

Annual Progress Report (APR)



2016 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 2016

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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 (NO₂) and Particulate matter (PM₁₀), related to road traffic emissions.

In 2015 the annual mean NO₂ level continued to exceed the national air quality objective across the City Centre 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.

There were no exceedances of the NO₂ one hour objective at any of the monitoring locations.

The annual mean PM₁₀ objective was exceeded at Wellington Road AQMA and City Centre AQMA (Market Street). The objective was met at all other continuous monitoring sites. The trend in annual mean PM₁₀ levels monitored across the City suggests concentrations are going down.

There were exceedances of the PM₁₀ 24 Hour Mean objective also at Wellington Road AQMA and City Centre AQMA (Market Street). The objective was just exceeded at King Street continuous monitoring site. This site is outside of an AQMA and it is the first time an exceedance has been recorded in the last 5 years. The exceedances at Market Street and King Street may have been due to meteorological conditions. Many of the exceedances at Wellington Road were due to local dust emissions from demolition of the nearby prison.

In Scotland local authorities now have a statutory obligation to achieve the 10µg/m³ annual mean objective for PM_{2.5}. Aberdeen City already monitors PM_{2.5} levels at 3 locations (2 roadside sites in the City Centre AQMA and 1 urban background). The objective was just exceeded in the City Centre AQMA. Based on the ratio of PM₁₀ to

PM_{2.5} relationship, levels may also be exceeded in the Wellington Road AQMA. Monitoring of PM_{2.5} in the Wellington Road AQMA will commence in 2016. Given the relationship between PM₁₀ and PM_{2.5} and due to the trend in PM₁₀ levels a reduction in PM_{2.5} levels may also be seen in the future. Monitoring will continue to establish levels and trends.

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

Aberdeen City Council has been working with many partners to deliver the Air Quality Action Plan. As most poor air quality in the City is caused by transport the main focus has been on working with Partners in the transport field to deliver the Local Transport Strategy as well as the Air Quality Action Plan. These have included (but not limited to): Nestrans (Regional Transport Partnership), Aberdeenshire Council, First Bus, Stagecoach Bus, NHS Grampian, Transport Scotland, Co-wheels, Sustrans, Cycling Scotland, CarPlus, Co-wheels, Aberdeen Inspired, AWPR Managing Agent, BEAR Scotland and groups that include: Aberdeen schools, Freight Action Plan Implementation Group, Local Area Bus Operators Forum, Cycle Forum, various businesses, EVAS (Electric Vehicle Association Scotland) and European Partners for delivery of the hydrogen project.

Actions to Improve Air Quality

The key projects have related to modal shift and influencing travel choice, lowering emissions & cleaner vehicles, road infrastructure, traffic management and planning & policies. Specifically this has included finalising a Local Transport Strategy and ensuring that air quality is embedded within the Strategy; finalising a City Centre Masterplan and associated Sustainable Urban Mobility Plan for the City to include pedestrian, cycle and bus priority in the City Centre; expanding the hydrogen and electric vehicle offering as part of both private and public transport networks; delivering various events to tie in with international promotional weeks such as European Mobility Week and Green Transport Week; implementing large scale cycle projects; and, designing schemes for the transport network in the City for Locking in the Benefits of the Aberdeen Western Peripheral Route (AWPR) and other major road infrastructure as part of a revised Roads Hierarchy.

In relation to three of the projects, EV infrastructure, the Car Club and Hydrogen, Aberdeen City Council received an APSE Service Award for the Car Club, a Scottish Transport Award for 'Powering Ahead with Electric Vehicles in Aberdeen' in 2015 and 'Highly Commended' in the Low Carbon Road Transport Initiative of the Year at the 2015 Low Carbon Vehicle Partnership Awards.

The following photos are from 'In Town Without My Car Day'. As part of European Mobility Week 2015 three streets in the City Centre were closed to allow people the chance to experience car-free streets and encourage them to consider concrete solutions to tackle challenges like air pollution, traffic congestion, road safety, climate change, the decline of public spaces and the many health issues caused by sedentary lifestyles.



In Town Without My Car Day as part of European Mobility Week 2015 road closures on Schoolhill, Belmont Street and Little Belmont Street (from left to right): NHS Grampian talking to members of the public; Aberdeen Dance School encouraging members of the public to dance in the street, with the climbing wall HGV and Getabout tent in the background; water slide and pavement cafes on Belmont Street; trying a different mode of travel at the Getabout bike roadshow



Local Priorities and Challenges

The key priority for the Council in 2016 will be to continue to implement and develop the many policies and programmes for pedestrians, cyclists, bus and other road users and ensure that any new road infrastructure benefits all users so that the benefits are 'locked in' and residents and visitors have options other than the private car in order to deliver sustained air quality improvements for the City.

The delivery of a transformed Broad Street in 2016 will be the first of the City Centre Masterplan/ Sustainable Urban Mobility Plan projects to be implemented and

indicates the Council's determination to improve the air quality and environment within the City Centre for the benefit of residents, visitors and businesses alike.

A number of significant planning applications have been approved or are under consideration that have the potential to increase road traffic within the City Centre and/or Wellington Road Air Quality Management Areas. These include the proposed extension to Union Square retail park adjacent to the City Centre AQMA, a new Aberdeen Harbour and a new Energy from Waste facility. These developments, if approved, will require to incorporate mitigation measures to ensure air quality within the AQMAs is not compromised.

How to Get Involved

Further information on the Local Transport Strategy, City Centre Masterplan and Sustainable Urban Mobility Plan can be found on the Council's website:

http://www.aberdeencity.gov.uk/Council_government/shaping_aberdeen/City_Centre_Masterplan.asp

Further information on the schemes Aberdeen City Council has been delivering on Air Quality Action Plan and Local Transport Strategy actions in 2015 can be found on best practice pages on the Car Plus and Paths for All websites:

Car Club

<http://www.carplus.org.uk/case-study-co-wheels-aberdeen/>
<http://www.carplus.org.uk/the-benefits-of-shared-electric-vehicles-in-scotland/>

ITWMC Day

<http://www.pathsforall.org.uk/pfa/news/aberdeen-car-free-day-a-success.html>
(working with the NHS)
<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 2015. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Progress Report (APR) summarises the work being undertaken by 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 (NO₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m ³	Annual mean	31.12.2005
Particulate Matter (PM₁₀)	50 µg/m ³ , not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m ³	Annual mean	31.12.2010
Particulate Matter (PM_{2.5})	10 µg/m ³	Annual mean	31.12.2020
Sulphur dioxide (SO₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 µg/m ³	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m ³	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m ³	Running 8-Hour mean	31.12.2003
Lead	0.25 µg/m ³	Annual Mean	31.12.2008

2. Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by 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

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
City Centre	<ul style="list-style-type: none"> • NO₂ annual mean & 1 Hour mean • PM₁₀ annual mean 	Aberdeen	Declared 2001, extended in 2003. PM ₁₀ included in 2004. An area encompassing a number of properties Union St, King St, Market St, Holburn St and Victoria Road.	Air Quality Action Plan 2011
Anderson Drive	<ul style="list-style-type: none"> • NO₂ annual mean • PM₁₀ annual mean 	Aberdeen	Declared in 2008. Pockets of exceedances at residential properties along Anderson Drive and Auchmill Road.	Air Quality Action Plan 2011
Wellington Road	<ul style="list-style-type: none"> • NO₂ annual mean • PM₁₀ annual mean 	Aberdeen	Residential properties along Wellington Road (Queen Elizabeth II Bridge to Balnagask Rd) 1.	Air Quality Action Plan 2011

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 2015/16 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 and the Local Transport Strategy. Key completed measures are:

Action 1: Encourage Modal Shift and Influencing Travel Choice

- **Park and Choose**

The A96 Park & Choose site ('Chapelbrae') was fully designed and a contract issued for build in 2015. The site has been delayed due to utility work and now has an anticipated opening date in autumn 2016. The site will have 1,000 car parking spaces with associated waiting room, cycle parking, showers, lockers, electric vehicle charging spaces and real time information. Walking and cycling routes through the site link to the cycling infrastructure that has been installed on Dyce Drive to link to the airport, Blackburn, Farburn, Stoneywood and into the City Centre. ANPR cameras will ensure that the Park & Choose is not used as long stay airport parking while long distance bus services through to Aberdeen along the A96 can also serve the Park & Choose as they pass.

- **Cycling Strategy/ Active Travel Action Plan**

Rather than a separate Cycling Strategy and Walking Strategy the Council has drafted an Active Travel Action Plan containing detail for improving strategic walking and cycling in the City and complementary policies to support this including cycle training, promotion, etc. Major consultation took place with the public and stakeholders in 2015 to inform the draft. The draft is being presented to the City Council's Communities, Housing & Infrastructure Committee in August 2016 with a recommendation for consultation with the public and stakeholders.

- **Walking and cycling infrastructure**

Millions of pounds have been spent on improving walking and cycling routes within Aberdeen City in 2015/16 (end of financial year 31st March 2016). This has included:

- A96 Dyce Drive Link Road and A96 Park & Choose site – dual use paths
- Third Don Bridge - segregated cycle facilities alongside pedestrian facilities next to new road bridge across the River Don.

- Seaton Park – paths linking Seaton park to Third Don infrastructure
- A90 Parkway – new dual use facility linking Third Don to A90 Ellon Road
- A90 Ellon Road – part of longer distance route linking Aberdeen to Balmedie.
- Improvements in Dyce from A947 to Formartine & Buchan Way (NCN Route 1)
- Preliminary Design work for Anderson Drive, Riverside Drive, Craigshaw Drive and Dyce Drive.

- **Improve public awareness**

A number of events took place in 2015 supported by Smarter Choices Smarter Places funding as well as the Air Quality Action Plan grant. This included Aberdeen City's participation in 'In Town Without My Car Day' and Pedal for Scotland during European Mobility Week. Bikes of various types were available for the public to try in a designated area and marquees set up with representatives from the council's air quality and transportation strategy teams, 'Getabout', Aberdeen Cycling Forum, Sustrans, First, Stagecoach, Home Energy Scotland and various other sustainable transport and carbon reduction groups to provide information and numerous freebies. Over 5,000 people from the two events were estimated to have taken part and Paths for All have prepared a best practice paper for In Town Without My Car Day.

- **Car Clubs/ Car Sharing**

The Aberdeen Car Club has continued to grow, and continues to be one of the fastest growing in the UK. There are over 1100 members and 40 vehicles, 20 of which are EVs and another couple of which are hybrid.

Action 2: Lower Emissions and Cleaner Vehicles

- **Green Vehicle procurement & Fuel/ Charging Infrastructure**

Since 2015 First and Stagecoach have been operating ten hydrogen fuel cell buses in Aberdeen City and Shire. A refuelling station capable of filling the buses has been built north of the city centre while a second refuelling station capable of refuelling both buses and cars has planning permission and is

currently being built in the south of the City with an anticipated opening date in late 2016. As well as hydrogen buses two hydrogen diesel hybrid vans plus two electric vans with hydrogen fuel cell range extenders are being piloted by the City Council. EV charging infrastructure continues to be installed thanks to Transport Scotland and Scottish Government funding. There are now three rapid triple chargers and thirteen standard chargers, as well as normal charging chargers, in key locations around the City. Aberdeen City Council continues to make the electricity freely available to EV users.

Action 3: Road Infrastructure

- **Pedestrianisation**

The City Centre Masterplan and accompanying Sustainable Urban Mobility Plan were approved by Full Council in summer 2015. These detail measures for the transport network in the City Centre including a number of pedestrian priority areas. The themes cover: 'Relocating Car Movement', 'A Cycling City', 'Prioritising the Bus' and 'Improved Rail Linkages'. Pedestrian priority will focus on: Broad Street, Guild Street/ Station Gateway, Union Street, Schoolhill, George Street and Golden Square. Plans have been drawn up for Broad Street with consultation, design and implementation anticipated in 2016.

- **Road Building/ Junction Alterations**

The Aberdeen Western Peripheral Route (AWPR) contract has been awarded to Aberdeen Roads and the expected opening date is winter 2017. Although the design of the route is committed the Council continue to work with the AWPR Managing Agent to deliver Non-Motorised User Off set Mitigation schemes along the A90 Ellon Road linking Aberdeen to Balmedie and A96 Inverurie Road linking Aberdeen to Blackburn. In addition to the direct benefits of this project, a number of 'Locking in the Benefits' projects are also being developed including feasibility studies along Anderson Drive to upgrade roundabouts to traffic signals for improved pedestrian, cycle and bus movements.

Haudagain Roundabout designs have been finalised by Jacobs on behalf of Transport Scotland with a proposed start date immediately after the AWPR completion in 2018.

The Third Don Crossing contract was awarded in 2015 with an anticipated opening in late 2015, although this has now been delayed. Final snagging work is ongoing and the opening now programmed for spring 2016. The new facility consists of new bridge and link road connecting Bridge of Don to St Machar Drive and includes segregated walking and cycling infrastructure.

The Berryden Corridor has been awarded funding in the Council's Non-Housing Capital Programme and detailed design work is ongoing. The new road will include a dual use facility along its length for walking and cycling, enabling connection of the A96 cycle route to the City Centre.

Action 4: Traffic Management

- **ITS Intelligent Transport Systems**

Officers continue to work with Transport Scotland to deliver real time information at and on approach to Park & Rides using Variable Message Signs (VMS). This will inform drivers of the time taken to take the bus in to town compared to the car. Air quality information may also be displayed to inform drivers of when air quality is particularly poor in the city centre. In addition, VMS signs will offer alternatives to congested routes – thereby enabling drivers to avoid, rather than add traffic to already congested areas.

- **Freight and Commercial Vehicle Access**

Freight measures are being considered under a successful bid to the EU Programme, Civitas. The PORTIS project was confirmed early in 2016 and will explore improvements to the network over the next 4 years to improve freight access to the Harbour. AWPR Signage work is signing all freight (whether approaching from the north, west or south) in from the south of the City (rather than through the City Centre) along the Wellington Road corridor. A Feasibility Study has identified a number of improvements for the corridor

and a STAG Part 1 Study is taking the work to a more detailed level for specific improvements for freight on Wellington Road.

The City Centre Masterplan (CCMP) and the Sustainable Urban Mobility Plan (SUMP) have specific actions for freight delivery improvements across the City. Further work is needed to the SUMP to take account of traffic management interventions required to deliver the AWPR Signage Strategy routing aspirations for freight in the City.

Action 5: Planning and Policy

- **Supplementary Planning Guidance**

Revisions to the Aberdeen Local Development Plan (ALDP) Supplementary Guidance for Air Quality and Transport has merged the documents into one covering Transport, Air Quality and Noise. The revised SG will be formally adopted late 2016 and has more restrictive parking policies, and greater guidance for potential mitigation within Air Quality Management Areas.

Section 75 contributions are being sought for a number of schemes specifically related to sustainable transport improvements including: core paths, car club, public transport infrastructure and pedestrian safety improvements such as pedestrian crossings.

- **Integration of AQAP with LTS**

The Aberdeen City Local Transport Strategy was formally adopted by the Council in January 2016. This contains 6 new outcomes for the City including that by 2021 Aberdeen's transport system should have 'Improved air quality and the environment'. A specific objective has also been set: 'To improve air quality across the City, so that the existing Air Quality Management Areas are revoked and no further Air Quality Management Areas are declared'. An associated Action Plan will be produced in due course detailing how the Council will meet the Air Quality Outcomes and Objectives.

- **Roads Hierarchy**

As part of the AWPR Locking in the Benefits work has taken place on a new roads hierarchy for the City given that the AWPR will become the new trunk road and the existing trunk road network through Aberdeen (Anderson Drive, Parkway, Ellon Road) will no longer be classed as 'A' roads and there will be a consequent impact on the rest of the network. A STAG Part 1 has been completed on an option assessment that ranges from 'Do Nothing' to 'Vehicle Max' as well as 'Sustainable Transport Max'. The option that best met the Planning and Scheme Objectives was Option 10: "Creation of 3 zones within the Anderson Drive boundary with demand management restrictions for vehicles between them. Public transport and cycling corridors will penetrate each of the zones while CCMP/ SUMP proposals for pedestrians, cyclists and bus users will remain in the City Centre". Councillors have agreed that a consultation exercise based on getting feedback on this proposal takes place with stakeholders and members of the public in 2016.

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

- **Car Parking Policies**

The Council is still reviewing the potential for low emission vehicle parking incentives and the premise for this has been wrapped into a wider low emission strategy for the City and further proposals will be considered in the SUMP. Electricity continues to be provided free of charge however, offering some incentivisation.

Implementation of Controlled Parking Zones (CPZs) has stalled however some progress has been made on progressing the development of the North Dee (area next to Aberdeen Harbour and major shopping centre) CPZ.

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

- A96 Park and Choose - Completion
- Cycling Strategy/ Active Travel Action Plan – consultation and adoption
- 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 and adoption of hydrogen vehicles
- Green Vehicle procurement & Fuel/ Charging Infrastructure – completion of second hydrogen refuelling station and additional ev charging points
- Pedestrianisation - Improvements to pedestrian experience on Broad Street
- ITS – continued expansion of Bluetooth journey time monitoring and 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
- Integration of AQAP with LTS – specific actions identified for improving air quality within the LTS Action Plan
- City Centre Masterplan and SUMP - Development of revised Sustainable Urban Mobility Plan with further air quality proposals
- Roads Hierarchy – consultation exercise with members of the public and stakeholders
- Car parking – implementation of Controlled Parking Zone in North Dee area.

Table 2.2 – Progress on Measures to Improve Air Quality quantifiable

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1.1a	Increase Bus Use	Alternative to private vehicle use	Creation of additional Park & Choose sites at A96 and Schoolhill	Nestrans/ ACC/ AC	2008 onwards	2015-16	253,753 passengers using Park & Ride in 2013. No further update available.	Currently not possible to establish target due to unknown Euro Class of buses	A96 site under construction: drawings prepared, tender released, contractor appointed. A90 south planning discussions ongoing	A96 site due to open in autumn 2016. A90 south completion date subject to planning permission deadlines	A96 launch date being confirmed. Option for only Euro 6 or better busses in contract.
1.1b	Increase Bus Use	Alternative to private vehicle use	Delivery of standards and targets agreed by Bus Quality Partnership	LABOF	2010	Ongoing	6.4% employed adults not working from home, resident in Aberdeen City, bus to work (2014)	Not quantifiable	New standards/targets are currently being revised for a further refresh of the quality partnership, possibly on a statutory basis.	Ongoing	Based on SHS statistics where sample size of 150 was used.
1.1c	Increase Bus Use	Alternative to private vehicle use	Increase corridors covered by BPIP (currently voluntary)	LABOF	2010	Ongoing	6.4% employed adults not working from home, resident in Aberdeen City, bus to work (2014)	Not quantifiable	Extension of operating hours of Great Northern Road bus lane delivered. King Street improvements undertaken	Ongoing	A96 route from Park & Choose site being investigated (2016-18)

Aberdeen City Council

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1.1d	Increase Bus Use	Alternative to private vehicle use	Integrated Ticketing	LABOF/ Transport Scotland	No defined start date	Unknown		Not quantifiable	Transport Scotland taking forward for Scotland	Unknown	
1.2a	Improve Cycling & Walking Provision	Alternatives to private vehicle use	Implementation of strategic and local cycle routes	ACC	Ongoing	Ongoing	2.0% employed adults not working from home, resident in Aberdeen City, cycle to work (2014)	Not quantifiable	Various routes implemented in 2015/16 including: A90 Ellon Road, A90 Parkway, Third Don Bridge, Seaton Park routes	Ongoing	Based on SHS statistics where sample size of 150 was used.
1.2b	Improve Cycling & Walking Provision	Alternatives to private vehicle use	Increase cycle parking at schools, workplaces and in public areas	ACC	Ongoing	Ongoing	2.0% employed adults not working from home, resident in Aberdeen City, cycle to work (2014), 3% of pupils regularly cycle to school (2015)	Not quantifiable	Further cycle parking rolled out in primary and secondary schools. Cycle parking continues to be rolled out in public areas where there is need and as part of planning permission.		Based on SHS 2014 statistics where sample size of 150 was used and Hands Up Survey results in 2015.

Aberdeen City Council

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1.2c	Improve Cycling & Walking Provision	Alternatives to private vehicle use	Implement Designing Streets for better overall walking and cycling environments	ACC	Ongoing	Ongoing	64.6% of adults walked as a means of transport in last 7 days (2014)	Not quantifiable	New schemes and developments continue to be designed to meet Designing Streets best practice (Grandhome, Newhills, Countesswells, etc).	Ongoing	Based on SHS 2014 data
1.2d	Improve Cycling & Walking Provision	Alternatives to private vehicle use	Cycling Strategy/ Active Travel Action Plan	ACC	2015-16	2016	27.2% employed adults not working from home, resident in Aberdeen City, walk or cycle to work (2014),	Not quantifiable	Draft prepared for 2016 August CHI Committee. Consultation has taken place with various stakeholders	2017 for Strategy, implementation work ongoing.	Linked to Civitas/ Portis proposals and City Centre Masterplan/ Sustainable Urban Mobility Plan proposals.
1.3a	Travel Plans	Promoting travel alternatives	Encourage update of voluntary travel plans	ACC & Nestrans	Ongoing	Ongoing	New Indicator] No. organisation adopting TPs; No. employees covered by TPs	Not quantifiable	Travel Plan Strategy under revision	Ongoing	Getabout website updated. Under SCSP programme AC is working with a number of business/ organisations

Aberdeen City Council

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1.3b	Travel Plans	Promoting travel alternatives	Ensure Travel Plans are requested as part of Planning process	ACC	Ongoing	Ongoing	[New Indicator] No. organisation adopting TPs; No. employees covered by TPs	Not quantifiable	Technical Advice Note (TAN) for Travel Planning drafted. Revised ALDP SG going through Planning process.	Ongoing	
1.3c	Travel Plans	Promoting travel alternatives	Continue to implement the Council's Travel Plan	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 and analysis underway	Ongoing	
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	Improve public awareness of air quality issues	Public information	ACC Website Improvements to Air Quality pages	ACC	2011	Ongoing	N/A	Not quantifiable			
1.4c	Improve public awareness of air quality issues	Public information	'Airtext' Alert Service	ACC			No. of service users	Not quantifiable			

Aberdeen City Council

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1.4d	Improve public awareness of air quality issues	Public information	Undertake air quality and sustainable travel events with Getabout Partnership	Getabout	Ongoing	Ongoing	10 events	Not quantifiable	In Town Without My Car Day took place again in September 2015; planning has now commenced for 2016 event.	Ongoing	Linked to Smarter Choices, Smarter Places Programme
1.4e	Improve public awareness of air quality issues	Public information	Marketing Initiatives (Walk to School)	ACC	Ongoing	Ongoing	[New Indicator] Number of schools receiving air quality / travel initiatives	Not quantifiable	Work undertaken with a number of schools in 2015 such as Middleton Park cycle ride.		Linked to SCSP Programme 2016
1.5a	Car Clubs / Car Pool Schemes	Alternatives to private vehicle use	Expand cars and locations of car club	ACC	2011	2012	1,100 members of Aberdeen Car Club, 38 vehicles (Dec, 2015)	Estimate 0 – 1 µg/m ³	36 Car Club cars available for public use. Still one of fastest growing car clubs in country. Highest number of evs in car club fleet in UK.	Ongoing	Car Club tender being revised and will be released for reappointment in April 2017.
1.5b	Car Clubs / Car Pool Schemes	Alternatives to private vehicle use	Undertake promotional campaigns with the public and businesses/ organisations	ACC	2011	2012	1,100 members of Aberdeen Car Club, 38 vehicles (Dec, 2015)		Marketing and promotional campaigns undertaken	Ongoing	

Aberdeen City Council

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1.5c	Car Clubs / Car Pool Schemes	Alternatives to private vehicle use	Continuation of regional car sharing scheme	Nestrans	Ongoing	Ongoing	2,811 members of participants in Nestrans Carshare scheme (2015)	Estimate 0 – 1 µg/m ³	Work undertaken with a number of businesses to promote car sharing as part of SCSP 2015 programme		Forms part of ACC's 2016 SCSP programme
1.6a	Rail Improvement	Alternatives to private vehicle use	Continue to work with Nestrans and Transport Scotland/ Network Rail to deliver local rail improvements including new stations	Transport Scotland/ Nestrans	Ongoing	2018-19	8 railway stations in North East in 2015. Current modal share 0.6% (2011 census data)	Estimate 0 – 1 µg/m ³	Scottish Government has announced programme of improvements to be introduced in 2018/19. Kintore Station funding package being consolidated.	>2020	
1.6b	Rail Improvement	Alternatives to private vehicle use	Infrastructure improvements	Transport Scotland	Ongoing	2019	8 railway stations in North East in 2015.	Not quantifiable	Investigation works underway to determine programme for Aberdeen to Inverness rail improvements	2019 – Phase 1	
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	

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Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
2.1a	Green Vehicle procurement & Fuel/ Charging Infrastructure	Transport planning and infrastructure	Improve Council Fleet	ACC	Ongoing	Ongoing	100% Euro IV or better in Council's fleet (April 2015)	Not quantifiable	EVs continue to form part of the Council fleet. Purchase of hydrogen vans (2014) and installation of hydrogen refuelling station (2015). Second hydrogen refuelling station has planning permission and expected to be built in 2016.	Ongoing	Continued investment in both hydrogen and ev infrastructure by the Council
2.1b	Green Vehicle procurement & Fuel/ Charging Infrastructure	Transport planning and infrastructure	Commercial Bus fleet improvement	LABOF	2010	Ongoing	First Bus have 60% Euro IV buses or better Stagecoach have 85% Euro IV buses or better	Not quantifiable	10 hydrogen buses operated by First and Stagecoach since 2015	Initial tranche completed	Potential continued investment in buses likely
2.1c	Green Vehicle procurement & Fuel/ Charging Infrastructure	Transport planning and infrastructure	Installation of electric vehicle charging points	ACC & Nestrans	2011	Ongoing	54 Council-managed public spaces with charge points (plus 12 in Council car parks available at weekends)	Not quantifiable	Additional EV infrastructure available to members of the public including fast charging	Ongoing	Further work via OLEV Bid
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		Real time tail pipe vehicle emission study undertaken

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Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
2.2b	Emissions Testing & Idling Enforcement	Public information	Idling Vehicles	ACC			No. cautions	Not quantifiable			
2.3a	Taxis	Vehicle fleet efficiency	Non-idling signs	ACC	Ongoing	On hold	[New Indicator] Spatial coverage of signs	Not quantifiable	Idling signage not currently being pursued due to City Centre Masterplan taking priority in informing streetscape	Ongoing	
2.3b	Taxis	Vehicle fleet efficiency	Licensing: vehicle inspections, emissions restrictions	ACC	Ongoing	Ongoing	[New Indicator] Fleet emissions profile improvement	Not quantifiable	Licensing Committee removed the requirement for all taxis and private hire cars to have a minimum 1400 cc engines in order to permit lower emission vehicles to be used.		
2.4	Low Emission Zone	Environmental Permits	To investigate the potential for a Low Emission Zone in the City Centre	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	Ongoing	Potential actions being explored/ taken forward by steering group. Linked to City Centre Masterplan

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Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
3.1a	Pedestrianisation	Transport planning and infrastructure	Pedestrianise areas of the City Centre	ACC	Ongoing	Ongoing	N/A	TBC	City Centre Masterplan approved. Consultation underway for options for Broad Street, including full and part-pedestrianisation.	2018	Part of overall City Centre masterplan proposals. Union Street now proposed as bus and pedestrian priority rather than full pedestrianisation
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 $\mu\text{g}/\text{m}^3$ for PM_{10} and NO_2 (Market St and Anderson Dr)	Construction underway	Late 2017	
3.2b	Road Building / Junction Alterations	Transport planning and infrastructure	Haudagain Improvements	Transport Scotland	Implementation to commence upon completion of AWPR	2018	Monitoring data from permanent traffic counters on Anderson Drive, Market Street and Wellington Road	TBC undergoing assessment	Design complete. Checks underway with ACC	2019	Haudagain upgrade will commence on completion of the AWPR.

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Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
3.2c	Road Building / Junction Alterations	Transport planning and infrastructure	Third Don Crossing	ACC	2008	2015	Monitoring data from permanent traffic counters on Anderson Drive, Market Street and Wellington Road	2 – 4 $\mu\text{g}/\text{m}^3$ for NO_2 and 0-1 $\mu\text{g}/\text{m}^3$ for PM_{10}	New road bridge with walking and cycling facilities linking Bridge of Don to St Machar Drive to be completed 2016	2016	Target pollution reduction is outside of AQMAs on Ellon Road and Kings St
3.2d	Road Building / Junction Alterations	Transport planning and infrastructure	Dyce Drive Link Road	ACC	2012	2015	Monitoring data from permanent traffic counters on Anderson Drive, Market Street and Wellington Road	Not quantifiable	Creation of link road linking AWPR junction to Aberdeen Airport with associated pedestrian and cycle infrastructure and link to A96Park & Choose site to be completed 2016	2016	
3.2e	Road Building / Junction Alterations	Transport planning and infrastructure	Berryden	ACC	2008	2016	Monitoring data from permanent traffic counters on Anderson Drive, Market Street and Wellington Road	TBC	Design review undertaken in 2015 for new Berryden corridor dual carriageway linking Deburn to St Machar Drive with associated pedestrian and cycle facilities	2017	

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Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
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 Park and Choose	Linked to Wellington Road improvement . STAG 1 Assessment underway.
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

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Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
4.3b	Freight and Commercial Vehicle Access	Freight and delivery management	Commercial Delivery Strategy (routing, timing, idling control)	ACC	2015	Further detailed work required	n/a	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
4.3c	Freight and Commercial Vehicle Access	Freight and delivery management	Freight Consolidation Centre	ACC	Ongoing	Unknown	n/a	Not quantifiable	Freight improvement feasibility funding contained within Civitas Portis application.	To be determined	
5.1a	Produce Supplementary Planning Guidance	Policy guidance and development control	Construction Code of Practice	ACC	Ongoing	Ongoing	[New Indicator] Annual monetary contributions towards air quality/sustainable transport measures in AQMAs	Not quantifiable	Major new developments require Dust Management Plans		

Aberdeen City Council

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5.1b	Produce Supplementary Planning Guidance	Policy guidance and development control	Improve Development Control	ACC	Ongoing	Ongoing	[New Indicator] Annual monetary contributions towards air quality/sustainable transport measures in AQMAs	Not quantifiable	SG's produced for Air Quality and Noise. Revised SG not yet adopted merges Transport, Air Quality and Noise and will be formally adopted late 2016.		
5.1c	Produce Supplementary Planning Guidance	Policy guidance and development control	Section 75 monetary contributions	ACC	Ongoing	Ongoing	[New Indicator] Annual monetary contributions towards air quality/sustainable transport measures in AQMAs	Not quantifiable	Contributions sought for sustainable transport improvements: core paths, car club, public transport infrastructure and pedestrian safety improvements such as pedestrian crossings, etc.		
5.2a	Integration of AQAP with LTS and RTS	Policy guidance and development control	Ensure air quality issues are referenced in the LTS and RTS	ACC and Nestrans	2013-15	2016-21	Updated LTS	Not quantifiable	Air quality and noise embedded within the LTS with specific objectives and actions to improve air quality	2021	LTS adopted in January 2016

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Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5.2b	City Centre Master Plan	Policy guidance and development control	Ensure air quality issues are referenced in the City Centre Master Plan	ACC	2013-15	2015-2040	Delivery of each project within plan	Assess on a project basis as plan implemented	Plan approved by Council 2015	2040	1 st project is Broad Street development
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	Successful bid to SCSP programme to work on health issues
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 proposal

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Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5.5a	Car Parking Policies	Policy guidance and development control	Low Emission Vehicle Parking Incentives	ACC	Ongoing	On hold	[New Indicator when adopted] 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.	Unknown	
5.5b	Car Parking Policies	Policy guidance and development control	Limit car parking for new developments	ACC	2013	Ongoing	ALDP SG maximum car parking standards for City Centre residential units is 1.5 spaces per unit and office is 1 space per 80m2 (2012)	Not quantifiable	Revised parking standards included in emerging Local Development Plan 2016 and associated Supplementary Guidance.	Ongoing	City Centre Masterplan proposes zero parking for new office developments
5.5c	Car Parking Policies	Policy guidance and development control	Development of Local and Regional Car Parking Policies	ACC & Nestrans	Ongoing	Ongoing	Local Policy compliance with Regional policies	Not quantifiable	Regional Car parking Strategy adopted 2012. Development underway Revised parking standards included in emerging Local Development Plan 2016.	Ongoing	Review of car parking being undertaken as part of Civitas Portis project
5.6	Integration of AQAP with Noise Action Plan (NAP)	Environmental Permit	Implementation of policies that benefit both air quality and noise	ACC/ NHS	2012	Ongoing	NAP compliance	Not quantifiable	Adopted NAP in 2014	Ongoing	

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Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5.7a	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. Free charging facilities available through Home Energy Scotland.	Ongoing	
5.7b	National Lobbying	Transport planning and infrastructure	Shipping Emissions Reductions	ACC	2011	Ongoing	N/A	Not quantifiable	Work being undertaken as part of Civitas Portis project with Aberdeen Harbour	Ongoing	
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			

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Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
6.3	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	No identified date	No identified date	N/A	Not quantifiable	ALDP revised Supplementary Guidance (2016) contains further information on developing a robust policy to achieve this as part of development	No identified date	Major road building schemes also have proposals for tree planting to benefit air quality.
6.4	Shipping	Freight and delivery management	Consider actions available at Aberdeen Harbour	ACC & Aberdeen Harbour	Ongoing	Ongoing	Pollutant monitoring	Not quantifiable	Work being undertaken as part of Civitas Portis project with Aberdeen Harbour.		

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 2015. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at www.scottishairquality.co.uk.

Maps showing the location of the monitoring sites are provided in <http://airquality.aberdeencity.gov.uk>. 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 NO₂ and PM₁₀. 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. A new particulate monitor was installed at the Market Street site in 2015 to monitor PM₁₀ and PM_{2.5}. The equipment is collocated with the existing PM₁₀ monitoring equipment to assess meteorological effects on the performance of different monitoring equipment.

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.

3.1.2 Non-Automatic Monitoring Sites

Aberdeen City Council undertook non- automatic (passive) monitoring of NO₂ at 56 sites during 2015. 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.

In 2015 4 new diffusion tube locations were established in the north of the city to assess any impact of the proposed Berryden Corridor (Site ID BC1 to BC4). The tubes are at roadside with the façade of the nearest relevant property 2-20m back from the roadside and background locations. Procedures within LAQM.TG 16 have been used to estimate the concentration at the nearest receptor where appropriate.

Access to several tube locations along the Third Don Crossing Road was not possible as the road construction progressed through the year and data has been annualised. One new tube location (DT58) was installed to replace tube location DT53 due to the relocation of lamp post being used.

There have been no changes in 2015 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 (NO₂)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

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

Table A.4 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year.

Figure A.1 illustrates the trend in NO₂ Annual Mean Concentration at all automatic sites for the past 5 years.

Concentrations at Union Street automatic monitoring site continue to exceed the annual mean objective although the levels are the lowest recorded since 2013 with a downward trend, towards the annual mean objective levels. All non automatic monitoring locations along Union Street continued to exceed the Annual Mean objective.

At Errol Place, Anderson Drive, Market Street and King Street automatic monitoring sites concentrations are below the objective. There has been a downward trend in annual mean concentrations over the last 5 years at these sites. Errol Place and King Street are outwith the AQMAs. However data from non-automatic monitoring locations along Market Street and within the city centre AQMA at King Street continue to exceed the annual mean objective.

The automatic monitoring data from the Anderson Drive site was annualised as valid data capture was less than 75% due to equipment breakdown. Details of the annualisation process are detailed in Appendix C, Table C.3.

The Anderson Drive AQMA was declared due to predicted exceedances of the annual mean objective at locations elsewhere along the Anderson Drive/Haudagain roundabout corridor. Non automatic monitoring results at locations DT 39 and DT45 indicate that there are still exceedances of the annual mean objective in the Haudagain Roundabout corridor and South Anderson Drive/Broomhill Road Junction.

Non automatic monitoring data at several locations on Holburn Street (DT 18 and DT15) and East North Street (DT 33) exceeded the annual mean objective. These locations are within the city centre AQMA.

The non automatic monitoring site on Wellington Road DT36 (within AQMA) recorded a level below the annual mean objective for the first time since 2012.

There were no exceedances of the annual mean objective recorded at any automatic or non automatic locations outside AQMAs.

There were no exceedances of the hourly mean at any automatic or non automatic site in 2015.

3.2.2 Particulate Matter (PM₁₀)

Table A.5 in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of 18µg/m³.

Table A.6 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 5 years with the air quality objective of 50µg/m³, not to be exceeded more than 7 times per year.

All data was ratified by Ricardo-AEA (RAEA). TEOM and BAM data since 2009 has been corrected to gravitational equivalent by AEA Technology using the procedures described in Appendix C.

PM₁₀ data from Union Street has been annualised in accordance with LAQM TG 16 as data capture in 2015 was less than 75%. Data between July and September 2015 was rejected due to excessive noise. The equipment required removal from the site for repair. Appendix C, Table C.3 provides details of the annualisation process.

The Union Street and Market Street continuous monitoring locations are representative of population exposure for PM₁₀ due to the proximity of flats in the area. Anderson Drive and Wellington Road are both closer to the kerb than the façade of the nearest residential properties and are not representative of population exposure. 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 annual mean objective was just exceeded at Market Street and Wellington Road. Both monitoring sites are located within Air Quality Management Areas. However the levels are the lowest recorded in the last five years. Figure A.2 in Appendix A shows the downward trend in concentrations over the last five years.

Levels were below the objective at Errol Place and King Street (Outside AQMA), and Union Street, Anderson Drive (within AQMAs).

Exceedances of the 24 hour mean objective were recorded at Market Street, Wellington Road and King Street. The number of exceedances at Market Street were the lowest recorded since 2011. Conversely the number of exceedances at Wellington Road and King Street were the highest since 2011.

The increased number of exceedances at Wellington Road is likely to be due to dust emitted during the demolition of the Craiginches Prison located immediately adjacent to the continuous monitoring station. Demolition work was carried out between March and May 2015. During that time 12 exceedances of the 24 hour mean were

recorded. Similar exceedances were not recorded across the City and nitrogen dioxide levels were not elevated during this time, indicating that the cause of the exceedances were unlikely to be traffic related.

The exceedances at King Street coincided with exceedances at other monitoring sites, especially Market Street and therefore exceedances may have been influenced by meteorological conditions. The weather conditions during these exceedances were light southerly winds with either high humidity or precipitation. King Street and Market Street sites use BAMs to measure PM₁₀ levels.

A Fine Dust Monitor System (Fidas) was installed at the Market Street Continuous Monitoring site in September 2015. The equipment measures PM₁₀ and PM_{2.5} and has been co-located with the BAM to establish what effect local meteorological conditions may be having on the BAM. The co-location study will be reported in 2017 when there is a full year of data available.

3.2.3 Particulate Matter (PM_{2.5})

Table A.7 in Appendix A compares the ratified and adjusted monitored PM_{2.5} annual mean concentrations for the past 5 years with the air quality objective of 10µg/m³.

There are 3 continuous monitoring sites measuring PM_{2.5} levels in Aberdeen City. Monitoring of PM_{2.5} at Errol Place (urban background) commenced in February 2009 as part of the UK Automatic Urban and Rural Network (AURN). There has been no exceedance of the objective at that site since monitoring began.

Monitoring of PM_{2.5} at Union Street (Roadside) commenced in April 2014 following the installation of a FDMS. The 2015 data indicates that the annual mean objective to be met by 2020 is currently exceeded.

Monitoring of PM_{2.5} at Market Street (Roadside) commenced in September 2015. Data capture was less than 75% therefore the data has been annualised in accordance with LAQM TG 16. Data from Errol Place was used to estimate the annual mean at Market Street. Whilst the annual data capture for Errol Place was 88% the period mean was only 78%. However estimating PM_{2.5} concentrations from

PM₁₀ Monitoring in LAQM TG 16, using Errol Place and Union Street PM_{2.5} and PM₁₀ data, a value of 13 (19 x 0.66) was calculated suggesting the concentration is likely to exceed the objective. See Table in Appendix C, Table C.5 for ratio calculation details.

The annual mean for PM₁₀ at Wellington Road was 20 µg/m³. estimating PM_{2.5} concentrations from PM₁₀ Monitoring in LAQM TG 16, a value of 13 µg/m³ (20 x 0.66) was calculated suggesting the concentration is likely to exceed the objective at this location.

Estimated PM_{2.5} concentrations at King Street monitoring site are 11 µg/m³ (17 x 0.66) and therefore it appears the objective is likely to just be exceeded at this location.

This is the first year PM_{2.5} monitoring data has been available for the roadside sites. The downward trend in PM₁₀ levels suggest a reduction in PM_{2.5} may also be seen. Monitoring will continue at these sites to establish if further assessment is required.

All measured or estimated PM_{2.5} concentration exceedances are within existing AQMAs for PM₁₀ except for King Street.

3.2.4 Sulphur Dioxide (SO₂)

No monitoring of sulphur dioxide was carried out in 2015 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 2015 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

There are no new road traffic sources since the Updating and Screen Report 2015. There are a number of projects that were detailed in the USA 2015 that are ongoing.

4.1.1 Aberdeen Western Peripheral Route (AWPR)

Construction of the route is ongoing with a completion date of Winter 2017.

4.1.2 3rd Don Crossing

Construction of the new crossing over the River Don in the north of Aberdeen commenced in 2014. The new road opened in June 2016. Monitoring of nitrogen dioxide levels using diffusion tubes continues at various locations along the existing road network and the new route to monitor before/after construction air quality impacts. Results are detailed in Appendix A Table A.3.

4.1.3 Berryden Corridor

The Council is committed to upgrading the existing Berryden corridor. An option appraisal of potential routes will be undertaken and include potential air quality impacts. In 2015 monitoring of nitrogen dioxide levels commenced using diffusion tubes at various locations along the existing road network and proposed new route to monitor before/after construction air quality impacts. Results are detailed in Appendix A Table A.3.

4.1.4 A90/A96 Haudagain Improvement

The Haudagain roundabout is a junction between several major roads in Aberdeen which is currently operating over capacity. This causes significant queues and delays to traffic and exceedances of the air quality objectives both at the roundabout

and on approach roads. Traffic flows on the approach roads are >30,000 vehicles per day, including a high percentage of HGVs.

The Scottish Government has committed to starting the construction of improvements to Haudagain once the Aberdeen Western Peripheral Route (AWPR) is completed, which is currently anticipated to be winter 2017.

Detailed air quality modelling is currently being carried out to assess the impact of the improvements both within the existing AQMA and adjacent to sensitive receptors along the new link.

4.1.5 City Centre Masterplan

The Council appointed specialised consultants in 2014 to devise a long term plan for the regeneration of Aberdeen City Centre. A Masterplan was published for consultation in early 2015. Sustainable transport and an improved public transport network are key elements. For example, the Masterplan includes a proposal to remove private cars from some streets, including parts of Union St, creating approximately 43,600 sq m (11 acres) of additional space for pedestrians and cyclists, the introduction of taxi and bus only streets and bus priority measures on priority routes. Further information will be provided in future air quality report and Action Plan updates as the Masterplan develops.

4.1.6 Real time Tailpipe Vehicle Emission Study

The University of Leeds Institute of Transport Studies undertook a Real Driving Emission study for the Council in April 2015. The performance of over 24,000 cars, taxis, HGVs, LGVs, vans, buses and coaches were tested over 9 days at 5 sites across the City.

Diesel vehicle NO_x emission controls significantly underperformed compared to manufactured published data with little difference in emissions across Euro 3, 4, and 5 vehicles. Diesel cars and vans contributed most of the primary NO₂. Although

Euro 6 diesel car NO_x emissions were roughly half those of Euro 3, 4, and 5 vehicles, emissions were still on average more than 3 times the EU emission standard. NO_x emissions from Euro 6 HGVs were over 10 times lower than Euro 3,4, and 5 HGVs indicating SCR (selective catalytic reduction) HGV exhaust after-treatment has led to a significant improvement in the performance of HGVs.

Information from the tailpipe emission study will support the Council in the determination of the most beneficial measures to improve air quality in Aberdeen. The report can be downloaded from [aberdeencity air quality reports](#).

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 are no new other transport sources in Aberdeen City in 2015.

4.3 Industrial Sources

4.3.1 Proposed Energy from Waste Plant at East Tullos Industrial Estate

Discussions commenced in 2015 for a new Energy from Waste Facility to process residential municipal waste from the Aberdeen City, Aberdeenshire and Moray Council areas. SEPA would be the enforcing authority for industrial emissions at the new facility; however the local authority has responsibility for the assessment of the additional road traffic generated both during the construction and operational phases. A proportion of the additional traffic will pass through the Wellington Road AQMA, however the majority will access the site via the AWPR and the southern section of Wellington Road outwith the AQMA. A planning application, which will incorporate air quality and health impact assessments, is anticipated early in 2016.

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.

There are no new, existing or significantly changed industrial sources in Aberdeen City in 2015.

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 2015.

4.5 New Developments with Fugitive or Uncontrolled Sources

Construction of the Aberdeen Western Peripheral Route commenced in 2015. There is considerable scope during the construction phase for fugitive or uncontrolled particulate matter from exposed soil along the route. Due to the temporary and transient nature of construction operations emissions of any significance are not anticipated. The construction contractors utilise dust suppression system when required along the route.

Rock crushing and screening operations are also being carried out at processing areas in:

- Cranfield
- Boganjoss
- Kepplestone
- Rothnick
- Beanshill

The crushing/screening process is authorised by permit issued by the Scottish Environmental Protection Agency (SEPA). The Permits require dust suppression systems to be used to minimise the release of dust from the plant and also from any stockpiles and haul roads used for the transport of crushed material.

5. Planning Applications

5.1 Aberdeen Harbour, Nigg Bay

A new Harbour is proposed at Nigg Bay to the south of the existing Harbour to provide a deep berthing facility that can accommodate large multi-purpose vessels in the oil and gas sector and new business streams such as larger cruise ships and the decommissioning of oil and gas industry infrastructure. The existing Harbour will continue to operate.

Existing air quality in the vicinity of the proposed development is good and there is no risk of exceedances of the air quality objectives either during the operational or construction phases provided good management practices are adopted. The development will generate increased construction and operational road traffic within the Wellington Road and City Centre AQMAs. PM₁₀ concentrations are predicted to continue to exceed the annual mean air quality objectives at year of opening. Although compliance with the NO₂ annual objective is predicted, further sensitivity testing, assuming no improvement in vehicle exhaust emissions, predicted continued exceedance. These exceedances are predominantly caused by existing road traffic. Traffic associated with the proposed development is predicted to have a minor to negligible significant. Measures to mitigate against vehicle emissions will be considered at the detailed design stage. The Scottish Government will determine the planning application.

5.2 Union Square Retail Park proposed extension

A planning application was received to extend the existing Union Square retail park, including the provision of 863 additional car parking spaces. The retail park is located adjacent to Market Street and the majority of vehicles access the car park via the Market Street entrance. Approximately 1156 additional LGV trips associated with the proposed development are predicted on average each day on the south Market St/Virginia Street corridor within the City Centre AQMA, although this will be off-set, to a limited extent, by a decrease in road traffic associated with other proposed

transportation infrastructure improvement measures including the AWPR and Union Street pedestrianisation.

Concentrations of NO₂ and PM₁₀ were predicted to decrease by year of opening due to the proposed transportation infrastructure measures, however continued exceedance of the annual mean NO₂ objective was predicted across the City Centre AQMA. Air quality modelling predicted a maximum increase NO₂ concentration of 0.59% (max difference 0.36ug⁻³) with the proposed Development scenerio compared to the Without Development scenario. PM₁₀ concentrations were predicted to increase by no more than 0.3%. PM₁₀ concentrations were predicted to be slightly below the annual mean objective at year of opening. Using the Environmental Protection/LAQM Land Use and Planning Development Control: Planning for Air Quality (May 2015) the predicted development impact was classified as Slight to Moderate for NO₂ and Negligible to Slight for PM₁₀.

The provision of extensive additional city centre car parking is contrary to a number of Aberdeen City Council planning policies including the Local Development Plan 2014, Air Quality Action Plan 2011, the Local Transport Strategy 2016-2021 and the City Centre Masterplan. The application will be determined in 2016.

5.3 Aberdeen Exhibition and Conference Centre, Bucksburn

A new Exhibition and Conference Centre, incorporating hotels, leisure facilities and an energy centre is proposed on the A96 approximately 1.5km from the commencement of the A96 Anderson Dr/Haudigain Roundabout/Auchmill Road AQMA and 3km from Haudigain roundabout. Existing air quality in the vicinity of the site is good and there is no risk of exceedance of the air quality objectives at this location. The AWPR and proposed Haudagain roundabout infrastructure improvements are predicted to significantly reduce traffic flow and congestion in the wider area. The air quality assessment predicted compliance with the objectives at all locations by 2018 and a negligible impact on sensitive receptors, including receptors within the AQMA.

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

Data from the Union Street continuous monitoring station and diffusion tubes confirmed NO₂ concentrations within the City Centre AQMA continue to exceed the annual mean objective. However, NO₂ levels at both Union Street and Market Street have been decreasing since 2012. The NO₂ annual mean data was below the objective at the Market Street continuous monitoring site, the first time this has occurred since monitoring at the site commenced in 2011.

The annual mean and 24 hour PM₁₀ objectives were met at Union Street. The objectives were exceeded on Market Street, however the levels were significantly lower than the last couple of years and there has been a downward trend in concentrations over the last 5 years. Co-location of PM₁₀ monitoring equipment at Market Street has commenced to assess the impact of meteorological effects on data from BAM and Fidas monitoring equipment. Details of the study will be reported in the 2017 Annual Progress Report.

Annual mean NO₂ and PM₁₀ concentrations at both the Anderson Drive and Errol Place continuous monitoring stations remain below the annual mean objectives. Although the Anderson Drive site is within the Anderson Drive/Haudigan roundabout/Auchmill Road AQMA, diffusion tube values along the route continue to exceed the annual mean objective at specific locations indicating the AQMA remains valid.

There has also been a downward trend in annual mean concentration at the Wellington Road continuous monitoring site. The recorded level of 40 µg/m³ in 2015 is the lowest value since monitoring commenced in 2011 and is on the threshold of the objective.

The non automatic monitoring on Wellington Road also recorded NO₂ levels below the annual mean objective.

PM₁₀ concentrations exceed the annual mean air quality objectives at Wellington Road. However the 5 year trend is a reduction in concentrations.

There were no exceedances of the NO₂ one hour mean objective at any of the automatic sites. Diffusion tube data also recorded no sites with an annual mean >60ugm⁻³ suggesting exceedances of the 1 hour objective were unlikely across the city.

The annual mean PM₁₀ objective was not exceeded at the King Street continuous monitoring station in 2015 although exceedances have been recorded in previous years. Concentrations from the BAM monitor at this location may be elevated during prolonged periods of heavy rain and sea mist. The colocation study at Market Street may assist identifying the impact of meteorological conditions.

Exceedances of the PM_{2.5} annual mean were recorded at Union Street and Market Street continuous monitoring stations. This is the first year monitoring was carried out at these locations. The annual mean PM₁₀ levels at King Street and Wellington Road continuous stations also suggest PM_{2.5} levels are likely to exceed the objective at these locations. Monitoring will continue, to assess if further action is required. It is also intended to update the particulate monitoring equipment at Wellington Road with new replacement equipment capable of monitoring PM₁₀ and PM_{2.5}.

There were no exceedances of the objectives at any locations outwith the AQMAs.

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

6.2 Conclusions relating to New Local Developments

Both the proposed new Aberdeen Harbour and extension to the Union Square retail park have the potential to impact on the existing City Centre and/or Wellington Road AQMAs.

A potential new Harbour at Nigg Bay is of regional economic significance. Should planning permission be granted, the nature and scale of the development will enable the exploration of potential measures to mitigate against road transport related pollution during the detailed design stage.

Significant additional parking provision associated with the proposed Union Square retail park expansion will, should planning permission be granted, directly impact on parts of the City Centre AQMA, particularly the Market St/Virginia St corridor. While the additional traffic may not significantly increase pollution concentrations, the increased traffic flow is contrary to Council planning policy and would adversely impact on the Council's ability to achieve the air quality objectives.

6.3 Proposed Actions

- New monitoring data has identified new exceedances of the PM_{2.5} annual mean objective in the existing city centre AQMA for PM₁₀. This is the first year data has been available in these areas and therefore monitoring will continue to establish if action is required.
- Proposed major road developments including the Haudagain roundabout and Berryden Corridor improvements will require detailed assessments for NO₂ and PM₁₀.
- New monitoring data has not identified a need for any other additional monitoring or changes to the existing AQMAs and no other LAQM Tasks have been identified.

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- Continue monitoring (non automatic) near sensitive receptors along the route of the 3rd Don Crossing (due to open in 2016) and the existing road network where traffic flows are expected to reduce.
- Continue monitoring (non automatic) near sensitive receptors along the route of the proposed Berryden corridor.
- Update the existing particulate monitoring equipment at Wellington Road by replacing with equipment capable of monitoring PM₁₀ and PM_{2.5}.
- Report on the PM₁₀ monitoring co-location study undertaken at the continuous monitoring site located at Market Street in the next annual progress report.
- Review and update the air quality provisions within in the 2012 Local Development Plan and Supplementary Planning Guidance, which is currently being refreshed, and ensure air quality issues are included within other relevant Council policies;
- Ensure potential air quality impacts are considered, and potential benefits fully realised, during the design of proposed transportation infrastructure improvements including the Haudagain roundabout upgrade, Berryden corridor improvements, partial/total pedestrianisation of Broad Street and the pedestrianisation of Union Street. These improvements provide an opportunity to significantly improve air quality within the AQMAs, however potential negative impacts from the dispersion and re-routing of traffic also needs consideration.
- Continued implementation of the Actions within the Air Quality Action Plan 2011
- Submit the next air quality progress report.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
CM1	Errol Place	Background	X394397	Y807392	PM ₁₀ , PM _{2.5} , O ₃ , NO ₂ (NO, NO _x)	N	TEOM FDMS Chemiluminescence	N/A	N/A	3
CM2	Union Street	Roadside	X393656	Y805967	PM ₁₀ , NO ₂ (NO, NO _x)	Y	Dichotomous Monitor FDMS Chemiluminescence	2	2m	2.5
CM3	Market Street	Roadside	X394560	Y805677	PM ₁₀ , PM _{2.5} NO ₂ (NO, NO _x)	Y	BAM/Fidas 200 ⁽³⁾ Chemiluminescence	0	2m	1.5
CM4	Anderson Drive	Roadside	X392506	Y804186	PM ₁₀ , NO ₂ (NO, NO _x)	Y	TEOM Chemiluminescence	10	6m	1.5
CM5	Wellington Road	Roadside	X394395	Y804779	PM ₁₀ , NO ₂ (NO, NO _x)	Y	TEOM Chemiluminescence	5	4m	1.5
CM6	King Street	Roadside	X394333	Y808770	PM ₁₀ , NO ₂ (NO, NO _x)	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.

(3) Fidas 200 installed 30 September 2015. Monitors PM₁₀ and PM_{2.5}.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?
DT1	Bucksburn Primary Sch, Inverurie Road	Roadside	389744	809575	NO ₂	Y	0	8	N
DT2	885 Gt Northern Rd	Roadside	391151	809161	NO ₂	Y	11	3	N
DT3	549 N Anderson Dr	Roadside	391387	808959	NO ₂	Y	17	3	N
DT4	38 Ellon Rd	Roadside	394652	809714	NO ₂	N	7	3	N
DT5	520 King St	Roadside	394236	808066	NO ₂	N	9	0.1	N
DT6	86 Victoria Rd, Torry	Roadside	394764	805197	NO ₂	N	0	3	N
DT7	Wellington Rd//Kerloch Pl	Roadside	394411	804407	NO ₂	Y	0	3	N
DT8	107 Anderson Dr	Roadside	392337	804340	NO ₂	Y	14	3	N
DT9	39 Market St	Roadside	394264	806146	NO ₂	Y	0	3	N
DT10	184/192 Market St	Roadside	394530	805708	NO ₂	Y	0	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) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?
DT11	105 King St	Roadside	394406	806637	NO ₂	Y	0	3	N
DT12	40 Union St	Roadside	394283	806286	NO ₂	Y	0	3	N
DT13	Music Hall, Union St	Roadside	393777	806030	NO ₂	Y	0	6	N
DT14	Dyce Prim, Gordon Ter	Urban background	389046	812794	NO ₂	N	(N/A)	N/A	N
DT15	Northfield swimming pool	Urban background	390801	808132	NO ₂	N	(N/A)	N/A	N
DT16	1 Trinity Quay	Roadside	394336	806097	NO ₂	Y	0	5	N
DT17	43/45 Union St	Roadside	394273	806255	NO ₂	Y	0	3	N
DT18	14 Holburn St	Roadside	393305	805734	NO ₂	Y	0	3	N
DT19	468 Union St	Roadside	393386	805826	NO ₂	Y	0	3	N
DT20	212 King St	Roadside	394400	806842	NO ₂	N	0	4	N
DT21	26 King St	Roadside	394449	806453	NO ₂	Y	0	4	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?
DT22	104 King St	Roadside	394425	806634	NO ₂	Y	0	4	N
DT23	785 Gt Northern Rd	Roadside	391458	809102	NO ₂	N	0	3	N
DT24	40 Auchmill Rd	Roadside	389930	809603	NO ₂	N	0	3	N
DT25	21 Holburn St	Roadside	393332	805748	NO ₂	Y	0	3	N
DT26	147 Holburn St	Roadside	393214	805367	NO ₂	N	0	3	N
DT27	80 Holburn St	Roadside	393233	805565	NO ₂	Y	0	3	N
DT28	61 Holburn St	Roadside	393275	805624	NO ₂	Y	5	3	N
DT29	469 Union St	Roadside	393400	805811	NO ₂	Y	0	3	N
DT30	209 Union St	Roadside	393619	805919	NO ₂	Y	0	5	N
DT31	249 Holburn St	Roadside	393170	805120	NO ₂	Y	0	5	N
DT33	East North St	Roadside	394505	806531	NO ₂	Y	0	4	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?
DT34	404 King Street	Roadside	394317	807527	NO ₂	N	0	9	N
DT36	115 Menzies Rd/Wellington Rd	Roadside	394403	804799	NO ₂	Y	12	1	N
DT37	137 Wellington Road	Roadside	394697	803735	NO ₂	N	17	14	N
DT39	819 Gt Northern Rd	Roadside	391293	809136	NO ₂	Y	0	3	N
DT40	852 Fullerton Ct (facade)	Facade	391353	809158	NO ₂	Y	0	7	N
DT41	852 Fullerton Ct (roadside)	Roadside	391352	809151	NO ₂	Y	7	0.1	N
DT45	111 S Anderson Dr	Facade	392311	804349	NO ₂	Y	0	13	N
DT46	West North Street	Roadside	394277	806671	NO ₂	Y	0	4	N
DT47	Powis Terrace	Roadside	393368	807511	NO ₂	N	5	0.1	N
DT48	139 Gt. Northern Road	Roadside	393089	808229	NO ₂	N	10	0.1	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?
DT49	142 Gt. Northern Road	Roadside	392969	808460	NO ₂	N	11	3	N
DT50	St. Machar Dr/Dunbar St.	Roadside	394015	808483	NO ₂	N	6	0.1	N
DT51	Gordon Mills Road/10 Meadow Place	Roadside	393111	809287	NO ₂	N	12	2	N
DT52	90 Tillydrone Av	Roadside	393342	809066	NO ₂	N	6	0.1	N
DT53	47 Tillydrone Av	Roadside	393581	808740	NO ₂	N	9	0.1	N
DT54	36 - 38 School Road	Roadside	394358	808434	NO ₂	N	14	2	N
DT55	Ellon Road/Balgownie Crescent	Roadside	394629	809740	NO ₂	N	9	2	N
DT56	Fairview Drive	Urban Background	392239	810163	NO ₂	N	N/A	N/A	N
DT57	Park Place/Constitution St	Roadside	394628	806692	NO ₂	N	16	0.1	N
DT58	47 Tillydrone Av	Roadside	393584	808729	NO ₂	N	8	4	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?
DT61	21 Skene Square	Roadside	393543	806684	NO ₂	N	0	2	N
DT62	35 Chestnut Row	Urban Background	392903	807302	NO ₂	N	N/A	N/A	N
DT63	93 Berryden Road	Roadside	393034	807392	NO ₂	N	11	2	N
DT64	102 Picktillum Place	Urban Background	393025	807828	NO ₂	N	N/A	N/A	N
CL1	Errol Place	Background	394397	807392	NO ₂	N	N/A	N/A	Y
CL2	Union Street	Roadside	393656	805967	NO ₂	Y	2	2	Y
CL3	Market Street	Roadside	394560	805677	NO ₂	Y	0	2	Y
CL4	Anderson Drive	Roadside	392506	804186	NO ₂	Y	10	6	Y
CL5	Wellington Road	Roadside	394395	804779	NO ₂	Y	5	4	Y
CL6	King Street	Roadside	394333	808770	NO ₂	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 NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2011	2012	2013	2014	2015
CM1	Background	Automatic		99	23	21	20 ⁽⁴⁾	21	23
CM2	Roadside	Automatic		99	44	53	48	47	46
CM3	Roadside	Automatic		94	40	44	43	40	36
CM4	Roadside	Automatic		64	23	30	22	26 ⁽⁴⁾	22
CM5	Roadside	Automatic		93	51	59	52	48 ⁽⁴⁾	40
CM6	Roadside	Automatic		93	32	29	28	27	28
DT1	Roadside	Diffusion Tube		83	33	34	31.6	32.7	31.9
DT2 ⁽⁵⁾	Roadside	Diffusion Tube		92	41	40	42	38.2	34.4
DT3 ⁽⁵⁾	Roadside	Diffusion Tube		92	28	29	27.5	26.7	24.8
DT4 ⁽⁵⁾	Roadside	Diffusion Tube		100	40	37	34.8	29.6	35.5

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2011	2012	2013	2014	2015
DT5 ⁽⁵⁾	Roadside	Diffusion Tube		92	30	29	28.4	24.9	25.3
DT6	Roadside	Diffusion Tube		92	33	41	34.4	35	31.3
DT7	Roadside	Diffusion Tube		100	45	42	46.3	45.6⁽⁴⁾	37.5
DT8 ⁽⁵⁾	Roadside	Diffusion Tube		100	42	46	39.1 ⁽⁴⁾	33.1	33.5
DT9	Roadside	Diffusion Tube		92	52	59	57.6	57.5	50.9
DT10	Roadside	Diffusion Tube		100	<u>64</u>	<u>71</u>	<u>70.4</u>	53.9	56.1
DT11	Roadside	Diffusion Tube		83	<u>63</u>	<u>62</u>	<u>64.7</u>	55.3	54.4
DT12	Roadside	Diffusion Tube		92	51	57	54.3	51.3	49.8
DT13	Roadside	Diffusion Tube		100	42	48	43.4	40.5	41.0
DT14	Urban background	Diffusion Tube		100	9	10	12.9 ⁽⁶⁾	10.5	10.0
DT15	Urban background	Diffusion Tube		100	11	13	14.5 ⁽⁶⁾	16.5	13.4

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2011	2012	2013	2014	2015
DT16	Roadside	Diffusion Tube		92	46	54	52.3	48.6	45.4
DT17	Roadside	Diffusion Tube		92	55	54	58.2	55	51.8
DT18	Roadside	Diffusion Tube		92	55	<u>61</u>	50.1	47.5	50.2
DT19	Roadside	Diffusion Tube		100	54	<u>61</u>	54.9	51.4	53.3
DT20	Roadside	Diffusion Tube		100	37	36	35.8	33.3	34.9
DT21	Roadside	Diffusion Tube		83	43	43	44.5	43.3	45.8
DT22	Roadside	Diffusion Tube		92	48	49	51.1	45.2	44.1
DT23 ^(5,7)	Roadside	Diffusion Tube		0	32	33	27.6	37.2	n/a
DT24	Roadside	Diffusion Tube		100	41	47	39.8 ⁽⁴⁾	28.8	32.8
DT25	Roadside	Diffusion Tube		100	47	55	40.5	50.3	45.4
DT26	Roadside	Diffusion Tube		100	31	33	31.7	28.7	25.5

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2011	2012	2013	2014	2015
DT27	Roadside	Diffusion Tube		92	31	33	31.6 ⁽⁴⁾	28.4	28.3
DT28 ⁽⁵⁾	Roadside	Diffusion Tube		83	38	44b	40.5	40.1	36.4
DT29	Roadside	Diffusion Tube		100	<u>63</u>	56	<u>63.3</u>	57.9	58.2
DT30	Roadside	Diffusion Tube		100	57	55⁽⁶⁾	56.1	53.4	50.9
DT31	Roadside	Diffusion Tube		83	35	38	37.2	33.2	32.1
DT33	Roadside	Diffusion Tube		100	51	52	51	44.5	46.4
DT34	Roadside	Diffusion Tube		92	35	33	33.9	31.2	29.2
DT36 ⁽⁵⁾	Roadside	Diffusion Tube		92	31	48	43.4	41	37.8
DT37 ⁽⁵⁾	Roadside	Diffusion Tube		100	31	36	30.9	26.9	28.8
DT39	Roadside	Diffusion Tube		100	55	55	<u>69⁽⁴⁾</u>	<u>63.8</u>	54.2
DT40	Facade	Diffusion Tube		25	36	36	36	36.6	39.0 ⁽³⁾

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2011	2012	2013	2014	2015
DT41 ⁽⁵⁾	Roadside	Diffusion Tube		100	22	30	25.4	26.4	29.5
DT45	Facade	Diffusion Tube		100	29	36	37.1	42.4	41.7
DT46	Roadside	Diffusion Tube		100	N/A	30	33	30.4	30.1
DT47 ⁽⁵⁾	Roadside	Diffusion Tube		100	n/a	n/a	38.8	33.2	32.9
DT48 ⁽⁵⁾	Roadside	Diffusion Tube		100	n/a	n/a	25.9	23.2	23.2
DT49 ⁽⁵⁾	Roadside	Diffusion Tube		100	n/a	n/a	37.5	29.1	28.7
DT50 ⁽⁵⁾	Roadside	Diffusion Tube		100	n/a	n/a	25.3	22.8	22.7
DT51 ⁽⁵⁾	Roadside	Diffusion Tube		33	n/a	n/a	17.4	16.3	15.5 ⁽³⁾
DT52 ⁽⁵⁾	Roadside	Diffusion Tube		67	n/a	n/a	16.8	15.6	16.5 ⁽³⁾
DT53 ⁽⁵⁾	Roadside	Diffusion Tube		25	n/a	n/a	22.3	19.2	18.5 ⁽³⁾
DT54 ⁽⁵⁾	Roadside	Diffusion Tube		92	n/a	n/a	24.3	21.9	21.9

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2011	2012	2013	2014	2015
DT55 ⁽⁵⁾	Roadside	Diffusion Tube		100	n/a	n/a	31.3	28.1	26.9
DT56	Urban Background	Diffusion Tube		100	n/a	n/a	14.8	13.7	12.0
DT57 ⁽⁵⁾	Roadside	Diffusion Tube		92	n/a	n/a	33	30.3	30.7
DT58 ⁽⁵⁾	Roadside	Diffusion Tube		33	n/a	n/a	n/a	n/a	26 ⁽³⁾
DT61	Roadside	Diffusion Tube		25	n/a	n/a	n/a	n/a	35.9 ⁽³⁾
DT62	Urban Background	Diffusion Tube		33	n/a	n/a	n/a	n/a	14.5 ⁽³⁾
DT63 ⁽⁵⁾	Roadside	Diffusion Tube		33	n/a	n/a	n/a	n/a	26 ⁽³⁾
DT64	Urban Background	Diffusion Tube		17	n/a	n/a	n/a	n/a	16.9 ⁽³⁾

Notes: Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 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.
- (7) Tube DT23 No data available in 2015 due to tube located in incorrect place.

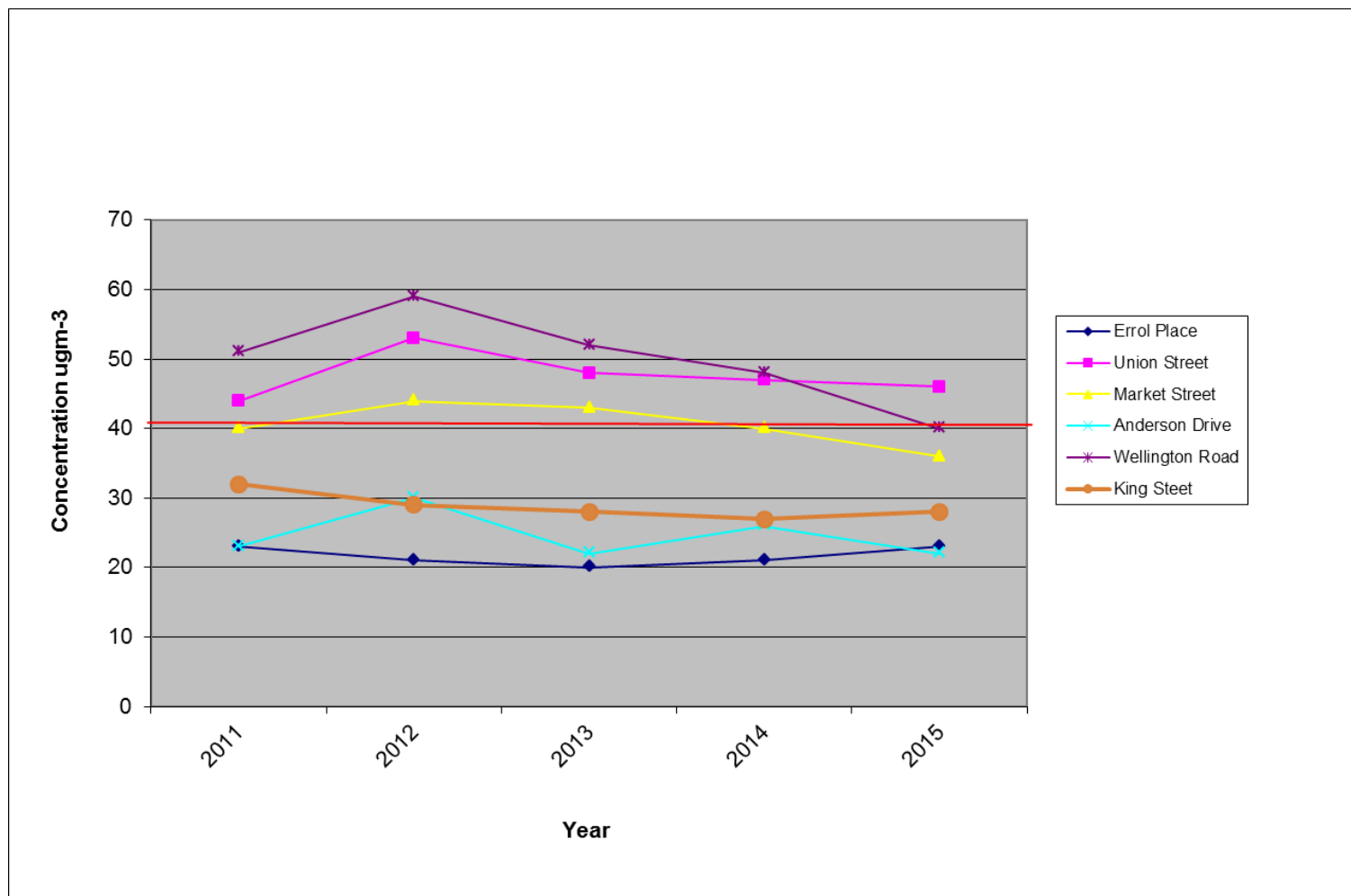
Figure A.1: Trend in NO₂ Annual Mean Concentration (µg/m³) Continuous Monitoring Sites 2011 - 2015

Table A.4 – 1-Hour Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
					2011	2012	2013	2014	2015
CM1	Background	Automatic		99	0	0	0 (86)	0	1
CM2	Roadside	Automatic		99	6(168)	1	0	0	3
CM3	Roadside	Automatic		94	1	0	1	0	0
CM4	Roadside	Automatic		64	0	0	0	0(111)	0(109)
CM5	Roadside	Automatic		93	4	10	6	0(163)	0
CM6	Roadside	Automatic		93	0	0(108.4)	0	0	0

Notes: Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

(3) If the period of valid data is less than 90%, the 99.8th percentile of 1-hour means is provided in brackets.

Table A.5 – Annual Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2011	2012	2013	2014	2015
CM1	Background		97	14	12	13	15	12
CM2	Roadside		61	22	21	20	18	17
CM3	Roadside		96	22	23	26	26	19
CM4	Roadside		90	16	15	15	15	13
CM5	Roadside		93	24	23	22	21	20
CM6	Roadside		93	19	19	19	19	17

Notes: Exceedances of the PM₁₀ annual mean objective of 18µg/m³ 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.

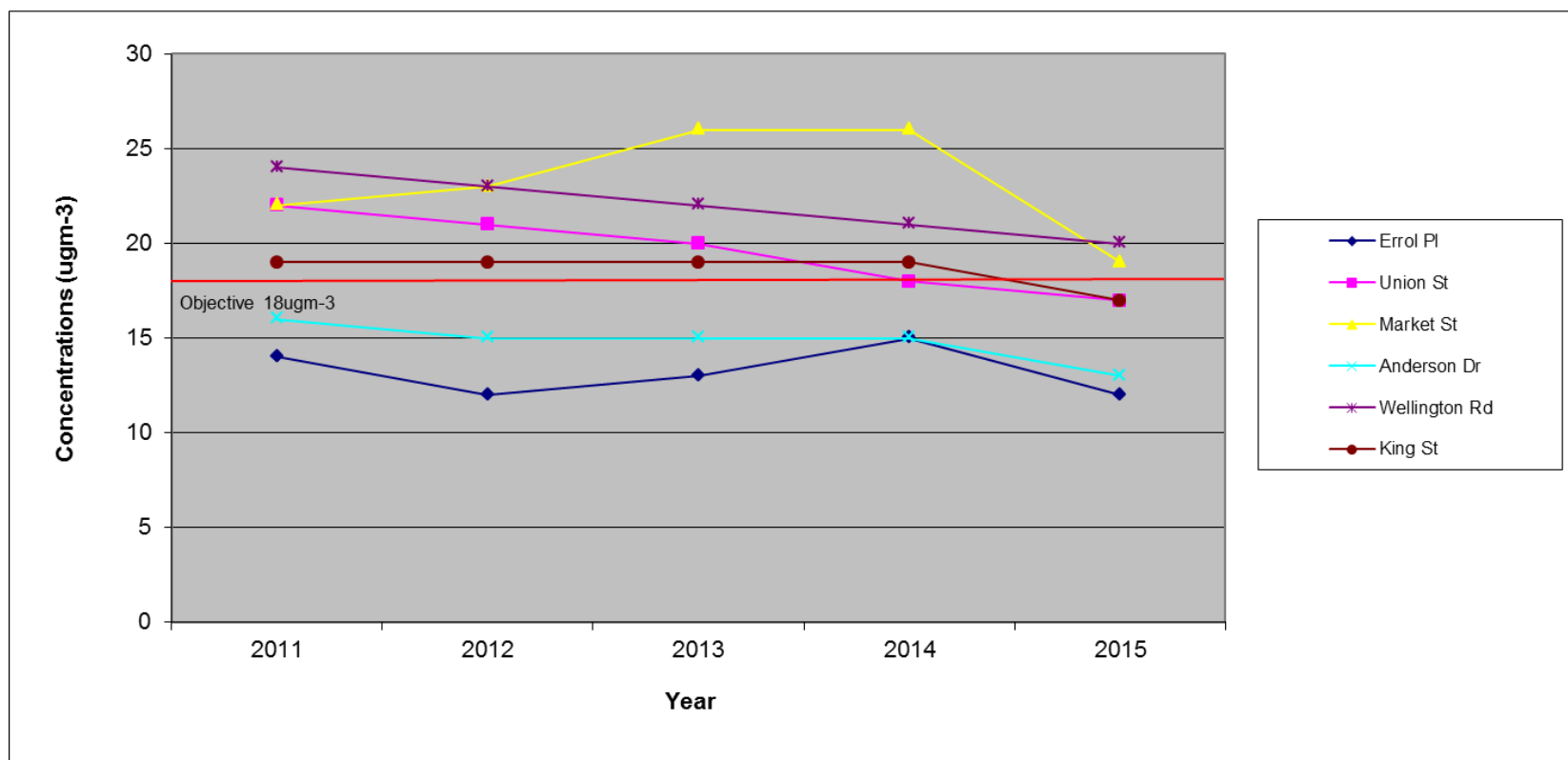
Figure A.2: Trend in PM₁₀ Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) Continuous Monitoring Sites 2011 - 2015

Table A.6 – 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM ₁₀ 24-Hour Means > 50µg/m ³ (3)				
				2011	2012	2013	2014	2015
CM1	Background		97	1	1	1 (42)	0	4
CM2	Roadside		61	4	3	4	0 (32) ⁽⁴⁾	4(49)
CM3	Roadside		96	15	15(71.1)	59	22	12
CM4	Roadside		90	0	0	1	0	2
CM5	Roadside		93	8	10	7	2	16
CM6	Roadside		93	7(38)	6	4	5	8

Notes: Exceedences of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 7 times/year) are shown in **bold**.

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

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

(3) If the period of valid data is less than 90%, the 98.08th percentile of 24-hour means is provided in brackets.

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

Table A.7 – Annual Mean PM_{2.5} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	PM _{2.5} Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2011	2012	2013	2014	2015
CM1	Background		88	8	9	9	10	8
CM2	Roadside		83	n/a	n/a	n/a	n/a	11
CM3	Roadside		25	n/a	n/a	n/a	n/a	11

Notes: Exceedences of the PM_{2.5} annual mean objective of 10µg/m³ 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 2015

Table B.1 – NO₂ Monthly Diffusion Tube Results for 2015

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted ⁽¹⁾
DT1	40	38	45	43	39	34	-	-	36	38	37	21	37.1	31.9
DT2	48	45	54	64	45	50	55	54	59	50	-	38	51.1	34.4
DT3	28	31	33	42	38	34	38	39	39	43	-	32	36.1	24.8
DT4	57	49	67	53	47	37	39	31	43	41	58	47	47.4	35.5
DT5	44	43	55	39	37	33	34	-	37	41	49	35	40.6	25.3
DT6	42	41	42	37	36	33	-	33	33	37	34	32	36.4	31.3
DT7	44	46	53	46	44	35	39	42	44	47	49	34	43.6	37.5
DT8	68	67	69	35	39	28	28	30	66	64	75	55	52.0	33.5
DT9	53	47	58	58	70	55	60	58	69	59	64	-	59.2	50.9
DT10	74	70	73	68	70	58	66	61	58	65	69	51	65.3	56.1
DT11	68	70	72	48	67	59	44	60	-	67	77	-	63.2	54.4
DT12	59	-	65	59	62	49	57	56	52	62	64	52	57.9	49.8
DT13	60	54	55	48	51	48	45	43	39	43	49	37	47.7	41.0
DT14	18	17	18	14	11	7	7	6	9	8	16	21	12.7	10.0

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted ⁽¹⁾
DT15	15	19	23	23	17	10	12	13	15	15	21	20	16.9	13.4
DT16	51	48	57	-	53	50	43	52	52	50	64	61	52.8	45.4
DT17	57	53	62	64	-	57	57	60	65	58	70	59	60.2	51.8
DT18	68	58	67	63	58	54	55	45	43	59	-	72	58.4	50.2
DT19	78	71	65	67	67	61	54	50	53	55	61	62	62.0	53.3
DT20	47	44	48	43	39	33	33	30	38	38	43	51	40.6	34.9
DT21	47	45	73	50	45	39	48	48	-	52	-	85	53.2	45.8
DT22	-	44	48	69	50	41	60	46	54	49	54	49	51.3	44.1
DT24	49	46	46	38	39	34	34	29	29	35	32	46	38.1	32.8
DT25	47	44	56	58	57	52	45	52	65	50	55	53	52.8	45.4
DT26	33	27	36	35	27	24	27	25	24	28	36	34	29.7	25.5
DT27	35	-	39	38	34	28	27	29	30	29	38	35	32.9	28.3
DT28	42	40	47	50	-	36	50	40	-	39	48	51	44.3	36.4
DT29	76	69	73	75	67	63	64	61	60	54	73	77	67.7	58.2
DT30	79	44	69	70	65	54	50	51	57	37	66	68	59.2	50.9
DT31	41	37	42	37	40	29	31	35	37	-	44	-	37.3	32.1
DT33	59	55	64	57	49	45	46	49	53	49	61	60	53.9	46.4

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted ⁽¹⁾
DT34	45	38	-	36	33	24	23	24	31	33	41	45	33.9	29.2
DT36	55	52	58	58	56	43	60	53	-	51	54	56	54.2	37.8
DT37	42	42	45	34	36	27	31	28	32	31	23	40	34.3	28.8
DT39	74	63	80	58	62	61	63	57	64	61	58	55	63.0	54.2
DT40	50	52	-	-	-	-	-	-	34	-	-	-	45.3	39.0
DT41	71	49	61	67	57	48	48	41	53	53	67	69	57.0	29.5
DT45	66	28	38	61	73	55	62	71	32	34	29	33	48.5	41.7
DT46	38	37	46	48	36	24	26	27	32	30	39	37	35.0	30.1
TDC/1	58	60	60	43	48	54	53	57	51	68	60	57	55.8	32.9
TDC/2	40	42	41	37	33	36	30	35	35	43	44	35	37.6	23.2
TDC/3	41	40	38	40	32	38	33	36	40	45	51	45	39.9	28.7
TDC/4	36	40	31	29	25	27	23	28	33	37	38	30	31.4	22.7
TDC/5	25	24	25	19	-	-	-	-	-	-	-	-	23.3	16.5
TDC/6	-	-	-	19	12	19	17	16	20	21	26	-	18.8	18.5
TDC/7	30	28	29	-	-	-	-	-	-	-	-	-	29.0	21.9
TDC/8	32	41	34	29	23	22	18	23	22	-	33	31	28.0	21.9
TDC/9	35	40	42	37	31	39	32	36	34	40	50	37	37.8	26.9

Site ID	NO ₂ Mean Concentrations (µg/m ³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted ⁽¹⁾
TDC/10	19	18	17	14	11	12	9	12	11	19	22	19	15.3	12.0
TDC/11	41	44	43	36	33	30	28	39	-	45	46	42	38.8	30.7
TDC/12	-	-	-	-	-	-	-	22	18	31	-	30	25.3	26
BC1	-	-	-	-	-	-	-	-	48	-	50	60	52.7	35.9
BC2	-	-	-	-	-	-	-	-	14	15	23	24	19.0	14.5
BC3	-	-	-	-	-	-	-	-	33	29	37	44	35.8	26.0
BC4	-	-	-	-	-	-	-	-	-	-	25	30	27.5	16.9

(1) See Appendix C for details on bias adjustment and annualisation

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

QA/QC of Diffusion Tube Monitoring

Diffusion tube monitoring is carried in accordance with the procedures contained in the guidance 'Diffusion Tubes for Ambient NO₂ 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 2m above ground level and exposed for 4 weeks. 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.

96.9% of results were satisfactory (z-score < ± 2), 100 % were within (z-score < ± 3). 1 of the 32 results was in the "warning" category during the period April 2015 to March 2016.

The laboratory participates monthly in the nitrogen dioxide "inter comparison" exercise, managed by the National Physical Laboratory. All results in April 2015 were satisfactory and the annual summary (produced by AEA Energy & Environment) indicates that the results were classified as "Good" throughout 2015 with a "Bias Correction Factor A" of 0.84.

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 the 20%).

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

Table C.1: Bias Factor Calculations

Type	DT Mean ($\mu\text{g m}^{-3}$)	CM Mean ($\mu\text{g m}^{-3}$)	Bias Factor A	Bias B (%)	CM Data Capture for periods used (%)	No Monitoring Periods
Errol Place	29	23	0.79	27	99	13
Union Street	54	47	0.86	16	99	13
Wellington Road	43	41	0.94	6	93	13
King Street	33	28	0.84	19	93	13
Market Street	45	36	0.81	23	95	13
Anderson Drive	26	22	0.87	15	93	9

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. Although only 9 monitoring periods of data were available from the Anderson Drive site its inclusion in the adjustment does not influence the factor derived.

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 and Union Street 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 NO₂.

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 2015 for diffusion tubes and automatic monitoring sites. Annualisation was carried out in accordance with LAQM TG (16). Table C.2 details annualisation of diffusion tube data and Table C.3 details annualisation of continuous monitoring data.

Table C.2: Annualising diffusion tube data 2015

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 ⁽¹⁾ (M x Ra)
TDC/5	Roadside	NO ₂ Annual Mean	33	23.3	3/12/14 to 1/4/15	22.8	28.6	0.80	18.6
TDC/6	Roadside	NO ₂ Annual Mean	67	18.8	4/3/15 to 28/10/15	22.8	19.5	1.17	21.9
TDC/7	Roadside	NO ₂ Annual Mean	25	29	3/12/14 to 4/3/15	22.8	29.6	0.77	22.4
TDC/12	Roadside	NO ₂ Annual Mean	33	25.3	1/7/15 to 30/9/15 and 28/10/15 to 2/12/15	22.8	16.9	1.35	32
BC1	Roadside	NO ₂ Annual Mean	25	52.7	29/7/15 to 26/8/15 and 30/9/15 to 2/12/15	22.8	28.8	0.79	41.8

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 ⁽¹⁾ (M x Ra)
BC2	Urban Background	NO2 Annual Mean	33	19.0	29/7/15 to 2/12/15	22.8	23.6	0.97	18.4
BC3	Roadside	NO2 Annual Mean	33	35.8	29/7/15 to 2/12/15	22.8	23.6	0.97	34.7
BC4	Urban Background	NO2 Annual Mean	17	27.5	30/9/15 to 2/12/15	22.8	29.3	0.78	21.4

(1) Estimate of annual mean at monitoring site before bias correction and adjustment at nearest relevant receptor where required.

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.3: Annualising Continuous Monitoring Data 2015

Site ID	Location	Type	Data	Data Capture 2015 (%)	Measured Mean (M)	Period of data	Errol PI Data capture for period	Errol PI Annual Mean (Am)	Errol PI Period Mean (Pm)	Ratio Am/Pm (Ra)	Estimate of annual mean at monitoring site (M x Ra)
CM3	Market Street	Roadside	PM _{2.5} Annual Mean Concentration	25	8	30 Sept to 31 Dec	78	8	5.82	1.38	11
CM2	Union Street	Roadside	PM ₁₀ Annual Mean Concentration	61	17	1 Jan to 2 June 1 Oct to 31 Dec	99	12	12.3	0.98	17
CM4	Anderson Drive	Roadside	NO ₂ Annual Mean Concentration	64	22	1 Jan to 18 Feb 15 Jun to 31 Dec	98	23	25.91	0.89	20

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.4 Diffusion Tube concentrations showing calculations to façade (2015)

Site ID	Bias Measured Conc	Background Conc	Dist to kerb (m)	Dist façade (m)	Façade Concentration (ugm-3)
	Cy	Cb	Dy	Dz	Cz
2	43.9	15.6	3	11	34.4
3	31.0	17.1	3	17	24.8
4	40.8	16.7	3	7	35.5
5	34.9	19.4	0.1	9	25.3
8	44.7	16.7	3	14	33.5
28	38.1	24.9	3	5	36.4
36	46.6	25.6	1	8	37.8
37	29.5	22.9	10	13	28.8
41	49.0	15.6	0.1	7	29.5
TDC/1	47.9	20.1	0.1	5	32.9
TDC/2	32.3	18	0.1	10	23.2
TDC/3	34.3	17.7	3	11	28.7
TDC/4	27.0	19.4	0.1	6	22.7
TDC/5	16.0	14.7	2	12	15.5
TDC/6	18.8	14.7	0.1	6	16.5
TDC/7	19.3	18	0.1	9	18.5
TDC/8	24.1	19.4	2	14	21.9
TDC/9	32.5	16.7	2	9	26.9
TDC/11	33.4	29.6	0.1	16	30.7
TDC/12	27.52	18	4	8	26
BC3	29.8	20.1	2	11	26.0

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 2015 Anderson Drive and Wellington Road was corrected to gravitational equivalent by AEA using the Volatile Correction Model (VCM). Data from the BAMs at King Street and Market Street were also corrected by RAEA Technology (RAEA) using a gravitational factor of 0.83333 at King Street and 0.9662 at Market Street for Gravitational Equivalent. The factors are different due to Market Street BAM having a heated inlet.

Table C.5 Estimating PM_{2.5} concentrations from PM₁₀ monitoring

Monitoring Site	PM_{2.5} (µg/m³)	PM₁₀ (µg/m³)	Ratio PM_{2.5}/PM₁₀
Errol Place	8	12	0.67
Union Street	11	17	0.65
		Average	0.66

Note: Although PM_{2.5} and PM₁₀ monitoring data is available from Market Street site the data has not been used in obtaining the estimation ratio due to insufficient PM_{2.5} data capture in 2015.

Glossary of Terms

Abbreviation	Description
ACC	Aberdeen City Council
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
APR	Air quality Annual Progress Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
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
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide

References

- 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 Aberdeen City Council Updating and Screening Assessment June 2015
- 10 Aberdeen Real Time Vehicle Emission Measurement and Analysis 2016