Streets Travel Tracker walk to school incentive scheme, with plans to increase this to 15 schools during 2017; and
- The 2017 Aberdeen Cycle Map was launched.

### **Public Transport**

- A new Park and Ride site at Craibstone, on the A96, opened in January 2017, with services running to and from Aberdeen City Centre.
- Aberdeen City Council has continued to expand the supported bus network in order to address gaps in the commercial network.
- Efforts have also been ongoing to promote the Grasshopper multi-operator bus ticket and to make it more attractive to users. The ticket can now be stored on a smartcard, making it Scotland's first means of smart multi-operator travel.
- A new bus gate opened on Bedford Road, Aberdeen.
- Additional Bus Lane enforcement cameras have been deployed on Lang Stracht, Great Northern Road and the new Bedford Road bus gate.

### **Clean Vehicles**

- The Aberdeen Car Club has continued to expand, with more electric and hydrogen vehicles added to the fleet. It now has 22 electric vehicles, 5 hydrogen fuel cell vehicles and 5 petrol hybrid vehicles as part of its fleet of 45 vehicles.
- Following a tendering exercise in early 2017, Co-wheels were re-appointed as the successful operator.
- The electric vehicle charging network has continued to expand, with more charging points located at various locations throughout the City. These include two new rapid chargers and a new double fast charger.

- A second hydrogen refuelling station, ACHES (Aberdeen City Hydrogen Energy Storage), in the south of Aberdeen, is also now operational. Two of the new electric vehicle charge points (one rapid and the double fast charger) are located here, allowing the facility to function as a low carbon vehicle refuelling hub.
- Aberdeen City Council supported the Energy Saving Trust (EST) Scotland Electric Vehicle Roadshow Aberdeen which saw 768 people attend. This provided a chance for members of the public to test drive electric vehicles, to attend information seminars and to visit trade stands to find out more about electric vehicles, charging infrastructure, grants and speak to current owners about their experiences.

## **Freight**

### **Eco Stars launch**

In 2016 the Council, in partnership with Aberdeenshire Council and the Regional Partnership, (NESTRANS) and supported by a Scottish Government grant, set up the Eco Stars fleet recognition scheme. The Aberdeen City and Aberdeenshire scheme is the first in Scotland to run as a partnership over more than one authority and aims to help bus, freight and van fleet operators reduce emissions and running costs. It was launched in November 2016 with awards presented to inaugural members. By the end of 2016 there were 42 participating organisations in the Aberdeen City and Aberdeenshire scheme, including 9 new members and approximately 2500 vehicles.

### **Locking in the Benefits of the Aberdeen Western Peripheral Route (AWPR)**

Public consultation has been undertaken on how City streets should operate following the opening of the AWPR. The findings will be developed into a 'Roads Hierarchy' for Aberdeen, with the aim of prioritising road space on strategic corridors for active travel and public transport.

A study has been launched to appraise options for Wellington Road, part of which is currently an AQMA, to make transport along this corridor more efficient and sustainable. A public consultation took place early in 2017, with the results currently being analysed.

An AWPR signage strategy is also being developed, to ensure drivers use the most appropriate roads when travelling to and from Aberdeen and are encouraged to use

the new bypass for longer-distance trips, rather than entering the central area of Aberdeen City.

### **Local Priorities and Challenges**

The main priorities for Aberdeen City Council in the coming year are as follows:

- Liaise with Transport Scotland on the proposed city wide traffic count;
- Support SEPA in the update of the Aberdeen air quality model;
- Undertake Low Emission Feasibility Studies in the City's three Air Quality Management Areas (AQMAs) in accordance with national guidance and timescales specified by the Cleaner Air for Scotland Governance Group

### **How to Get Involved**

Further information on the Local Transport Strategy, Action Plan and Active Travel Action Plan is available at the following web sites:

[www.aberdeencity.gov.uk/lts](http://www.aberdeencity.gov.uk/lts)

City Centre Masterplan and Sustainable Urban Mobility Plan:

[http://www.aberdeencity.gov.uk/council\\_government/shaping\\_aberdeen/City\\_Centre\\_Masterplan\\_Consultation\\_Material.asp](http://www.aberdeencity.gov.uk/council_government/shaping_aberdeen/City_Centre_Masterplan_Consultation_Material.asp)

Further information on the schemes Aberdeen City Council has been delivering on Air Quality Action Plan and Local Transport Strategy actions over previous years can be found on best practice pages on the Car Plus and Paths for All websites:

### **Car Club**

[www.carplus.org.uk/case-study-co-wheels-aberdeen/](http://www.carplus.org.uk/case-study-co-wheels-aberdeen/)

### **ITWMC Day**

[www.pathsforall.org.uk/pfa/news/aberdeen-car-free-day-a-success.html](http://www.pathsforall.org.uk/pfa/news/aberdeen-car-free-day-a-success.html)

(working with the NHS)

[www.pathsforall.org.uk/pfa/get-involved/scsp-case-studies.html](http://www.pathsforall.org.uk/pfa/get-involved/scsp-case-studies.html)

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## **1. Local Air Quality Management**

This report provides an overview of air quality in Aberdeen City during 2016. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Progress Report (APR) summarises the work being undertaken by Aberdeen City 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
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 AQMAs declared by Aberdeen City Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at <https://uk-air.defra.gov.uk/aqma/maps>.

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

<b>AQMA Name</b>	<b>Pollutants and Air Quality Objectives</b>	<b>City / Town</b>	<b>Description</b>	<b>Action Plan</b>
City Centre	<ul style="list-style-type: none"> <li>• NO<sub>2</sub> annual mean &amp; 1 Hour mean</li> <li>• PM<sub>10</sub> annual mean</li> </ul>	Aberdeen	Declared 2001, extended in 2003. PM <sub>10</sub> included in 2004. An area encompassing a number of properties Union St, King St, Market St, Holburn St and Victoria Road.	<a href="#">Air Quality Action Plan 2011</a>
Anderson Drive	<ul style="list-style-type: none"> <li>• NO<sub>2</sub> annual mean</li> <li>• PM<sub>10</sub> annual mean</li> </ul>	Aberdeen	Declared in 2008. Pockets of exceedances at residential properties along Anderson Drive and Auchmill Road.	<a href="#">Air Quality Action Plan 2011</a>
Wellington Road	<ul style="list-style-type: none"> <li>• NO<sub>2</sub> annual mean</li> <li>• PM<sub>10</sub> annual mean</li> </ul>	Aberdeen	Residential properties along Wellington Road (Queen Elizabeth II Bridge to Balnagask Rd)	<a href="#">Air Quality Action Plan 2011</a>

### 2.2 Progress and Impact of Measures to address Air Quality in Aberdeen City

Aberdeen City 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 each AQMA. Key completed measures are:

**Action 1: Modal Shift and Influencing Travel Choice**

- Increase Bus Use:
  - Opening of the Craibstone Park and Ride site (A96)
  - Continued expansion and development of the Grasshopper multi-operator ticket
  - Continued progress in developing a Statutory Bus Quality Partnership (or otherwise enhanced bus quality partnership) for Aberdeen City and Aberdeenshire
  - A new bus gate opened on Bedford Road, Aberdeen.
  - Additional bus lane enforcement cameras have been deployed on Lang Stracht, Great Northern Road and the new Bedford Road bus gate.
- Improve Cycling and Walking Provision:
  - Continued expansion of the pedestrian, cycle and Core Path network;
  - Adoption of Active Travel Action Plan.
  - Update of Aberdeen Cycle Map
- Travel Plans:
  - Adoption of Local Development Plan 2017 and Supplementary Guidance on Transport and Accessibility, reaffirming the Council's planning policies in terms of Travel Plans and Transport Assessments and when they are required;
  - Launch of revised Getabout website, with enhanced information for businesses on how to develop a Travel Plan;
  - Launch of Scotland-wide Travel Know How website, with a range of information and resources for developers and businesses looking to implement a Travel Plan;

- Establishment of Regional Travel Plan Working Group to develop Regional Travel Planning Strategy;
- Establishment of NHS Travel Plan Working Group, looking at how to implement successful Travel Plan for NHS sites.
- Improve public awareness of air quality issues:
  - Continuation of annual event programme to encourage and promote sustainable transport and to raise awareness of air quality issues in the City (bicycle roadshow events, Bike Week, European Mobility Week, In Town Without My Car Day)
  - Worked with the Aberdeen Business Improvement District and West End Traders to close a street in the West End of the City Centre in order to trial a market. Again this helped to demonstrate to local residents and the business community alike that traffic-free streets are much more pleasant and can create additional opportunities to enable activities that will draw people into an area.
  - I-Bike Officer working in schools
- Car Clubs/Pool Car Schemes;
  - The Aberdeen Car Club has continued to expand, with more electric and hydrogen vehicles added to the fleet. It now has 22 electric vehicles, 5 hydrogen fuel cell vehicles and 5 petrol hybrid vehicles as part of its fleet of 45 vehicles.
  - Following a tendering exercise in early 2017, Co-wheels were re-appointed as the successful operator.
- Crossrail
  - Nestrans and Aberdeenshire Council have been successful in an application to the Scottish Stations Fund for 50% of the estimated cost of the re-opening of Kintore Station. Officers are now looking at options to secure further external funding to the project. It is anticipated that the station will be completed prior to December 2018, albeit subject to the wider Network Rail delivery programme;

- The Minister for Transport and Islands announced a *Revolution in Rail*, a programme of rail capacity, frequency and journey time improvements to be introduced in 2018/19. Key benefits for the North East of Scotland will be: an hourly 'local' service across the City between Inverurie and Montrose, stopping at all stations; additional services to the above to create a half hourly service between Aberdeen and Inverurie (facilitated by completion of the upgrade of the Aberdeen to Inverurie line) and additional early morning and late evening services to Elgin, Keith, Huntly and Insch from Aberdeen; and an hourly limited stop high speed train service to both Edinburgh and Glasgow, with many trains from Edinburgh and Glasgow extending through to Inverness.
- Public Transport Subsidies
  - Aberdeen City Council has expanded the supported bus network with evening and weekend services in certain areas of the City which are not served by the commercial bus network.
- Congestion Charge/Toll Road
  - Aberdeen City Council has commissioned AECOM to undertake a Strategic Car Parking Review of the City with a focus on the City Centre. This includes a review of possible demand management measures for the City (congestion charging, toll roads, emission based parking, low emission zones, workplace charging levies, etc). A more in depth study will take place in 2017.

## **Action 2: Lower Emissions and Cleaner Vehicles**

- Green Vehicle procurement & Fuel/ Charging Infrastructure
  - The electric vehicle charging network has continued to expand, with more charging points located at various locations throughout the City. These include two new rapid chargers and a new double fast charger.
  - A second hydrogen refuelling station, ACHES (Aberdeen City Hydrogen Energy Storage), in the south of Aberdeen, is also now operational.

Two of the new electric vehicle charge points (one rapid and the double fast charger) are located here, allowing the facility to function as a low carbon vehicle refuelling hub.

- Aberdeen City Council supported the Energy Saving Trust (EST) Scotland Electric Vehicle Roadshow Aberdeen which saw 768 people attend. This provided a chance for members of the public to test drive electric vehicles, to attend information seminars and to visit trade stands to find out more about electric vehicles, charging infrastructure, grants and speak to current owners about their experiences.
- Hydrogen vehicles are now integrated into the Aberdeen City car club fleet provided by Co-wheels, with hydrogen vehicles available for trial by Aberdeen businesses.
- Taxis
  - Licencing Committee has removed the minimum engine size requirement in order to allow electric and hydrogen vehicles to be used as taxis, provided they meet the wheelchair accessible vehicle policy.

### **Action 3: Road Infrastructure**

- Pedestrianisation
  - Part-pedestrianisation of Broad Street underway, due to be completed by the end of 2017.
- Road Building/Junction Alterations
  - Third Don Crossing opened in June 2016;
  - New Airport link road opened in 2017
  - AWPR construction underway;
  - Advanced demolition works now underway to facilitate Berryden corridor improvements.



- Traffic Calming
  - Various around the City in new developments / residential areas: Bieldside, Cults and in the City Centre

#### **Action 4: Traffic Management**

- Intelligent Transport System (ITS)
  - Work has taken place across the City to ensure that data management is collated and controlled in the ITS Unit. This includes ANPR (Automatic Number Plate Recognition and Bluetooth technology to monitor journeys.
- Freight and Commercial Vehicle Access
  - Aberdeen City Council has received money from EU Civitas PORTIS project which is considering access to the Harbour. Activities under this work package include: revisiting freight distribution hub/ consolidation centre concept for Aberdeen, looking at SMART transport systems for freight and reviewing all freight routes.
- Speed Regulation
  - In addition to traffic calming around the City there have also been speed reductions on all radial routes into the City. Some of these relate to AWPR works, others are permanent reductions to 40 or 30mph from 50 or 70mph.

#### **Action 5: Planning and Policies**

- Produce Supplementary Planning Guidance
  - SG on Transport and Accessibility and Air Quality developed alongside Aberdeen Local Development Plan 2017
- Integration of policies of AQAP with Local Transport Strategy (LTS) and Regional Transport Strategy (RTS)

- LTS has specific air quality objectives with specific actions contained within the Local Transport Strategy Costed Action and Delivery Plan
- Active Travel Action Plan has been integrated with the Health and Transport Action Plan
- Road Hierarchy
  - Study underway with public consultation undertaken in early 2017.
- Car Parking Policies:
  - Strategic Car Parking Review underway
- National Lobbying
  - Feeding into the development of Switched on Scotland Phase 2: An Action Plan for Growth, which is the National Action Plan for electric vehicles.

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

- A96 Park and Ride opening was delayed due to inclement weather during construction
- Broad Street part pedestrianised/ shared space area delayed due to design amendments after further public consultation took place
- The revision of the Sustainable Urban Mobility Plan has been due to a delay in taking forward the Roads Hierarchy Study as a result of resource/ staffing issues
- The implementation of a Controlled Parking Zone in the North Dee area has been delayed due to a decision to undertake a Strategic Car Parking Review and a masterplan being developed for the North Dee area.
- Wellington Road multi-modal study delayed due to resource/ staffing issues.

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

- Walking and cycling infrastructure – further measures to improve walking and cycling networks
- Improve public awareness – continued participation in European Mobility Week and Bike Week and other events
- Car Clubs/ Car Sharing – further expansion of the Car Club
- Green Vehicle procurement & Fuel/ Charging Infrastructure – completion of second hydrogen refuelling station and additional electric vehicle charging points
- Pedestrianisation – Completion of the Broad Street shared space/ pedestrian priority area
- ITS – continued expansion of Bluetooth journey time monitoring alongside ANPR and Variable Messaging Systems (VMS) across the City
- Freight and Commercial Vehicle Access – Wellington Road Stag Part 1 complete
- Supplementary Planning Guidance – formal adoption of Transport, Air Quality and Noise Supplementary guidance
- Roads Hierarchy – completion of draft proposals for consultation with the public and stakeholders
- Car parking – completion of the Strategic Car Parking Review with recommendations for implementation to Committee.

Table 2.2 – Progress on Measures to Improve Air Quality

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>1 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE</b>											
1.1a	Increase bus use	Alternatives to private vehicle use	Creation of additional Park & Choose sites at A96 and Schoolhill	Nestrans/ ACC/ AC	2008 onwards	2016-17	193,884 passengers using Park & Ride in 2015/16	Currently not possible to establish target due to unknown Euro Class of buses	A96 site opened in January 2017; discussions over how to fund A90 South site ongoing	A96 – complete; A90 - unknown	
1.1b			Delivery of standards and targets agreed by Bus Quality Partnership	LABOF	2010	Ongoing	10.8% employed adults not working from home, resident in Aberdeen City, bus to work (2015)	Not quantifiable	New standards/ targets are currently being revised for a further refresh of the quality partnership, possibly on a statutory basis	Ongoing	
1.1c			Increase corridors covered by BPIP (currently voluntary)	LABOF	2010	Ongoing	10.8% employed adults not working from home, resident in Aberdeen City, bus to work (2015)	Not quantifiable	CIVITAS funding secured for looking at A96 corridor	Ongoing	
1.1d			Integrated Ticketing	ABOF/ Transport Scotland	No defined start date	Unknown		Not quantifiable	Transport Scotland taking forward for Scotland	Unknown	

## Aberdeen City Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>1 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE</b>											
1.2a	Improve Cycling & Walking Provision	Alternatives to private vehicle use	Core Paths Plan	ACC	2015-16	2017	Scottish Household Survey; LTS Annual Monitoring Report	Not quantifiable	Core Paths Plan revisions identified by ACC. Various routes continue to be upgraded and installed.	Ongoing	Major review to take place after 2017.
1.2b			Cycling Strategy/ Active Travel Action Plan	ACC	2015-16	2016	Scottish Household Survey; LTS Annual Monitoring Report	Not quantifiable	Active Travel Action Plan adopted January 2017	Implementation work ongoing.	Linked to Civitas/ Portis proposals and City Centre Masterplan/ Sustainable Urban Mobility Plan proposals.
1.3a	Travel Plans	Promoting travel alternatives	Existing Organisations	ACC & Nestrans	2015-16	2016 onwards	No. organisation adopting TPs; No. employees covered by TPs	Not quantifiable	Travel Plan Strategy under revision	2017	Getabout website also been updated.
1.3b			New Developments	ACC	2014-16	2016 onwards		Not quantifiable	Technical Advice Note (TAN) for Travel Planning drafted.	2017	
1.3c			Council	ACC	Ongoing	2003 onwards	51.4% of Council staff use sustainable modes to travel to work (CTP Survey 2016)	Not quantifiable	2016 staff travel survey completed	Ongoing	

## Aberdeen City Council

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<b>1 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE</b>											
1.4a	Improve public awareness of air quality issues	Public information	Use of Variable Messaging System (VMS)	ACC & Transport Scotland	Ongoing	Ongoing	N/A	Not quantifiable	Real time information facilities and additional VMS installed on A96 corridor	Ongoing	Link to A96 Park & Choose site and Bluetooth journey time monitoring
1.4b			ACC Website Improvements	ACC	2011	Ongoing	N/A	Not quantifiable			
1.4c			'Airtex' Alert Service	ACC			No. of service users	Not quantifiable			
1.4d			Undertake air quality and sustainable travel events with Getabout Partnership	Get About	Ongoing	Ongoing	14 events	Not quantifiable	In Town Without My Car Day took place again in September 2016; planning has now commenced for 2017 event. Supported EST Electric Vehicle Roadshow Aberdeen. I-Bike officer in Schools. Love to Ride campaign held in September 2016.	Ongoing	Linked to Smarter Choices, Smarter Places Programme

## Aberdeen City Council

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<b>1 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE</b>											
1.4e			Information Marketing Initiatives (Walk to School )Events	ACC	Ongoing	Ongoing	8 schools engaged in travel tracker.	Not quantifiable	8 schools engaged with Travel Tracker in 2016; aim to target a further 7 in 2017. I-Bike officer in Schools.	Ongoing	Linked to Smarter Choices, Smarter Places Programme
1.5a	Car Clubs / Car Pool Schemes	Alternatives to private vehicle use	General Public	ACC	2011	2012	1,524 members of the Aberdeen Car Club (April 2017)	Estimate 0 – 1 µg/m3	Co-wheel re-appointed as operator in 2017. 30 Car Club cars available for public use. Hydrogen vehicles now available for use. Still one of fastest growing car clubs in country. Highest number of evs in car club fleet in UK.	Ongoing	Two new bays created in Middlefield and Northfield

## Aberdeen City Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>1 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE</b>											
1.5b			Corporate	ACC	2011	2012	30 vehicles available to members of the public (April 2017)	Estimate 0 – 1 µg/m <sup>3</sup>	12 vehicles available for the Council to utilise, some on exclusive use. 1 used exclusively by SCARF, one by a nursing home and another two by RGU University	Ongoing	Trials on-going with hydrogen vehicles and electric van
1.6a	Rail Improvements	Alternatives to private vehicle use	Local rail improvements	Transport Scotland/ Nestrans	Ongoing	2018-19	8 railway stations in the North East in 2017. Current modal share 0.6% (2011 Census data as no results from SHS)	Estimate 0 – 1 µg/m <sup>3</sup>	Scottish Government has announced programme of improvements to be introduced in 2018/19. Kintore Station funding package being consolidated.	>2019	
1.6b			Infrastructure improvements	Transport Scotland/ Nestrans	Ongoing	2019	Studies and infrastructure delivered	Not quantifiable	Investigation works underway to determine programme for Aberdeen to Inverness rail improvements	2019 – Phase 1	



Aberdeen City Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>1 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE</b>											
1.7	Rail Freight	Freight and delivery management	Modal Shift from road to rail	Nestrans	Ongoing	Ongoing	166,000 tonnes of goods to or from the region carried by rail freight (2013)	Not quantifiable	New rail freight strategy for Scotland launched in 2016	Ongoing	

## Aberdeen City Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>2 LOWER EMISSIONS AND CLEANER VEHICLES</b>											
2.1a	Green Vehicle procurement & Fuel/ Charging Infrastructure	Transport planning and infrastructure	Council Fleet	ACC	Ongoing	Ongoing	100% Euro IV or better in Council's fleet (April 2017)	Not quantifiable	EVs continue to form part of the Council fleet. Purchase of hydrogen buses (2014) and opening of hydrogen refuelling stations (2015 and 2017). Working with Co-wheels, who provide managed pool car to the Council, to continue to green the fleet	Ongoing	Continued investment in both hydrogen and ev infrastructure by the Council. Taking part in European project to introduce hydrogen vehicles to Council fleet.
2.1b			QBP	LABOF	2012	2014	First Bus have 60% Euro IV buses or better Stagecoach have 85% Euro IV buses or better	Not quantifiable	Purchase of hydrogen buses run by First and Stagecoach	Initial tranche completed	Potential continued investment in buses likely
2.1c			Installation of electric vehicle charging points	ACC	Ongoing	Ongoing	40 publicly available charge points across Aberdeen, 15 fleet, 19 car club only	Not quantifiable	Number of publicly-available charge point sites has increased to 23 in the city. New information now installed alongside charge points	Ongoing	Undertaken under the SGs/ Transport Scotland and Energy Saving Trust Grants

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implement-ation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>2 LOWER EMISSIONS AND CLEANER VEHICLES</b>											
2.2a	Emissions Testing & Idling Enforcement	Public information	Roadside Emissions Testing	ACC	Ongoing	Ongoing	No. of tests / fails	Not quantifiable	No tests undertaken in 2015/16		
2.2b			Idling Vehicles	ACC			No. cautions	Not quantifiable	Radio adverts being undertaken in 2017		
2.3a	Taxis	Vehicle fleet efficiency	Non-idling signs	ACC	Ongoing	On hold	Spatial coverage of signs	Not quantifiable	Idling signage not currently being pursued	Ongoing	
2.3b			Licensing : vehicle inspections, emissions restrictions	ACC			Fleet emissions profile improvement	Not quantifiable			
2.4	Low Emission Zone	Environmental Permits	Low Emission Zone	ACC & Nestrans	2011	Not yet identified	Not yet identified	TBC through CAFS implementation	Update on initial Low Emission Study undertaken exploring priority air quality improvements	Complete	Potential actions being explored/ taken forward by steering group. Linked to City Centre Masterplan

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No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>3 ROAD INFRASTRUCTURE</b>											
3.1	Pedestrianisation	Transport planning and infrastructure	Union Street and Broad Street	ACC	2008	2016	N/A	TBC	City Centre Masterplan approved. Part-pedestrianisation of Broad Street now under construction	2017	Part of overall City Centre masterplan proposals. Union Street now proposed as bus priority rather than pedestrianised
3.2a	Road Building / Junction Alterations	Transport planning and infrastructure	Aberdeen Western Peripheral Route	AWPR Managing Agent	2008	2015-2017	Monitoring data from permanent traffic counters on Anderson Drive, Market Street and Wellington Road	0 – 1 µg/m <sup>3</sup> for PM10 and NO <sub>2</sub> (Market St and Anderson Dr)	Construction underway	Late 2017/ early 2018	<b>Trunk Road</b>
3.2b			Haudagain Improvements	Transport Scotland	Implementation to commence upon completion of AWPR	2018	Delivery of scheme	TBC undergoing assessment	Design complete. Checks underway with ACC	2019	Haudagain upgrade will commence on completion of the AWPR.

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>4 TRAFFIC MANAGEMENT</b>											
4.1	Intelligent Transport System (ITS)	Traffic management	To reduce city centre congestion	ACC	Ongoing	Ongoing	Predicted traffic flow impacts; air quality modelling; Monitoring data when operational; LTS monitoring data	Not quantifiable	Bluetooth monitoring installed on A96 corridor linking the Park & Choose to the city centre. RTI installed in additional sites including P&C.	On going	Linked to Civitas Portis proposal
4.2	High Occupancy Vehicle (HOV) Lane	Traffic management	Stonehaven Road	ACC	2011	Subject to implementation of AWPR and A90 south P&C		Not quantifiable	Feasibility study complete	Subject to implementation of AWPR and A90 south P and R	Linked to Wellington Road improvement. STAG 1 Assessment underway.

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No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>4 TRAFFIC MANAGEMENT</b>											
4.3a	Freight and Commercial Vehicle Access	Freight and delivery management	HGV Priority Measures	ACC	Ongoing	Unknown	N/A	Not quantifiable	Feasibility Study - Wellington Road Corridor – complete. STAG 1 Assessment underway	Further detailed work required then implementation subject to funding availability	Linked to AWPR signage strategy
4.3b			Commercial Delivery Strategy (routing, timing, idling control)	ACC	2015	Further detailed work required	Actions contained within SUMP and Roads Hierarchy Study relating to this issue	Not quantifiable	Possible measures identified as part of City Centre Masterplan and the Sustainable Urban Mobility Plan however change to network from CCMP proposals will result in amendments to proposals	2017	SUMP requires revision. Will be impacted upon by Roads Hierarchy Study too.
4.3c			Freight Consolidation Centre	ACC	Ongoing	Unknown	Delivery of study	Not quantifiable	Freight improvement feasibility funding contained within Civitas Portis application.	To be determined	

## Aberdeen City Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>5 PLANNING AND POLICIES</b>											
5.1a	Produce Supplementary Planning Guidance	Policy guidance and development control	Improve Development Control	ACC	Ongoing	Ongoing	Database of permitted development	Not quantifiable	New ASGs produced for Air Quality and Noise. Transport and Accessibility SG updated and contains policy relating to sustainable and low carbon transport.	2017	New developments now 'master-planned' and consider layout of the development for ped/ cycle/ public transport movements first.
5.1b			Section 75 monetary contributions	ACC	Ongoing	Ongoing	Database of contributions and what they have funded.	Not quantifiable	Contributions sought for sustainable transport improvements: core paths, car club, public transport infrastructure and pedestrian safety improvements such as pedestrian crossings, etc.	Ongoing	
5.1c			Construction Code of Practice	ACC			Database of developments signing CCoP	Not quantifiable			
5.2	Integration of AQAP with LTS and RTS	Policy guidance and development control		ACC and Nestrans	2013-15	2016-21	N/A	Not quantifiable	Air quality and noise embedded within the LTS with specific objectives and actions to improve	2021	LTS adopted in January 2016

## Aberdeen City Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>5 PLANNING AND POLICIES</b>											
5.3	Integration of AQAP with Health and Transport Action Plan (HTAP)	Policy guidance and development control	Highlight Health Impacts	ACC / NHS	Ongoing	On-going	N/A	Not quantifiable	HTAP agreed and Steering Group/Board being refreshed	On-going	
5.4	Road Hierarchy	Transport planning and infrastructure	Reclassification of Union St / Denburn (requires TRO)	ACC	2015-16	2016	N/A	Not quantifiable	Principles behind a new roads hierarchy have been approved, allowing feasibility and design to commence. AWPR Signage Strategy being determined.	2030	Linked to AWPR Locking in the Benefits and City Centre Masterplan / Sustainable Urban Mobility Plan proposals



## Aberdeen City Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>5 PLANNING AND POLICIES</b>											
5.5a	Car Parking Policies	Policy guidance and development control	Low Emission Vehicle Parking Incentives	ACC	Ongoing	On hold	no. of low emissions permits as proportion of total	Not quantifiable	Considered as part of a package of measures as part of the Low Emission Strategy for the City and in Strategic Car Parking Review.	Unknown	Questionnaire for Strategic Car Parking Review about to be launched
5.5b			Limit car parking for new developments	ACC	2013	Ongoing	N/A	Not quantifiable	Revised parking standards included in Local Development Plan 2017 and associated Supplementary Guidance.	Ongoing	City Centre Masterplan proposes zero parking for new office developments
5.5c			Development of Local and Regional Car Parking Policies	ACC & Nestrans	Ongoing	Ongoing	N/A	Not quantifiable	Regional Car parking Strategy adopted 2012. Development underway Revised parking standards included in emerging Local Development Plan 2016. Strategic car Parking review started with business awarded to consultant Aecom.	Ongoing	Review of car parking being undertaken as part of Civitas Portis project. Questionnaire for Strategic Car Parking Review about to be launched

## Aberdeen City Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>5 PLANNING AND POLICIES</b>											
5.6a	National Lobbying	Transport planning and infrastructure	Incentives/ funding/tax breaks for Low Emission Initiatives	ACC	2011	Ongoing	N/A	Not quantifiable	EVs continue to have some sort of subsidisation by the Government. Grants for home and workplace charging facilities available through Home Energy Scotland. Council continue to offer EV charging service for free	Ongoing	Report to go to committee in August to update members of cost of running EV charge-points to date.
5.6b			Shipping Emissions Reductions	ACC	2011	Ongoing	N/A	Not quantifiable	Work being undertaken as part of Civitas Portis project with Aberdeen Harbour	Ongoing	
5.6c			HGV/Bus Scrappage schemes	ACC	2011	Ongoing	N/A	Not quantifiable	Work taken forward by Nestrans with Freight Action Plan Implementation Group	Ongoing	

## Aberdeen City Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
<b>6 NON-TRANSPORT MEASURES</b>											
6.1	Control Biomass Installations	Policy guidance and development control	Enforce new developments to only install 'cleanest' biomass boilers	ACC	2012	Ongoing	Database of appliances installed	Not quantifiable	Air Quality Supplementary Guidance written in 2012. Guidance has been updated as part of new ALDP 2016 but not yet adopted.	2016/ongoing	
6.2	Industry Permitting	Environmental permits		ACC and SEPA			N/A	Not quantifiable			
6.3	Tree Planting	Promoting low emission plants (!)	Pro-active planting of tree species with a positive air quality impact and avoid planting varieties that may have detrimental air quality impact	ACC			N/A	Not quantifiable	Policies contained within ALDP Supplementary Guidance (2016) robust policy to achieve this as part of development		
6.4	Shipping	Freight and delivery management	Consider actions available at Aberdeen Harbour	ACC & Aberdeen Harbour			Pollutant monitoring	Not quantifiable	Work being undertaken as part of Civitas Portis project with Aberdeen Harbour		

### **2.3 Cleaner Air for Scotland**

Cleaner Air for Scotland – The Road to a Healthier Future (CAFS) is a national cross-government strategy that sets out how the Scottish Government and its partner organisations propose to reduce air pollution further to protect human health and fulfil Scotland’s legal responsibilities as soon as possible. A series of actions across a range of policy areas are outlined, a summary of which is available at <http://www.gov.scot/Publications/2015/11/5671/17>.

Officers represent the Council on the CAFS Governance Group and the National Low Emissions Framework and National Modelling Framework working groups, supporting the development of actions to assist the delivery of CAFS. Several air quality reports and bulletins were presented to the Council’s Communities, Housing and Infrastructure Committee in 2016 to inform elected members of developments and the implications for the Council. Similarly, Chief Officers were informed via meetings and more detailed briefings.

Progress by Aberdeen City Council against relevant actions within this strategy is demonstrated below.

#### **2.3.1 Transport – Avoiding travel – T1**

All local authorities should ensure that they have a corporate travel plan (perhaps within a carbon management plan) which is consistent with any local air quality action plan. Aberdeen City Council’s 2001 corporate travel plan, as updated in 2006, is outdated and requires to be refreshed. However, the council does undertake a biannual staff travel survey to identify how staff usually travel to work and how they travel at work. The most recent survey was April 2016 when 1,031 responses were received. The data will be used to inform any future travel plan.

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

Scottish Government expects any Scottish local authority which has or is currently developing a Sustainable Energy Action Plan (SEAP) to ensure that air quality considerations are covered. Aberdeen City Council has developed its own SEAP,

Powering Aberdeen: Aberdeen's Sustainable Energy Action Plan. The plan was approved at Full Council on 6 October 2016. Details are available at:

[Aberdeen's Sustainable Energy Action Plan](#)

### **2.3.3 Projects in Aberdeen City**

#### **Portis Civitas EU project**

A consortium of partners, including Aberdeen City Council and NESTRANS, was awarded a £23.2m EU grant for a north east transport project that aims to improve travel in the area. The funding is over 4 years and will be used to examine transport solution with a connection to port operations, supporting sustainable urban mobility through changes in behaviour and attitude. Various work streams are being developed including actions to 'lock in' the benefits of the AWPR, improve cross – city connectivity, reduce congestion and reduce emissions.

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

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

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

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

Aberdeen City Council undertook automatic (continuous) monitoring at 6 sites during 2016. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at [www.scottishairquality.co.uk](http://www.scottishairquality.co.uk).

Maps showing the location of the monitoring sites are provided at

[aberdeencity.gov.uk/planning\\_environment/environmental/air\\_quality/air\\_AirQuality.asp](http://aberdeencity.gov.uk/planning_environment/environmental/air_quality/air_AirQuality.asp).

Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

The Union Street and Market Street continuous monitoring sites are on busy city centre roads and are representative of population exposure for NO<sub>2</sub> and PM<sub>10</sub>. Union Street is the city's main shopping street with shops on the ground level and commercial premises and flats on the 1st, 2nd and 3rd floors. Almost all of the city's bus routes pass along at least part of Union Street and the inside lane of both sides of the road are designated bus lanes.

Market Street is adjacent to Aberdeen Harbour and has a high proportion of HGV's travelling between the north-east of Scotland, the Harbour and locations to the south of Aberdeen. The street is used by pedestrians travelling to the city centre from residential properties to the south of the river Dee, visiting the Union Square retail park and people working around the Harbour area. There are a small number of 1st, 2nd and 3rd floor flats. Emissions from Aberdeen Harbour also contribute to the pollution on Market Street.

The Anderson Drive site is 4m from the kerb and is not representative of population exposure as residential properties are set back 10-20m from the kerb. Similarly the site at Wellington Road is around 3-4m closer to the kerb than residential properties in the area. The nearest properties are 10m from the King Street site, however the location is typical of flatted properties close to the kerb at other locations on King

Street. Errol Place is representative of typical residential properties close to the city centre but not adjacent to a major road.

The automatic monitoring sites at Union Street, Market Street, Wellington Road and Anderson Drive are located with AQMAs.

Errol Place provides urban background data.

The King Street site is not located within an AQMA but is relatively close to the City Centre in an area of high traffic flow.

### **3.1.2 Non-Automatic Monitoring Sites**

Aberdeen City Council undertook non-automatic (passive) monitoring of NO<sub>2</sub> at 56 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 at [Aberdeen City non automatic monitoring sites](#). Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

Diffusion tubes on Market Street, Union Street and the majority of those on Holburn Street and King Street within the city centre are at building façade and are representative of population exposure. Some of the tubes outwith the city centre are at roadside locations with the façade of the nearest relevant property 5-20m back from the roadside. Procedures within LAQM.TG 16 have been used to estimate the concentration at the nearest receptor where appropriate.

Several tube locations along the Third Don Crossing Road required relocation due to road furniture changing as the road construction was completed. Two new tube locations, DT65 and DT66, were installed to replace tube locations DT52, DT51 respectively.

Access to location DT1 is no longer possible and has been replaced by DT67.

DT59 was installed at the end of 2015 to replace DT 23 that was not in a suitable location.

There have been no changes in 2016 requiring the declaration, amendment or revocation of AQMAs in Aberdeen as a result of the monitoring undertaken.

### **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>.

Table C.2 in Appendix C details the annualisation of diffusion tubes that did not have a data capture greater than 75%.

Table C.3 in Appendix C details diffusion tube concentrations at the nearest receptors using calculations to façade.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B.

The NO<sub>2</sub> levels at the continuous monitor at Union Street continues to exceed the annual mean air quality objective of 40 µg/m<sup>3</sup>. However the level of 43 µg/m<sup>3</sup> is the lowest recorded in the last 5 years. Diffusion tubes located along Union Street and the top end of Holburn Street also suggest exceedances of the objective throughout this area of the city centre AQMA. Levels recorded in these locations are generally lower than the previous 5 years and it appears the downward trend of levels towards the objective continues.

The levels of 46 µg/m<sup>3</sup> recorded at the Wellington Road continuous monitor located within the Wellington Road AQMA also exceeded the annual mean air quality objective. This level is greater than 2015 and is lower than the levels recorded between 2012 and 2014. There is no obvious trend in NO<sub>2</sub> levels evident at this roadside site. There are 2 diffusion tube locations (DT7, DT36) within the Wellington Road AQMA that are corrected to represent public exposure. Levels at these locations are below the annual mean objective and are at the lowest levels monitored since 2012. Diffusion tube DT37 located on Wellington Road and outside of the AQMA is also below the objective.



The continuous monitor at Market Street located within the city centre AQMA, recorded its lowest level since 2012 and is below the annual mean objective. However diffusion tubes DT9, DT10 and DT16 located in the Market Street area recorded levels above the objective suggesting exceedances of the annual mean continues at more congested or enclosed areas. Levels at these sites are the lowest since 2012 and there is downward trend towards objective levels.

The only pocket of exceedance of the annual mean objective in the Anderson Drive AQMA was recorded at the Haudagain round about.

The King Street continuous monitor data is outside of the City centre AQMA and continues to be well below the annual mean objective. Diffusion tubes within the AQMA on King Street and East North Street continue to exceed the objective.

A diffusion tube (DT61) outside of an AQMA at Skene Square recorded a level of  $40\mu\text{g}/\text{m}^3$  suggesting potential exceedance of the annual mean in this area. This issue is discussed further in section 4.1 Road traffic sources.

In 2016 no data for diffusion tube DT40, Fullerton Court, was available due to building works preventing access to the monitoring location. Monitoring at this location resumed in 2017.

Table A.4 in Appendix A compares the ratified continuous monitored  $\text{NO}_2$  hourly mean concentrations for the past 5 years with the air quality objective of  $200\mu\text{g}/\text{m}^3$ , not to be exceeded more than 18 times per year.

There were no exceedances of the hourly mean at any automatic or diffusion tube sites in 2016.

### **3.2.2 Particulate Matter ( $\text{PM}_{10}$ )**

Table A.5 in Appendix A compares the ratified and adjusted monitored  $\text{PM}_{10}$  annual mean concentrations for the past 5 years with the air quality objective of  $18\mu\text{g}/\text{m}^3$ .

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

There were no exceedances of the annual mean or 24 hour mean objective at any of the continuous monitoring sites in 2016. Measured concentrations are the lowest recorded since 2012 and there is a downward trend in concentrations at measurement locations across the city.

The fitting and advancement of diesel particulate filters fitted to diesel vehicles may be a contributory factor in reducing emissions.

Reasonably mild winter weather in the last few years may also have contributed to the downward trend due to less likelihood of congestion that can occur during episodes of bad weather.

A colocation study of PM<sub>10</sub> levels at the Market Street automatic site using a BAM and Fidas was carried out in 2016. The monitoring data was collected by Ricardo AEA. It is proposed to remove the BAM from the Market Street site in 2017 due to the Fidas measuring both PM<sub>10</sub> and PM<sub>2.5</sub>.

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

Table A.7 in Appendix A compares the ratified and adjusted monitored PM<sub>2.5</sub> annual mean concentrations for the past 5 years with the air quality objective of 10µg/m<sup>3</sup>.

There are 4 continuous monitoring sites measuring PM<sub>2.5</sub> levels in Aberdeen City.

A PM<sub>2.5</sub> monitor was installed at the Wellington Road site in September 2016. Annual data from this site will be presented in the 2018 report as sufficient data is not available for 2016.

No exceedances of the annual mean were recorded at the 3 existing continuous monitoring sites and the levels recorded are lower than in 2016.

PM<sub>2.5</sub> levels can be estimated from PM<sub>10</sub> annual mean levels recorded at Wellington Road, King Street and Anderson Drive by obtaining the mean ratio of PM<sub>2.5</sub> to PM<sub>10</sub> measured at Market Street and Union Street continuous monitoring sites in accordance with guidance in LAQM TG 16. See Table in Appendix C, Table C.4 for ratio calculation details.

Using the mean ratio factor of 0.52 the estimated PM<sub>2.5</sub> at the 3 sites were as follows:

- Wellington Road, 6 µg/m<sup>3</sup>
- King Street 8 µg/m<sup>3</sup>
- Anderson Drive 6 µg/m<sup>3</sup>

The estimated annual means are below the objective and, for King Street and Wellington Road, are lower than the estimations reported in the 2015 report.

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

No monitoring of sulphur dioxide was carried out in 2016 as previous assessments did not predict a likelihood of exceedance of the objectives and there has been no significant change in local emissions.

### **3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene**

No monitoring of Carbon Monoxide, Lead and 1,3-Butadiene was carried out in 2016 as previous assessments did not predict a likelihood of exceedances of the objectives and there has been no significant change in local emissions.

## **4. New Local Developments**

### **4.1 Road Traffic Sources**

#### **Third Don Crossing**

The Third Don Crossing opened in June 2016 providing a direct link from the north across the River Don. An estimated 10,000 vehicles use the new route daily, alleviating the congestion on the other main crossings at the Bridge of Don and Persley Bridge, which handles 40,000 vehicles a day and links to the Haudigan roundabout and the Anderson Dr/Auchmill Road AQMA. The air quality assessment carried out during the development phase predicted a neutral air quality impact due to the positive and negative impacts of the route on sensitive receptors. However, greatest benefit was predicted at locations of existing poor air quality.

A network of diffusion tubes were installed in 2013 to monitor NO<sub>2</sub> levels at road links close to the new route where traffic flows were predicted to increase. Concentrations pre 3<sup>rd</sup> Don Crossing ranged from 22-33ugm<sup>-3</sup>, well below the annual mean objective. Although the 2016 annual mean includes both pre and post monthly measurements, levels at all sites were lower in 2016 compared to 2014 and 2015, suggesting the new route has had no significant impact on air quality.

#### **Aberdeen Western Peripheral Route (AWPR)**

Construction of the route is still ongoing with a completion date of winter 2017. The new route will significantly reduce traffic flow within the AQMAs, particularly the Anderson Drive/Haudigan roundabout/Auchmill Road corridor and the Wellington Road AQMA.

#### **Broad Street Pedestrianisation**

Following a major public consultation process in 2016, the Council approved the partial pedestrianisation of Broad Street which is located in the City Centre and links directly to Union Street. Access will be restricted to buses and bicycles only, other vehicles will be required to take alternative routes. The air quality assessment predicted an increase in NO<sub>2</sub> and PM<sub>10</sub> emissions on the east section of Union Street and King Street within the AQMA, however decreased concentrations were predicted elsewhere within the AQMA. The pedestrianisation is the first major project of the

City Centre Masterplan which aims to provide a more sustainable transport network and provide additional space for pedestrians and cyclists. Broad Street will be closed to all traffic from March 2017 and reopen for buses only towards the end of the year. Buses will therefore require to be diverted to alternative routes for approximately 9 months with a potential increase in congestion and emissions.

### **Berryden Road Improvements**

A preliminary layout for the upgrade of the Berryden Road corridor has been agreed and discussions on the necessary land acquisition have commenced. The improvements include the duelling of Berryden Road and provide a more direct link between the City Centre and the Third Don Crossing.

Diffusion tubes were installed in 2015 to monitor NO<sub>2</sub> concentrations at existing roads close to the new route where traffic flows were predicted to change. With the exception of Skene Square, concentrations at all sites are currently well below the annual mean objective. In 2016, the first full year of monitoring, the concentration recorded at Skene Square was 40.9ugm<sup>-3</sup> suggesting levels are currently around the objective. Monitoring and screening carried out as part of previous review and assessments did not indicate a risk of exceedance of the objective in this area, however the increase in diesel car usage in recent years and a potential increase in traffic flow and congestion may have resulted in increased NO<sub>2</sub> emissions. Monitoring will continue at this site and additional diffusion tubes installed to monitor other nearby sensitive receptors. It is anticipated that the proposed junction improvements will reduce congestion in this area and improve air quality, however these benefits may be offset by an increase in traffic flow. The air quality assessment required as part of the development process will provide further information on the risk of exceedance of the air quality objectives.

### **A90/A96 Haudagain Improvements**

The Scottish Government has approved the final route layout and completed the necessary land purchases. Construction works are due to commence immediately following the completion of the AWPR. The improvements will create a new slip road around the Haudagain roundabout and improve traffic flow and air quality. The DMRB Environmental Statement details that there are no predicted exceedances of

the annual mean NO<sub>2</sub> or PM<sub>10</sub> levels with the scheme in place in 2018 and concludes that there will be no significant impact on local air quality as a result of the proposed scheme.

#### **4.2 Other Transport Sources**

Other transport sources include:

- 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.

There were no new other transport sources in Aberdeen City in 2016.

#### **4.3 Industrial Sources**

##### **Energy from Waste Facility, East Tullos Industrial Estate**

Planning permission for a new Energy from Waste facility to process 150,000 tonnes of residential waste from the Aberdeen City, Aberdeenshire and Moray Council areas was granted in October 2016. SEPA will be the enforcing authority for industrial emissions; however the local authority has responsibility for the assessment of additional road traffic emissions both during the construction and operational phases and from the potential cumulative impact of industrial emissions on air quality in the surrounding area.

The annual mean NO<sub>2</sub> concentration was predicted to continue to exceed the air quality objectives within the Wellington Road and City Centre in 2022, the year of plant opening due to existing road traffic emissions. The process contribution within the AQMAs was <0.5% of the objective and considered negligible. The majority of construction and operational vehicles will access the site via the AWPR and the southern section of Wellington Road outwith the AQMAs. An additional 22 HGVs and 11 LGVs movements per day are predicted on the northern section of Wellington Road and within the AQMA. However these vehicles will be Euro 6 compliant and have an insignificant impact on air quality. Emissions from facility activities were

predicted to have negligible impact on air quality in the surrounding area. A Construction Management Plan will require to be approved prior to the commencement of the construction works. NO<sub>2</sub> diffusion tubes will be located in several background locations in the Torry/Cove area in 2017 to monitor any changes in NO<sub>2</sub> levels before opening and during facility operation.

Other industrial sources include:

- **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.

The Scottish Environmental Protection Agency have advised there is no regulated process that has increased its emissions to air by more than 30%. The following is a list of changes to PPC permits in Aberdeen City in 2016:

<b>Site</b>	<b>Permit</b>	<b>Description</b>
Muller-Wiseman (West Tullos)	Part A	Site in process of surrendering licence
Muehlhan Industrial Service Ltd. Altens Industrial Estate	Part B	Permit issued July 2016 for a solvent coating activity. 4 stacks. Permit regulates odour, Particulates, Volatile Organic compounds

There are no new, existing or significantly changed industrial sources in Aberdeen City in 2016.

#### 4.4 Commercial and Domestic Sources

Commercial and domestic sources include:

- Biomass combustion plant – individual installations.
- 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.

There are no new commercial and domestic sources in Aberdeen City in 2016. The Energy from Waste Project in Altens is detailed in Section 4.3 and 5.

#### 4.5 New Developments with Fugitive or Uncontrolled Sources

This section relates potential fugitive or uncontrolled particulate matter from the following new sources:

New Source in 2016	Detail
Landfill sites	No new sources in 2016
Quarries	No new sources in 2016
Unmade haulage roads on industrial sites	No new sources in 2016
Waste transfer stations	The new Sita MRF/RDF Site at Altens Industrial Estate covered under a Waste Management Licence, issued by SEPA in December 2015. Site is not yet fully operational.
Other potential sources of fugitive particulate matter emissions.	Construction of the new Aberdeen Exhibition and Conference Centre at the Rowett North Site. Site preparation has exposed a significant area of earth. The contractor has implemented a dust management plan and utilise dust suppression systems.



## 5. Planning Applications

This section details any major planning applications under consideration that might affect air quality.

### **Football Stadium West Kingford**

In 2016 a planning application was received for the proposed development of a new Aberdeen Football Club Stadium to the west of the City at West Kingsford (Application Ref: 170021).

Air quality in the proposed location is currently good with nitrogen dioxide and particulate matter levels well below air quality objectives. Air quality dispersion modelling assessed any impact with the development and without the development in the year 2023, the proposed year of opening. The assessment concluded the impact from development traffic on air quality will be negligible and pollution concentrations will continue to meet national and EU air quality objectives. The application is due to be determined by full Council in Autumn 2017.

### **Aberdeen Harbour Nigg Bay**

The Harbour Expansion Project was approved by the Scottish Government on 20 December 2016 with construction work commencing in Spring 2017. The air quality assessment predicted a minor to negligible significance with respect to the annual mean NO<sub>2</sub> and PM<sub>10</sub> objectives.

PM<sub>10</sub> and NO<sub>2</sub> concentrations within and adjacent to the proposed development site are currently well below the air quality objectives and there is no risk of exceedances either during the construction or operational phase provided good management practices to control dust emissions are implemented.

## 6. Conclusions and Proposed Actions

### 6.1 Conclusions from New Monitoring Data

Data from the Union Street continuous monitoring station and diffusion tubes confirmed NO<sub>2</sub> concentrations within the City Centre AQMA continue to exceed the annual mean objective. However, NO<sub>2</sub> levels at both Union Street and Market Street have continued to decrease since 2012.

Annual mean NO<sub>2</sub> levels at both the Anderson Drive and Errol Place continuous monitoring stations remain well below the annual mean objective. Although the Anderson Drive site is within the Anderson Drive/Haudagain roundabout/Auchmill Road AQMA, diffusion tube values at the Haudagain roundabout continue to exceed the annual mean objective.

The King Street continuous monitor is outside of the City centre AQMA and recorded levels continue to be well below the annual mean objective.

The annual mean NO<sub>2</sub> level recorded at Wellington road exceeded the objective and is greater than the levels recorded in 2015. However the level is lower than levels recorded in 2012 to 2014. The non-automatic monitoring on Wellington Road recorded NO<sub>2</sub> levels below the annual mean objective.

There was one diffusion tube (DT61) outside of an AQMA at Skene Square that marginally exceeded the annual mean objective. This location has been monitored since 2015 and this is the first exceedance. Monitoring will continue at this location and it is proposed to locate more diffusion tubes in the area. Additionally the data has been provided to the consultants appointed to undertake air quality modelling for the Berryden Corridor road project, which aims to improve traffic flow.

There were no exceedances of the NO<sub>2</sub> one hour mean objective at any of the automatic sites. Diffusion tube data also recorded no sites with an annual mean >60ugm<sup>-3</sup> suggesting exceedances of the 1 hour objective were unlikely across the city.

The annual mean and 24 hour PM<sub>10</sub> objectives were met at all monitoring locations and the downward trend in concentrations at measurement locations across the city continues.

No exceedances of the PM<sub>2.5</sub> annual mean were recorded at the 3 continuous monitoring sites. Estimated PM<sub>2.5</sub> annual mean levels, based on PM<sub>10</sub> levels measured at Wellington Road, King Street and Anderson Drive, also indicated that exceedance of the annual mean objective is unlikely.

The 3 AQMAs in the City remain valid for NO<sub>2</sub> and PM<sub>10</sub>.

New monitoring data has not identified a need for any changes to the existing AQMAs and no other LAQM Tasks have been identified.

## **6.2 Conclusions relating to New Local Developments**

The proposed new Energy from Waste and Aberdeen Football Club stadium planning applications have the potential to impact significantly on air quality. However dispersion modelling indicated both developments will have a negligible impact due to the location of the facilities, proposed year of opening and nature of services provided.

## **6.3 Proposed Actions**

- Continue monitoring (non automatic) near sensitive receptors along the route of the 3<sup>rd</sup> Don Crossing.
- Continue monitoring (non automatic) near sensitive receptors along the route of the proposed Berryden Corridor.
- Install further non automatic monitoring locations in the Skene Square area.
- Extend the PM<sub>2.5</sub> monitoring network across the city by installing PM<sub>2.5</sub> monitoring equipment at the King Street site.

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- Progress LEZ feasibility study in accordance with national technical guidance and direction from the Cleaner Air for Scotland Governance Group.
- Additional traffic counts on strategic routes following the opening of the AWPR.
- Continued implementation of the Actions within the Air Quality Action Plan 2011
- Submit the next air quality progress report.
- Commence monitoring of NO<sub>2</sub> levels at background locations in the area where the new Energy from waste plant will be located.

## 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)
CM1	Errol Place	Urban Background	X394397	Y807392	PM <sub>10</sub> , PM <sub>2.5</sub> , O <sub>3</sub> , NO <sub>2</sub> (NO, NO <sub>x</sub> )	N	TEOM FDMS Chemiluminescence	N/A	N/A	3
CM2	Union Street	Roadside	X393656	Y805967	PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>2</sub> (NO, NO <sub>x</sub> )	Y	Dichotomous Monitor FDMS Chemiluminescence	2	2m	2.5
CM3	Market Street	Roadside	X394560	Y805677	PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>2</sub> (NO, NO <sub>x</sub> )	Y	Fidas 200 Chemiluminescence	0	2m	1.5
CM4	Anderson Drive	Roadside	X392506	Y804186	PM <sub>10</sub> , NO <sub>2</sub> (NO, NO <sub>x</sub> )	Y	TEOM Chemiluminescence	10	6m	1.5
CM5	Wellington Road	Roadside	X394395	Y804779	PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>2</sub> (NO, NO <sub>x</sub> )	Y	TEOM, Fidas 200 Chemiluminescence	5	4m	1.5
CM6	King Street	Roadside	X394333	Y808770	PM <sub>10</sub> , NO <sub>2</sub> (NO, NO <sub>x</sub> )	N	BAM Chemiluminescence	10	3m	1.5

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

(2) N/A if not applicable.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
DT2	885 Gt Northern Rd	Roadside	391151	809161	NO <sub>2</sub>	Y	11	3	N
DT3	549 N Anderson Dr	Roadside	391387	808959	NO <sub>2</sub>	Y	17	3	N
DT4	38 Ellon Rd	Roadside	394652	809714	NO <sub>2</sub>	N	7	3	N
DT5	520 King St	Roadside	394236	808066	NO <sub>2</sub>	N	9	0.1	N
DT6	86 Victoria Rd, Torry	Roadside	394764	805197	NO <sub>2</sub>	N	0	3	N
DT7	Wellington Rd//Kerloch Pl	Roadside	394411	804407	NO <sub>2</sub>	Y	0	3	N
DT8	107 Anderson Dr	Roadside	392337	804340	NO <sub>2</sub>	Y	14	3	N
DT9	39 Market St	Roadside	394264	806146	NO <sub>2</sub>	Y	0	3	N
DT10	184/192 Market St	Roadside	394530	805708	NO <sub>2</sub>	Y	0	3	N
DT11	105 King St	Roadside	394406	806637	NO <sub>2</sub>	Y	0	3	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?
DT12	40 Union St	Roadside	394283	806286	NO <sub>2</sub>	Y	0	3	N
DT13	Music Hall, Union St	Roadside	393777	806030	NO <sub>2</sub>	Y	0	6	N
DT14	Dyce Prim, Gordon Ter	Urban background	389046	812794	NO <sub>2</sub>	N	(N/A)	N/A	N
DT15	Northfield swimming pool	Urban background	390801	808132	NO <sub>2</sub>	N	(N/A)	N/A	N
DT16	1 Trinity Quay	Roadside	394336	806097	NO <sub>2</sub>	Y	0	5	N
DT17	43/45 Union St	Roadside	394273	806255	NO <sub>2</sub>	Y	0	3	N
DT18	14 Holburn St	Roadside	393305	805734	NO <sub>2</sub>	Y	0	3	N
DT19	468 Union St	Roadside	393386	805826	NO <sub>2</sub>	Y	0	3	N
DT20	212 King St	Roadside	394400	806842	NO <sub>2</sub>	N	0	4	N
DT21	26 King St	Roadside	394449	806453	NO <sub>2</sub>	Y	0	4	N
DT22	104 King St	Roadside	394425	806634	NO <sub>2</sub>	Y	0	4	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?
DT24	40 Auchmill Rd	Roadside	389930	809603	NO <sub>2</sub>	N	0	3	N
DT25	21 Holburn St	Roadside	393332	805748	NO <sub>2</sub>	Y	0	3	N
DT26	147 Holburn St	Roadside	393214	805367	NO <sub>2</sub>	N	0	3	N
DT27	80 Holburn St	Roadside	393233	805565	NO <sub>2</sub>	Y	0	3	N
DT28	61 Holburn St	Roadside	393275	805624	NO <sub>2</sub>	Y	5	3	N
DT29	469 Union St	Roadside	393400	805811	NO <sub>2</sub>	Y	0	3	N
DT30	209 Union St	Roadside	393619	805919	NO <sub>2</sub>	Y	0	5	N
DT31	249 Holburn St	Roadside	393170	805120	NO <sub>2</sub>	Y	0	5	N
DT33	East North St	Roadside	394505	806531	NO <sub>2</sub>	Y	0	4	N
DT34	404 King Street	Roadside	394317	807527	NO <sub>2</sub>	N	0	9	N
DT36	115 Menzies Rd/Wellington Rd	Roadside	394403	804799	NO <sub>2</sub>	Y	14	4	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?
DT37	137 Wellington Road	Roadside	394697	803735	NO2	N	17	14	N
DT39	819 Gt Northern Rd	Roadside	391293	809136	NO2	Y	0	3	N
DT40	852 Fullerton Ct (facade)	Facade	391353	809158	NO2	Y	0	7	N
DT41	852 Fullerton Ct (roadside)	Roadside	391352	809151	NO2	Y	7	0.1	N
DT45	111 S Anderson Dr	Facade	392311	804349	NO2	Y	0	13	N
DT46	West North Street	Roadside	394277	806671	NO2	Y	0	4	N
DT47	Powis Terrace	Roadside	393368	807511	NO2	N	5	0.1	N
DT48	139 Gt. Northern Road	Roadside	393089	808229	NO2	N	10	0.1	N
DT49	142 Gt. Northern Road	Roadside	392969	808460	NO <sub>2</sub>	N	11	3	N
DT50	St. Machar Dr/Dunbar St.	Roadside	394015	808483	NO <sub>2</sub>	N	6	0.1	N
DT54	36 - 38 School Road	Roadside	394358	808434	NO <sub>2</sub>	N	14	2	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?
DT55	Ellon Rd/Balgownie Crescent	Roadside	394629	809740	NO <sub>2</sub>	N	9	2	N
DT56	Fairview Drive	Urban Background	392239	810163	NO <sub>2</sub>	N	N/A	N/A	N
DT57	Park Place/Constitution St	Roadside	394628	806692	NO <sub>2</sub>	N	16	0.1	N
DT58	47 Tillydrone Av	Roadside	393584	808729	NO <sub>2</sub>	N	8	4	N
DT59	735 Gt.Western Rd	Facade	391525	809080	NO <sub>2</sub>	N	0	8	N
DT60	Anderson Drive/Beech Rd	Roadside	391287	807683	NO <sub>2</sub>	Y	N/A	0.1	N
DT61	21 Skene Square	Roadside	393543	806684	NO <sub>2</sub>	N	0	2	N
DT62	35 Chestnut Row	Urban Background	392903	807302	NO <sub>2</sub>	N	N/A	N/A	N
DT63	93 Berryden Road	Roadside	393034	807392	NO <sub>2</sub>	N	11	2	N
DT64	102 Picktillum Place	Urban Background	393025	807828	NO <sub>2</sub>	N	N/A	N/A	N
DT65	90 Tillydrone Av	Roadside	393331	809073	NO <sub>2</sub>	N	8	3	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
DT66	10 Meadow Place	Roadside	393120	809284	NO <sub>2</sub>	N	3	3	N
DT67	37 Inverurie Rd	Roadside	389756	809583	NO <sub>2</sub>	N	6	3	N
CL1	Errol Place	Background	394397	807392	NO <sub>2</sub>	N	N/A	N/A	Y
CL2	Union Street	Roadside	393656	805967	NO <sub>2</sub>	Y	2	2	Y
CL3	Market Street	Roadside	394560	805677	NO <sub>2</sub>	Y	0	2	Y
CL4	Anderson Drive	Roadside	392506	804186	NO <sub>2</sub>	Y	10	6	Y
CL5	Wellington Road	Roadside	394395	804779	NO <sub>2</sub>	Y	5	4	Y
CL6	King Street	Roadside	394333	808770	NO <sub>2</sub>	N	10	3	Y

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

(2) N/A if not applicable.

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2012	2013	2014	2015	2016
CM1	Background	Automatic		97	21	20 <sup>(4)</sup>	21	23	21
CM2	Roadside	Automatic		96	<b>53</b>	<b>48</b>	<b>47</b>	<b>46</b>	<b>43</b>
CM3	Roadside	Automatic		94	<b>44</b>	<b>43</b>	40	36	35
CM4	Roadside	Automatic		94	30	22	26 <sup>(4)</sup>	22	21
CM5	Roadside	Automatic		98	<b>59</b>	<b>52</b>	<b>48</b> <sup>(4)</sup>	40	<b>46</b>
CM6	Roadside	Automatic		96	29	28	27	28	28
DT2 <sup>(5)</sup>	Roadside	Diffusion Tube		83	40	<b>42</b>	38.2	34.4	32.8
DT3 <sup>(5)</sup>	Roadside	Diffusion Tube		83	29	27.5	26.7	24.8	24.3
DT4 <sup>(5)</sup>	Roadside	Diffusion Tube		100	37	34.8	29.6	35.5	30.7
DT5 <sup>(5)</sup>	Roadside	Diffusion Tube		100	29	28.4	24.9	25.3	20

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2012	2013	2014	2015	2016
DT6	Roadside	Diffusion Tube		100	<b>41</b>	34.4	35	31.3	32.5
DT7	Roadside	Diffusion Tube		100	<b>42</b>	<b>46.3</b>	<b>45.6</b> <sup>(4)</sup>	37.5	37.4
DT8 <sup>(5)</sup>	Roadside	Diffusion Tube		100	<b>46</b>	39.1 <sup>(4)</sup>	33.1	33.5	37.4
DT9	Roadside	Diffusion Tube		100	<b>59</b>	<b>57.6</b>	<b>57.5</b>	<b>50.9</b>	<b>50.2</b>
DT10	Roadside	Diffusion Tube		100	<b><u>71</u></b>	<b><u>70.4</u></b>	<b>53.9</b>	<b>56.1</b>	<b>54.1</b>
DT11	Roadside	Diffusion Tube		100	<b><u>62</u></b>	<b><u>64.7</u></b>	<b>55.3</b>	<b>54.4</b>	<b>51.1</b>
DT12	Roadside	Diffusion Tube		100	<b>57</b>	<b>54.3</b>	<b>51.3</b>	<b>49.8</b>	<b>48.9</b>
DT13	Roadside	Diffusion Tube		75	<b>48</b>	<b>43.4</b>	<b>40.5</b>	<b>41.0</b>	<b>40.9</b>
DT14	Urban background	Diffusion Tube		100	10	12.9 <sup>(6)</sup>	10.5	10.0	9.6
DT15	Urban background	Diffusion Tube		100	13	14.5 <sup>(6)</sup>	16.5	13.4	12.1
DT16	Roadside	Diffusion Tube		100	<b>54</b>	<b>52.3</b>	<b>48.6</b>	<b>45.4</b>	<b>43.8</b>

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2012	2013	2014	2015	2016
DT17	Roadside	Diffusion Tube		100	<b>54</b>	<b>58.2</b>	<b>55</b>	<b>51.8</b>	<b>46.7</b>
DT18	Roadside	Diffusion Tube		100	<b><u>61</u></b>	<b>50.1</b>	<b>47.5</b>	<b>50.2</b>	<b>48.5</b>
DT19	Roadside	Diffusion Tube		75	<b><u>61</u></b>	<b>54.9</b>	<b>51.4</b>	<b>53.3</b>	<b>45.4</b>
DT20	Roadside	Diffusion Tube		100	36	35.8	33.3	34.9	32.1
DT21	Roadside	Diffusion Tube		100	36	35.8	33.3	34.9	<b>44.1</b>
DT22	Roadside	Diffusion Tube		100	<b>49</b>	<b>51.1</b>	<b>45.2</b>	<b>44.1</b>	39.3
DT24	Roadside	Diffusion Tube		100	<b>41</b>	<b>47</b>	39.8 <sup>(4)</sup>	28.8	31.6
DT25	Roadside	Diffusion Tube		100	<b>47</b>	<b>55</b>	<b>40.5</b>	<b>50.3</b>	<b>42.8</b>
DT26	Roadside	Diffusion Tube		100	31	33	31.7	28.7	26.6
DT27	Roadside	Diffusion Tube		100	33	31.6 <sup>(4)</sup>	28.4	28.3	28.7
DT28 <sup>(5)</sup>	Roadside	Diffusion Tube		100	<b>44</b>	<b>40.5</b>	<b>40.1</b>	36.4	34.9

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2012	2013	2014	2015	2016
DT29	Roadside	Diffusion Tube		100	56	<u>63.3</u>	57.9	58.2	48.8
DT30	Roadside	Diffusion Tube		100	55 <sup>(6)</sup>	56.1	53.4	50.9	46.5
DT31	Roadside	Diffusion Tube		83	38	37.2	33.2	32.1	34.7
DT33	Roadside	Diffusion Tube		100	52	51	44.5	46.4	43.1
DT34	Roadside	Diffusion Tube		92	33	33.9	31.2	29.2	28.7
DT36 <sup>(5)</sup>	Roadside	Diffusion Tube		100	48	43.4	41	37.8	35.5
DT37 <sup>(5)</sup>	Roadside	Diffusion Tube		100	36	30.9	26.9	28.8	28.2
DT39	Roadside	Diffusion Tube		100	55	<u>69</u> <sup>(4)</sup>	<u>63.8</u>	54.2	47.4
DT40	Facade	Diffusion Tube		n/a	36	36	36.6	39.0 <sup>(3)</sup>	n/a
DT41 <sup>(5)</sup>	Roadside	Diffusion Tube		100	30	25.4	26.4	29.5	26
DT45	Facade	Diffusion Tube		100	36	37.1	42.4	41.7	30.6

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2012	2013	2014	2015	2016
DT46	Roadside	Diffusion Tube		75	30	33	30.4	30.1	26
DT47 <sup>(5)</sup>	Roadside	Diffusion Tube		100	n/a	38.8	33.2	32.9	28.5
DT48 <sup>(5)</sup>	Roadside	Diffusion Tube		100	n/a	25.9	23.2	23.2	18.9
DT49 <sup>(5)</sup>	Roadside	Diffusion Tube		100	n/a	37.5	29.1	28.7	28.4
DT50 <sup>(5)</sup>	Roadside	Diffusion Tube		100	n/a	25.3	22.8	22.7	18.3
DT54 <sup>(5)</sup>	Roadside	Diffusion Tube		100	n/a	24.3	21.9	21.9	18.3
DT55 <sup>(5)</sup>	Roadside	Diffusion Tube		92	n/a	31.3	28.1	26.9	22.9
DT56	Urban Background	Diffusion Tube		100	n/a	14.8	13.7	12.0	12.5
DT57 <sup>(5)</sup>	Roadside	Diffusion Tube		100	n/a	33	30.3	30.7	29.9
DT58 <sup>(5)</sup>	Roadside	Diffusion Tube		100	n/a	n/a	n/a	26 <sup>(3)</sup>	20.8
DT59	Facade	Diffusion Tube		100	n/a	n/a	n/a	n/a	24.2



Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2012	2013	2014	2015	2016
DT60	Roadside	Diffusion Tube		75	n/a	n/a	n/a	n/a	32.9
DT61	Roadside	Diffusion Tube		92	n/a	n/a	n/a	35.9 <sup>(3)</sup>	<b>40.3</b>
DT62	Urban Background	Diffusion Tube		100	n/a	n/a	n/a	14.5 <sup>(3)</sup>	14.4
DT63 <sup>(5)</sup>	Roadside	Diffusion Tube		100	n/a	n/a	n/a	26 <sup>(3)</sup>	23
DT64	Urban Background	Diffusion Tube		100	n/a	n/a	n/a	16.9 <sup>(3)</sup>	16.9
DT65 <sup>(5)</sup>	Roadside	Diffusion Tube		50	n/a	n/a	n/a	n/a	16.5 <sup>(3)</sup>
DT66 <sup>(5)</sup>	Roadside	Diffusion Tube		50	n/a	n/a	n/a	n/a	19 <sup>(3)</sup>
DT67 <sup>(5)</sup>	Roadside	Diffusion Tube		33	n/a	n/a	n/a	n/a	28.5 <sup>(3)</sup>

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) Although collection is almost 75% data has not been annualised in accordance with LAQM.TG(09) since the periods of data collection were sporadic over the 12 month period. Measured mean concentration is of data collected and therefore is a best estimate.
- (5) Concentrations at nearest relevant receptor have been estimated using the “NO2 fall-off with distance calculator” described in LAQM.TG.16 and are discussed in section Appendix C.
- (6) Data not bias adjusted due to lack of continuous Urban Background data.

Figure A.1: Trend in NO<sub>2</sub> Annual Mean Concentration (µg/m<sup>3</sup>) Continuous Monitoring Sites 2012 – 2016

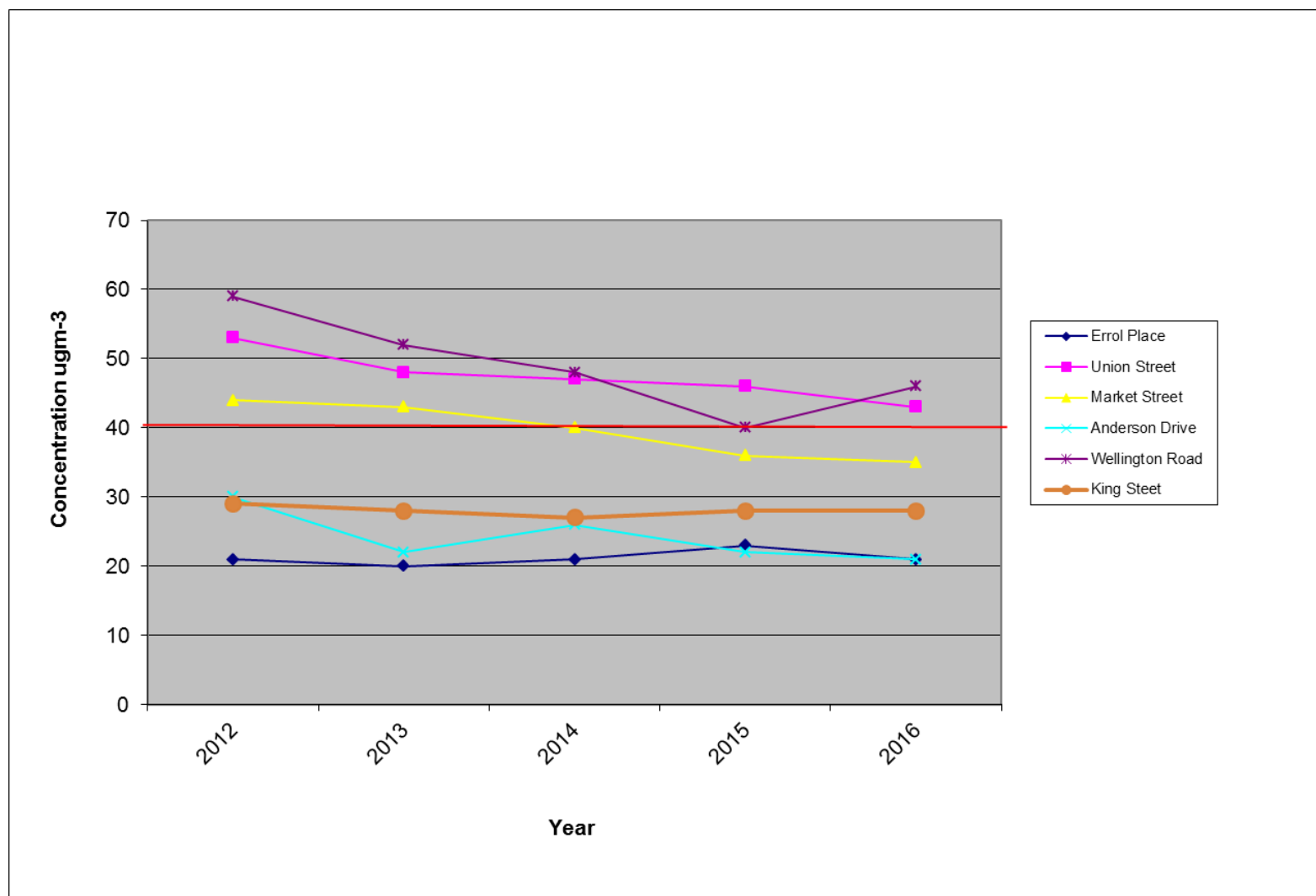


Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> 1-Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
					2012	2013	2014	2015	2016
CM1	Background	Automatic		97	0	0 (86)	0	1	0
CM2	Roadside	Automatic		96	1	0	0	3	0
CM3	Roadside	Automatic		94	0	1	0	0	1
CM4	Roadside	Automatic		94	0	0	0(111)	0(109)	0
CM5	Roadside	Automatic		98	10	6	0(163)	0	11
CM6	Roadside	Automatic		96	0(108.4)	0	0	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 85%, the 99.8<sup>th</sup> percentile of 1-hour means is provided in brackets.

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 2016 (%) <sup>(2)</sup>	PM <sub>10</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
				2012	2013	2014	2015	2016
CM1	Background		96	12	13	15	12	12
CM2	Roadside		78	<b>21</b>	<b>20</b>	18	17	13
CM3	Roadside		98	<b>23</b>	<b>26</b>	<b>26</b>	<b>19</b>	12
CM4	Roadside		94	15	15	15	13	12
CM5	Roadside		97	<b>23</b>	<b>22</b>	<b>21</b>	<b>20</b>	16
CM6	Roadside		89	<b>19</b>	<b>19</b>	<b>19</b>	17	16

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.

Figure A.2: Trend in PM<sub>10</sub> Annual Mean Concentration (µg/m<sup>3</sup>) Continuous Monitoring Sites 2012 - 2016

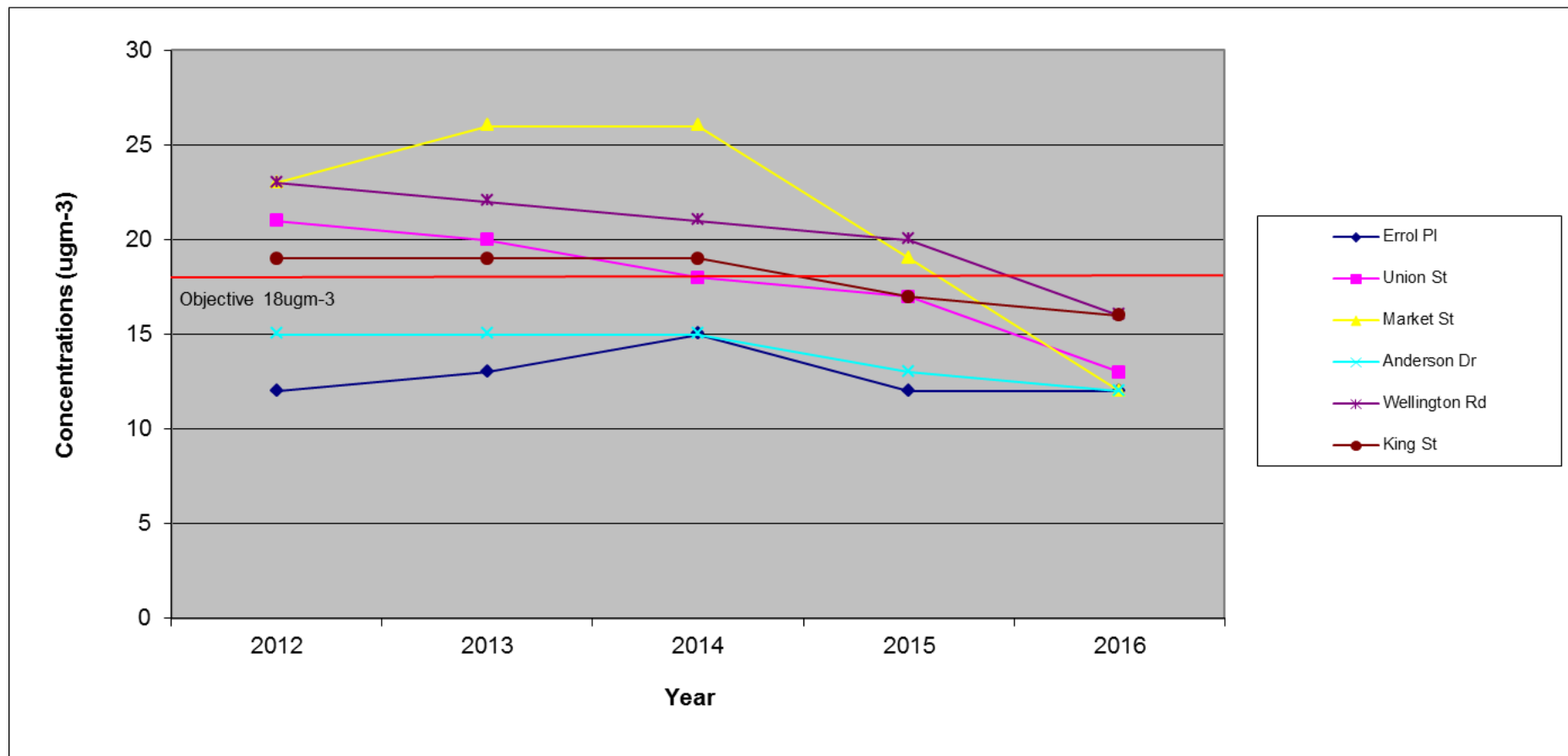


Table A.6 – 24-Hour Mean PM<sub>10</sub> Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	PM <sub>10</sub> 24-Hour Means > 50µg/m <sup>3</sup> (3)				
				2012	2013	2014	2015	2016
CM1	Background		96	1	1 (42)	0	4	0
CM2	Roadside		78	3	4	0 (32) <sup>(4)</sup>	4(49)	0 (26)
CM3	Roadside		98	<b>15(71.1)</b>	<b>59</b>	<b>22</b>	<b>12</b>	1
CM4	Roadside		94	0	1	0	2	0
CM5	Roadside		97	<b>10</b>	7	2	<b>16</b>	2 <sup>(5)</sup>
CM6	Roadside		89	6	4	5	<b>8</b>	1

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 85%, the 98.1<sup>st</sup> percentile of 24-hour means is provided in brackets.

(4) PM10 instruments: TEOM from 1 January 2014 to 10 April 2014. FDMS from 11 April 2014.

(5) PM10 instruments: TEOM from 1 January 2015 to 19 September 2016. Fidas from 20 September 2016.

Table A.7 – Annual Mean PM<sub>2.5</sub> Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	PM <sub>2.5</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
				2012	2013	2014	2015	2016
CM1	Background		95	9	9	10	8	5
CM2	Roadside		77	n/a	n/a	n/a	<b>11</b>	7
CM3	Roadside		98	n/a	n/a	n/a	11	6

Notes: Exceedances of the PM<sub>10</sub> annual mean objective of 10µg/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.



## Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results for 2016

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>	
	DT2	55	55	53	58	51	48	50	48	-	-	50			44
DT3	-	42	47	51	-	45	28	33	32	51	43	30	40.2	34.6	
DT4	60	49	50	33	40	27	41	34	43	33	49	51	42.5	36.3	
DT5	49	41	43	32	36	28	35	32	38	31	52	47	38.7	33.3	
DT6	44	39	43	40	44	37	31	31	30	36	42	36	37.8	32.5	
DT7	50	50	45	48	47	43	39	35	37	41	51	36	43.5	37.4	
DT8	77	64	78	69	68	62	58	56	52	34	78	60	63	54.2	
DT9	55	58	58	64	59	69	51	75	48	62	54	48	58.4	50.2	
DT10	77	74	68	66	59	63	58	59	51	57	67	56	62.9	54.1	
DT11	75	63	66	56	53	47	63	56	56	56	64	58	59.4	51.1	
DT12	62	64	62	60	62	56	50	55	45	52	64	50	56.8	48.9	
DT13	58	54	52	54	46	49	41	39	35	-	-	-	47.6	40.9	
DT14	17	15	10	9	8	8	8	7	10	13	22	19	12.2	9.6	
DT15	23	18	14	12	13	13	10	11	13	19	20	18	15.3	12.1	

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>	
DT16	53	54	50	56	52	56	51	40	39	69	50	41	50.9	43.8	
DT17	61	50	53	55	50	54	53	52	51	63	57	52	54.3	46.7	
DT18	69	68	59	62	55	48	49	47	45	55	64	56	56.4	48.5	
DT19	65	67	56	59	50	48	45	47	38	-	-	-	52.8	45.4	
DT20	48	40	38	34	30	27	34	32	34	37	51	43	37.3	32.1	
DT21	49	72	46	59	42	42	43	43	47	61	68	43	51.3	44.1	
DT22	53	48	48	44	43	43	42	40	44	52	49	42	45.7	39.3	
DT24	41	47	45	38	33	25	26	28	24	35	67	32	36.8	31.6	
DT25	53	48	47	54	55	50	43	43	40	65	55	44	49.8	42.8	
DT26	30	29	34	33	34	31	23	25	23	40	39	30	30.9	26.6	
DT27	43	36	37	33	37	29	26	24	25	39	38	33	33.3	28.7	
DT28	53	47	44	45	47	46	32	34	35	48	50	39	43.3	37.3	
DT29	69	61	61	49	54	58	57	48	46	64	59	55	56.8	48.8	
DT30	67	59	54	48	56	46	54	45	46	59	62	53	54.1	46.5	
DT31	64	37	39	34	-	33	-	30	33	41	53	40	40.4	34.7	
DT33	74	57	50	46	43	41	49	40	46	48	56	52	50.2	43.1	
DT34	45	39	34	-	25	19	31	26	30	33	46	39	33.4	28.7	

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted <sup>(1)</sup>
DT36	53	51	57	60	66	56	49	39	46	55	61	45	53.2	45.7
DT37	45	49	36	34	32	28	33	24	28	23	43	36	34.3	29.5
DT39	71	65	62	56	59	44	49	31	49	56	64	56	55.2	47.4
DT40	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a
DT41	79	63	54	54	44	34	55	51	46	57	75	55	55.6	47.8
DT45	39	38	35	39	39	35	22	21	21	68	37	33	35.6	30.6
DT46	-	37	-	32	26	22	27	25	29	36	-	38	30.2	26.0
DT47	65	61	48	49	46	39	47	46	44	57	63	57	51.8	44.6
DT48	36	45	40	34	30	28	33	31	35	40	44	42	36.5	31.4
DT49	54	49	45	38	36	34	34	34	34	46	63	44	42.6	36.6
DT50	41	37	34	28	26	21	25	24	27	29	46	36	31.2	26.8
DT54	41	35	27	24	20	18	23	20	21	28	40	34	27.6	23.7
DT55	41	36	41	33	36	32	-	27	33	30	39	35	34.8	29.9
DT56	24	19	15	13	10	11	11	11	14	19	23	20	15.8	12.5
DT57	47	40	36	30	28	24	32	26	34	33	42	38	34.2	29.4
DT58	43	26	21	17	16	15	27	21	24	29	44	37	26.7	22.9
DT59	38	38	28	24	21	19	24	21	25	28	40	31	28.1	24.2

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>	
	DT60	-	-	33	-	38	34	38	33	39	46	41			42
DT61	60	-	47	50	41	38	45	39	38	48	57	53	46.9	40.3	
DT62	30	22	16	15	14	13	12	11	15	20	27	24	18.3	14.4	
DT63	43	37	34	30	29	27	26	25	28	36	45	38	33.2	28.5	
DT64	33	25	21	17	16	16	15	13	16	24	33	27	21.3	16.9	
DT65	-	-	-	-	-	-	16	14	16	27	35	31	23.2	19.2 <sup>(2)</sup>	
DT66	-	-	-	-	-	-	19	16	21	23	38	37	25.7	21.2 <sup>(2)</sup>	
DT67	-	-	-	-	-	-	-	-	50	59	41	46	49	34.9 <sup>(2)</sup>	

(1) See Appendix C for details on bias adjustment

(2) Annualised. See Appendix C for details.

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

### **QA/QC of Diffusion Tube Monitoring**

Diffusion tube monitoring is carried out in accordance with the procedures contained in the guidance 'Diffusion Tubes for Ambient NO<sub>2</sub> Monitoring: Practical Guidance for Laboratories and Users' and LAQM.TG 16. All tubes, other than those co-located at the continuous analysers are attached to lampposts/downpipes at a height of approximately 2 meters above ground level and exposed for 4 to 5 weeks in line with the Defra calendar of exposure periods. Co-located tubes are located in triplicate close to the analyser air intake. All exposure times are recorded. Three unexposed travel blanks are submitted to the laboratory with each batch of exposed tubes.

Aberdeen City Council's Public Analyst is UKAS accredited for the analysis of diffusion tubes and also participates in the LGC AIR Scheme.

UKAS carried out an annual assessment of the laboratory in February 2016 to ensure laboratory guidance is being implemented. No problems were identified.

100% of results were satisfactory (z-score <  $\pm 2$ ), for the period April 2016 to March 2017.

The laboratory participates monthly in the nitrogen dioxide "inter comparison" exercise, managed by the National Physical Laboratory. All results in April 2016 were satisfactory and the annual summary (produced by AEA Energy & Environment) indicates that the results were classified as "Good" throughout 2016 with a "Bias Correction Factor A" of 0.86.

### **Factor from Local Co-location Studies**

The web based spreadsheet of national bias adjustment factors (NBAFS) was reviewed, however the information for Aberdeen is limited to one site. Although the Council's Public Analyst undertakes the analysis of diffusion tubes from neighbouring

authorities, Aberdeen City Council is the only authority with continuous monitoring stations that can be used to calculate bias adjustment factors. Accordingly, a locally derived bias factor based on the co-located tubes at the Aberdeen continuous monitoring stations was used to adjust diffusion tube measurements at the other locations across the city. This process was considered appropriate due to the lack of other co-located studies using the laboratory for tube analysis, the remote location of Aberdeen from other conurbations and the good QA/QC performance of the laboratory.

Triplicate diffusion tubes are located adjacent to continuous monitor air analyser inlets. Tubes are exposed in 4 week periods throughout the year. Diffusion tubes are provided by Gradko International and analysed by Aberdeen City Council’s Public Analyst. The preparation technique is 20% tri-ethanolamine in water.

In accordance with LAQM TG 16 the Local bias factor adjustment tool, downloaded from the DEFRA Local Air Quality Management website, is used to calculate bias adjustment factors and the precision and accuracy of the triplicate co-located tubes. Table C1 summarises the bias adjustment factors. Only data with good precision has been used (coefficient of variation smaller than 20%).

Errol Place is an urban background site while the others sites are roadside.

**Table C.1: Bias Factor Calculations**

Type	DT Mean (ugm <sup>-3</sup> )	CM Mean (ugm <sup>-3</sup> )	Bias Factor A	Bias B (%)	CM Data Capture for periods used (%)	Number Monitoring Periods
<b>Errol Place</b>	27	21	0.79	27	99	13
<b>Union Street</b>	50	43	0.85	17	100	13
<b>Wellington Rd</b>	43	46	1.07	-7	97	13
<b>King Street</b>	32	28	0.87	14	96	13
<b>Market Street</b>	44	35	0.80	24	96	12
<b>Anderson Dr</b>	28	21	0.76	31	97	13

## Diffusion Tube Bias Adjustment Factors

LAQM TG 16 advises the value of a local co-location study (and the subsequent bias adjustment) will be improved if the concentrations being measured are similar to those in the wider survey. Therefore separate bias adjustment has been derived for roadside and background.

In accordance with LAQM TG 16 Bias B values of road side continuous monitoring locations were averaged for the road side locations and the inverse derived to obtain a bias adjustment factor of **0.86**. The bias factor at Wellington Road is at least 20% greater than any of the other sites. However, the bias factor was used in the adjustment factor calculation due to period of data capture being 97% and accuracy and precision of data being very good. Inclusion of Wellington Road also provides a more conservative adjustment value.

A separate adjustment factor is derived for background sites using the Bias A, from Errol Place. LAQM TG 16 advises the value of a local co-location study (and the subsequent bias adjustment) will be improved if the concentrations being measured are similar to those in the wider survey. Therefore separate bias adjustment has been derived for roadside and background.

A separate adjustment factor is derived for background sites using the Bias A, from Errol Place, of **0.79**.

Derivation of the bias adjustment factors were verified with the LAQM Support Helpdesk.

## QA/QC of Automatic Monitoring

All equipment is subject to the QA/QC procedure recommended in LAQM.TG 16. Equipment is serviced at 6 monthly intervals. The contract includes call outs to site for repairs and the routine replacement of consumables.

The Errol Place, Union Street and Wellington Road sites are part of the UK's Automatic Urban Network. All sites are part of the Scottish Government data

reporting process and subject to independent audit by Ricardo AEA (RAEA) at 6 monthly intervals. Data validation and ratification is also performed by RAEA.

The analysers perform daily automatic calibrations which are used to assess the routine performance of the analysers and any long term response drift. Manual calibrations are performed by trained Council officers every two weeks using a calibration mixture traceable to national standards. These calibrations act as a check on the operation of the analysers and enable determination of the instrument response factors used to calculate the concentration of NO<sub>2</sub>.

Data is checked daily (Monday-Friday). Should a problem be identified either by Council officers or by RAEA the site is visited immediately and, if necessary, a further manual calibration is performed. Data considered suspect is deleted. Records are kept of instrument breakdowns, services and audits and any local activities or weather that may influence readings.

### **Data Annualisation**

Annualisation of data was carried out where there was insufficient data capture in 2016 for three diffusion tube locations. Annualisation was carried out in accordance with LAQM TG (16). Table C.2 details annualisation of diffusion tube data.

For all sites the required period mean was derived using the continuous monitoring site, Errol Place (urban background). There are no other continuous background monitoring sites within a 50 mile radius of Aberdeen City. Valid data capture for Errol Place was also above 85% for the annual mean concentrations to be annualised.



Table C.2: Annualising diffusion tube data 2016

Site ID	Type	Data	Data Capture 2015 (%)	Measured Mean Raw data (M)	Period of data	Errol PI Annual Mean (Am)	Errol PI Period Mean (Pm)	Ratio Am/Pm (Ra)	Estimate of annual mean at monitoring site <sup>(1)</sup> (M x Ra)
DT65	Roadside	NO <sub>2</sub> Annual Mean	50	23.2	29/6/16 to 4/1/17	20.6	21.4	0.96	22.3
DT66	Roadside	NO <sub>2</sub> Annual Mean	50	25.7	29/6/16 to 4/1/17	20.6	21.4	0.96	24.7
DT67	Roadside	NO <sub>2</sub> Annual Mean	33	49	24/8/16 to 4/1/17	20.6	24.8	0.83	40.6

**Table: C.3 Diffusion Tube concentrations showing calculations to façade (2016)**

Site ID	Bias Measured Concentration	Background Concentration	Distance to kerb	Distance façade	Façade Concentration
	Cy	Cb	Dy	Dz	Cz
DT2	44.0	10.5	3	11	32.8
DT3	34.6	11.6	3	17	24.3
DT4	36.6	9.9	3	7	30.7
DT5	33.3	11.8	0.1	9	20.0
DT8	54.2	12.2	3	14	37.4
DT28	37.3	19.4	3	5	34.9
DT36	45.7	16.5	1	8	35.5
DT37	29.5	15	14	17	28.2
DT41	47.8	10.5	0.1	7	26.0
DT47	44.6	14.7	0.1	5	28.5
DT48	31.4	11.7	0.1	10	18.9
DT49	36.6	12.2	3	11	28.4
DT50	26.8	11.8	0.1	6	18.3
DT54	23.7	11.8	2	14	18.3
DT55	29.9	9.9	2	9	22.9
DT57	29.4	30.1	0.1	16	29.9
DT63	28.5	14.7	2	11	23.0
DT65	19.2	8.8	3	8	16.5
DT66	21.2	8.8	2	12	19
DT67	34.9	9.6	3	6	28.5

Dy -distance to kerb at which concentrations were measured

Dz -distance to kerb at which concentrations are to be predicted

### PM Monitoring Adjustment

All TEOM data between 2009 to 2016 Anderson Drive and Wellington Road was corrected to gravitational equivalent by AEA using the Volatile Correction Model (VCM). Data from the BAM at King Street were also corrected by RAEA Technology (RAEA) using a gravitational factor of 0.83333.

FDMS and FIDAS PM10 do not require adjustment. FIDAS PM2.5 is adjusted using a factor of 0.943.

**Table C.4 Estimating PM<sub>2.5</sub> concentrations from PM<sub>10</sub> monitoring**

<b>Monitoring Site</b>	<b>PM<sub>2.5</sub> (µg/m<sup>3</sup>)</b>	<b>PM<sub>10</sub> (µg/m<sup>3</sup>)</b>	<b>Ratio PM<sub>2.5</sub>/PM<sub>10</sub></b>
Market Street	7	13	0.50
Union Street	11	17	0.54
		<b>Mean</b>	<b>0.52</b>

In accordance with LAQM TG (16) only sites of the same classification are used to derive a ratio.

## 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
ANPR	Automatic Number Plate Recognition
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
AWPR	Aberdeen Western Peripheral Route
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
LEZ	Low Emission Zone
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**

- 1 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DETR July 2007.
- 2 Environment Act 1995.
- 3 The Air Quality (Scotland) Regulations 2000.
- 4 The Air Quality (Scotland)(Amendment) Regulations 2001.
- 5 Local Air Quality Management Technical Guidance LAQM, TG(16), DEFRA, April 2016
- 6 Local Air Quality Management Policy Guidance, (PG)(S)(16), DEFRA, March 2016
- 7 Aberdeen City Council Action Plan, March 2011
- 8 Aberdeen Action Plan Progress Update 2015
- 9 2016 Air Quality Annual Progress Report (APR) for Aberdeen City Council
- 10 Aberdeen Real Time Vehicle Emission Measurement and Analysis 2016