Annual Progress Report (APR)

2018 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 2018

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Executive Summary: Air Quality in Our Area

Air Quality in Aberdeen City

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

The main pollutants of concern in Aberdeen City are nitrogen dioxide (NO_2) and particulate matter (PM_{10}), related to road traffic emissions.

In 2017 the annual mean NO_2 level continued to exceed the national air quality objective across the City Centre Air Quality Management Area (AQMA) although concentrations were again lower than previous years. The concentration at the Wellington Road continuous monitoring station was below the objective for the first time and no exceedances were recorded at diffusion tube sites in or adjacent to the Wellington Road AQMA. Pockets of exceedances were recorded within the Anderson Drive/Haudagain Roundabout/Auchmill Road AQMA.

Levels of NO_2 recorded at Skene Square in 2016 were at the objective level indicating potential exceedances of the annual mean objective in an area out with an existing AQMA. Further diffusion tube monitoring at an additional two sites commenced in 2017. The annualised data from the monitoring in the area recorded concentrations just below or at the objective level. Major transportation infrastructure measures with an anticipated commencement date of 2020 will be implemented around Berryden Road and the Skene Square area to improve travel connectivity, reduce congestion and impact on air quality at this location. An air quality assessment is currently being carried out as part of the development scope.

There were no exceedances of the NO_2 one hour objective at any of the monitoring locations.

There were no exceedances of the $PM_{2.5}$ annual mean objective. $PM_{2.5}$ monitoring equipment was installed at Wellington Road towards the end of 2016 and at the King Street continuous monitoring station in June 2017.

There were no exceedances of the annual or 24 hour mean PM_{10} objectives. Concentrations at all sites were significantly reduced compared to previous years, continuing the trend of improving air quality.

Actions to Improve Air Quality

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

Active Travel

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

Delivery of the Aberdeen City Centre Masterplan continues, with the Broad Street part-pedestrianisation and public realm improvement scheme now under construction and due for completion towards the end of summer 2018.

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

- An I Bike officer contributes to work to deliver targeted and intensive cycling training and promotion to schools in the Bridge of Don are of Aberdeen;
- Events have taken place throughout the year, often tying in with national and european campaigns such as Bike Week and European Mobility Week.
- The Council held the annual In Town Without My Car Day event in September, where a series of City Centre streets are closed to allow members of the public to experience these streets in a different manner, without the noise, danger and distraction of motor traffic.
- The Cycle Tour Series professional road racing event in the city centre in May also raised the profile of cycling.
- A road closure and subsequent awareness raising event took place at Danestone Primary School to promote sustainable transport and encourage children to travel to school more sustainably. This took place in September.

- Bike roadshow events were delivered to schools and workplaces throughout Bikeweek and European Mobility Week
- A marketing campaign to promote the Aberdeen City and Aberdeeshire sustainable transport brand, Getabout, was undertaken involving radio and TV advertising, the creation of a mascot costume and the purchasing of promotional materials.
- A Bridge of Don specific Cycle Map has been produced and circulated and the "Getting to Foresterhill" lealet updated
- The Aberdeen Cycle map has been updated and circulated to sites including various NHS sites, the tourist information, museums, parks, universities, libraries, the College, schools, the railway station and Business Improvement District. Aberdeenshire Council have also taken copies.
- The Living Streets Travel Tracker, which allows children to record their journey to school and get points depending on how sustainably they travelled, is operating is some city schools.
- Road Safety Magic Shows were delivered to 12 Aberdeen Primary Schools
- Travel Planning budget support was given to Aberdeen and Robert Gordon Universities
- A walking trail was launched in Westfield Park for a month to encourage people to walk between destinations rather than drive
- More cycle lockers have been implemented at Bridge of Don Park and Ride
- Bike doctor sessions have been held in the city centre and a local park

Previous work with the Aberdeen Business Improvement District and West End Traders to close a street in the West End of the City Centre in order to trial a market has proved so successful that these markets are now being held more often.

Public Transport

- Aberdeen City Council has continued to expand the supported bus network in order to address gaps in the commercial network.
- Efforts have also been ongoing to promote the Grasshopper multi-operator bus ticket and to make it more attractive to users. The ticket can now be stored on

a smartcard, making it Scotland's first means of smart multi-operator travel. Both main bus operators in the City now also offer contactless payment using a debit or credit card.

- Work to deliver the Aberdeen to Inverness rail improvement project and to deliver a Revolution in Rail has continued with new and improved rail services, including the re-opening of Kintore Station, on track to commence operation from December 2019.

Clean Vehicles

- The Aberdeen Car Club has continued to expand, with more electric and hydrogen vehicles added to the fleet. It now has 20 electric vehicles, 5 hydrogen fuel cell vehicles and 5 petrol hybrid vehicles as part of its fleet of 44 vehicles.
- The electric vehicle charging network has continued to expand, with more charging points located at various locations throughout the City. These include four new rapid triple chargers in Bridge of Don (1), Craibstone Park and Ride (2) and Kingswells Park and Ride (1) and new double fast chargers at Chapel Street (1), Bridge of Don (1), Kingswells (1) and Craibstone Park and Ride (4).
- The first electric car club car in Scotland, bought by Aberdeen City Council with a Scottish Government Air Quality Grant and part of the Co-wheels Aberdeen fleet, has now been retired from service and donated to the Grampian Transport Museum where it can be used for educational purposes.

Freight

Eco Stars

The Eco Stars fleet recognition scheme aims to help bus, freight and van fleet operators reduce emissions and running costs. The Aberdeen City and Aberdeenshire scheme has grown in membership since its launch in 2016. In 2017 there were 83 participating organisations and approximatly 4856 vehicles.

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

Public consultation has been undertaken on how the city streets should operate following the opening of the AWPR. The findings will be developed into a 'Roads

Hierarchy' for Aberdeen, with the aim of prioritising road space on strategic corridors for active travel and public transport.

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

An AWPR signage strategy has also been developed to ensure drivers use the most appropriate roads when travelling to and from Aberdeen and are encouraged to use the new bypass for longer-distance trips, rather than entering the central area of Aberdeen City.

Local Priorities and Challenges

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

- Liaise with Transport Scotland on the proposed city wide traffic count;
- Support SEPA in the update of the Aberdeen air quality model;
- Undertake Low Emission Feasibility Studies in the City's three Air Quality Management Areas (AQMAs) in accordance with national guidance and timescales specified by the Cleaner Air for Scotland Governance Group
- Continue to work with partners through the Civitas Portis European project and Smarter Choices Smarter Places programmes and under the Getabout brand to bring about behaviour change and mode shift

How to Get Involved

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

https://www.aberdeencity.gov.uk/services/roads-transport-and-parking/local-transport-strategy

City Centre Masterplan and Sustainable Urban Mobility Plan:

https://www.aberdeencity.gov.uk/services/strategy-performance-and-statistics/city-centre-masterplan

and

https://aberdeencitycentremasterplan.com/about/

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

Car Club

www.carplus.org.uk/case-study-co-wheels-aberdeen/

ITWMC Day
www.pathsforall.org.uk/pfa/news/aberdeen-car-free-day-a-success.html
(working with the NHS)
www.pathsforall.org.uk/pfa/get-involved/scsp-case-studies.html

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1. Local Air Quality Management

This report provides an overview of air quality in Aberdeen City during 2017. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

Table 1.1 – Summary of Air Quality Objectives in Scotland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m^3	Annual mean	31.12.2010
Particulate Matter ($PM_{2.5}$)	10 µg/m^3	Annual mean	31.12.2020
Sulphur dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 µg/m^3	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m^3	Running 8-Hour mean	31.12.2003
Lead	0.25 µg/m^3	Annual Mean	31.12.2008

2. Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by 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	• NO_2 annual mean & 1 Hour mean • PM_{10} annual mean & 24 hour mean	Aberdeen	Declared 2001, extended in 2003. PM_{10} included in 2005 & 2011. 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	• NO_2 annual mean • PM_{10} annual mean & 24 hour mean	Aberdeen	Declared in 2008, amended 2011. Pockets of exceedances at residential properties along Anderson Drive and Auchmill Road.	Air Quality Action Plan 2011
Wellington Road	• NO_2 annual mean • PM_{10} annual mean & 24 hour mean	Aberdeen	Declared 2008. Residential properties along Wellington Road (Queen Elizabeth II Bridge to Balnagask Rd)	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 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in the air quality Action Plan relating to each AQMA. Key completed measures are:

Action 1: Modal Shift and Influencing Travel Choice

- Increase bus use:
    - Continued expansion and development of the Grasshopper multi-operator ticket and new contactless pay on bus
    - Continued progress in developing a Bus Alliance (or otherwise enhanced bus quality partnership) for Aberdeen City and Aberdeenshire
- Improve Cycling and Walking Provision:
    - Continued expansion of the pedestrian, cycle and Core Path network;
    - Production of a Bridge of Don specific cycle map
    - One month trial of a walking trail in a Bridge of Don park
    - More cycle lockers have been implemented at Bridge of Don Park and Ride
    - More cycle lockers have been implemented at Bridge of Don Park and Ride
- Travel Plans:
    - Through Civitas Portis, a project to work with businesses in the North Dee area of Aberdeen has been implemented
- Travel Planning budget support was given to Aberdeen and Robert Gordon Universities
- Improve public awareness of air quality issues:
    - Continuation of annual event programme to encourage and promote sustainable transport and to raise awareness of air quality issues in the

City (bicycle roadshow events, Bike Week, European Mobility Week, In Town Without My Car Day)

- Worked with the Aberdeen Business Improvement District and West End Traders to close a street in the West End of the City Centre in order to trial a market. Again this helped to demonstrate to local residents and the business community alike that traffic-free streets are much more pleasant and can create additional opportunities to enable activities that will draw people into an area.
- I-Bike Officer working in schools
- Travel Planning budget support was given to Aberdeen and Robert Gordon Universities

- Car Clubs/Pool Car Schemes;
  - The Aberdeen Car Club has continued to expand, with more electric and hydrogen vehicles added to the fleet. It now has 22 electric vehicles, 5 hydrogen fuel cell vehicles and 5 petrol hybrid vehicles as part of its fleet of 45 vehicles.
- Crossrail
  - Nestrans and Aberdeenshire Council have been successful in an application to the Scottish Stations Fund for 50% of the estimated cost of the re-opening of Kintore Station. The re-opening if the station will be completed as part of the A to I Rail Improvement Project which aims to redouble the rail track from Aberdeen to Inverness. This work is now well underway with the Aberdeen to Dyce section work in 2018, and the Dyce to Inverurie, including the re-opening of the Kintore station on 2019.
  - The Minister for Transport and Islands announced a *Revolution in Rail*, a programme of rail capacity, frequency and journey time improvements to be introduced in 2018/19. Key benefits for the North East of Scotland will be: an hourly 'local' service across the City between Inverurie and Montrose, stopping at all stations; additional services to the above to create a half hourly service between Aberdeen and Inverurie (facilitated by completion of the upgrade of the Aberdeen to Inverurie line) and additional early morning and late evening services to Elgin, Keith, Huntly

and Insch from Aberdeen; and an hourly limited stop high speed train service to both Edinburgh and Glasgow, with many trains from Edinburgh and Glasgow extending through to Inverness.

- Public Transport Subsidies
    - Aberdeen City Council has expanded the supported bus network with evening and weekend services in certain areas of the City which are not served by the commercial bus network.
- Car Parking Review
    - Aberdeen City Council has commissioned AECOM to undertake a Strategic Car Parking Review of the City with a focus on the City Centre. This review is hoped to reported to Members in Autumn 2018.

Action 2: Lower Emissions and Cleaner Vehicles

- Green Vehicle procurement & Fuel/ Charging Infrastructure
- The electric vehicle charging network has continued to expand, with more charging points located at various locations throughout the City. These include four new rapid triple chargers in Bridge of Don (1), Craibstone Park and Ride (2) and Kingswells Park and Ride (1) and new double fast chargers at Chapel Street (1), Bridge of Don (1), Kingswells (1) and Craibstone Park and Ride (4).
- The Aberdeen Local Development Plan (2017) Transport and Accessibility supplementary guidance now contains EV parking standards for new developments.
- Hydrogen vehicles are now integrated into the Aberdeen City car club fleet provided by Co-wheels, with hydrogen vehicles, including an electric van with hydrogen range extender available for trial by Aberdeen businesses.

Action 3: Road Infrastructure

- Pedestrianisation
    - Part-pedestrianisation of Broad Street underway, due to be completed by the summer of 2018.
- Road
    - AWPR construction underway and nearing completion and opening autumn 2018;
    - Advanced demolition works now underway to facilitate Berryden corridor improvements.

Action 4: Traffic Management

- Intelligent Transport System (ITS)
    - Work has taken place across the City to ensure that data management is collated and controlled in the ITS Unit. This includes ANPR (Automatic Number Plate Recognition) and Bluetooth technology to monitor journeys.
- Freight and Commercial Vehicle Access
    - Aberdeen City Council has received money from EU Civitas PORTIS project which is considering access to the Harbour. Activities under this work package include: revisiting freight distribution hub/ consolidation centre concept for Aberdeen, looking at SMART transport systems for freight and reviewing all freight routes.

Action 5: Planning and Policies

- Produce Supplementary Planning Guidance
    - SG on Transport and Accessibility and Air Quality developed alongside Aberdeen Local Development Plan 2017

- Integration of policies of AQAP with Local Transport Strategy (LTS) and Regional Transport Strategy (RTS)
    - LTS has specific air quality objectives with specific actions contained within the Local Transport Strategy Costed Action and Delivery Plan
    - Active Travel Action Plan has been integrated with the Health and Transport Action Plan
- Road Hierarchy
    - Principles agreed in August 2017. Options and assessment to be carried out in 2018/ 19.
- Car Parking Policies:
    - Strategic Car Parking Review underway
- National Lobbying
    - LEZ. Transport Bill, National Transport Strategy.

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

- Broad Street part pedestrianised/ shared space area delayed due to a temporary and partial re-opening over the Christmas period to enable a Christmas market.
- The revision of the Sustainable Urban Mobility Plan has been due to a delay in taking forward the Roads Hierarchy Study as a result of resource/ staffing issues.
- The implementation of a Controlled Parking Zone in the North Dee area has been delayed due to a decision to undertake a Strategic Car Parking Review and a masterplan being developed for the North Dee area.
- Wellington Road multi-modal study underway, with the STAG Part 2 assessment due to commence in 2018.

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

- Walking and cycling infrastructure – further measures to improve walking and cycling networks
- Improve public awareness – continued participation in European Mobility Week and Bike Week and other events and to continue to work with partners to develop Getabout brand
- Car Clubs/ Car Sharing – further expansion of the Car Club
- Green Vehicle procurement & Fuel/ Charging Infrastructure –additional electric vehicle charging points
- Pedestrianisation – Completion of the Broad Street shared space/ pedestrian priority area
- ITS – continued expansion of Bluetooth journey time monitoring alongside ANPR and Variable Messaging Systems (VMS) across the City
- Freight and Commercial Vehicle Access – Wellington Road Stag Part 1 complete, STAG Part 2 to be underway
- Completion of STAG Part 1 study into options for improving external transport connections to Aberdeen South Harbour
- Supplementary Planning Guidance – formal adoption of Transport, Air Quality and Noise Supplementary guidance
- Roads Hierarchy – option development and assessment
- Sustainable Urban Mobility Plan – review to be underway to ensure complementarity with Roads Hierarchy option development
- Development of a smart journey application, the application will provide sustainable and active travel journey information with the aim of reducing private car usage
- Car parking – completion of the Strategic Car Parking Review with recommendations for implementation to Committee.

Table 2.2 – Progress on Measures to Improve Air Quality

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE											
1.1a	Increase bus use	Alternatives to private vehicle use	Delivery of standards and targets agreed by Bus Quality Partnership	LABOF	2010	Ongoing	10.8% employed adults not working from home, resident in Aberdeen City, bus to work (2015)	Not quantifiable	New standards/ targets are currently being revised for a further refresh of the quality partnership, possibly on a statutory basis	Ongoing	
1.1b			Increase corridors covered by BPIP (currently voluntary)	LABOF	2010	Ongoing	10.8% employed adults not working from home, resident in Aberdeen City, bus to work (2015)	Not quantifiable	CIVITAS funding secured for looking at A96 corridor	Ongoing	
1.1c			Integrated Ticketing	ABOF/ Transport Scotland	No defined start date	Unknown		Not quantifiable	Transport Scotland taking forward for Scotland	Unknown	

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 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE											
1.2a	Improve Cycling & Walking Provision	Alternatives to private vehicle use	Core Paths Plan	ACC	2015-16	2017	Scottish Household Survey; LTS Annual Monitoring Report	Not quantifiable	Core Paths Plan revisions identified by ACC. Various routes continue to be upgraded and installed.	Ongoing	Small scale review of the Core Paths Plan to take place 2018/19.
1.2b			Cycling Strategy/ Active Travel Action Plan	ACC	2015-16	2016	Scottish Household Survey; LTS Annual Monitoring Report, Cityvoice	Not quantifiable	Active Travel Action Plan adopted January 2017	Implemen-tation work ongoing.	Linked to Civitas/ Portis proposals and City Centre Masterplan/ Sustainable Urban Mobility Plan proposals.

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 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE											
1.3a	Travel Plans	Promoting travel alternatives	Existing Organisations	ACC & Nestrans	2015-16	2016 onwards	No. organisation adopting TPs; No. employees covered by TPs, progress of travel plans in study area (North Dee)	Not quantifiable	Travel Plan Strategy under revision	2017	Getabout website also been updated. Civitas work started.
1.3b			New Developments	ACC	2014-16	2016 onwards		Not quantifiable	Technical Advice Note (TAN) for Travel Planning drafted.	2018	
1.3c			Council	ACC	Ongoing	2003 onwards	51.4% of Council staff use sustainable modes to travel to work (CTP Survey 2016)	Not quantifiable	2016 staff travel survey completed	Ongoing	2018 survey to be undertaken in July

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 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE											
1.4a	Improve public aware-ness of air quality issues	Public information	Use of Variable Messaging System (VMS)	ACC & Transport Scotland	Ongoing	Ongoing	N/A	Not quantifiable	Real time information facilities and additional VMS installed on A96 corridor	Ongoing	Link to A96 Park & Choose site and Bluetooth journey time monitoring
1.4b			ACC Website Improvements	ACC	2011	Ongoing	N/A	Not quantifiable			
1.4c			'Airtext' Alert Service	ACC			No. of service users	Not quantifiable			

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 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE											
1.4d			Undertake air quality and sustainable travel events with Getabout Partnership	Get About	Ongoing	Ongoing	Events taking place	Not quantifiable	In Town Without My Car Day took place again in September 2017, Roadshow events in schools and workplaces during June and September 2017, Big Cycle event at school in September 2018, Active travel day at another school in September 2018, Tour series Cycle route, National Clean Air Day, Winter Safety Event November 2017, Workplace Travel Challenge March 2018.	Ongoing	Linked to Smarter Choices, Smarter Places Programme

1.4e			Information Marketing Initiatives (Walk to School)Events	ACC	Ongoing	Ongoing			Marketing campaign to promote getabout on TV, radio, Cinema, promo items and mascot costume bought, updated "Getting to Foresterhill" leaflet, Aberdeen Cycle map reprinted and distributed to various sites, new Bridge of don cycle map produced, Living streets Travel tracker in 10 schools, Road safety magic shows to 12 schools, Walking Trail in Westfield Park for a month, Bike doctor sessions,		Linked to Smarter Choices, Smarter Places Programme
1.5a	Car Clubs / Car Pool Schemes	Alternatives to private vehicle use	General Public	ACC	2011	2012	1,800 members of the Aberdeen Car Club (April 2018	Estimate 0 – 1 µg/m3	Co-wheel re-appointed as operator in 2017. 33 Car Club cars available for public use. Hydrogen	Ongoing	New bay created in Tillydrone

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 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE											
									vehicles now available for use. Still one of fastest growing car clubs in country. Highest number of evs in car club fleet in UK.		
1.5b			Corporate	ACC	2011	2012	33 vehicles available to members of the public (April 2018)	Estimate 0 – 1 µg/m3	12 vehicles available for the Council to utilise, (9 on fully exclusive use and 3 shared with public) on exclusive use and and another two fully exclusive by RGU University	Ongoing	Trials on-going with hydrogen vehicles and electric van with hydrogen range extender

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 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE											
1.6a	Rail Improve-ments	Alternatives to private vehicle use	Local rail improvements	Transport Scotland/ Nestrans	Ongoing	2018-19	8 railway stations in the North East in 2017. Current modal share 0.6% (2011 Census data as no results from SHS)	Estimate 0 – 1 µg/m3	Scottish Government has announced programme of improvements to be introduced in 2018/19. Kintore Station funding package being consolidated. A to I track re-doubling is underway. Inverurie Station car park extended in 2017, improving the rail park and ride offering to Aberdeen.	>2019	
1.6b			Infrastructure improvements	Transport Scotland/ Nestrans	Ongoing	2019	Studies and infrastructure delivered	Not quantifiable	Investigation works underway to determine programme for Aberdeen to Inverness rail improvements	2019 – Phase 1	

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 MODAL SHIFT AND INFLUENCING TRAVEL CHOICE											
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	

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 LOWER EMISSIONS AND CLEANER VEHICLES											
2.1a	Green Vehicle procurement & Fuel/ Charging Infrastructure	Transport planning and infras-tructure	Council Fleet	ACC	Ongoing	Ongoing	100% Euro IV or better in Council's fleet (April 2017)	Not quantifiable	EVs continue to form part of the Council fleet. Purchase of hydrogen buses (2014) and opening of hydrogen refuelling stations (2015 and 2017). Working with Co-wheels, who provide managed pool car to the Council, to continue to green the fleet	Ongoing	Continued investment in both hydrogen and ev infrastructu re by the Council. Taking part in European project to introduce hydrogen vehicles to Council fleet.
2.1b			QBP	LABOF	2012	2014	First Bus have 60% Euro IV buses or better Stagecoach have 85% Euro IV buses or better	Not quantifiable	Purchase of hydrogen buses run by First and Stagecoach	Initial tranche completed	Potential continued investment in buses likely

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 LOWER EMISSIONS AND CLEANER VEHICLES											
2.1c			Installa-tion of electric vehicle charging points	ACC	Ongoing	Ongoing	Installaitons organised by the Council. – 62 public, 19 car club, 19 fleet only	Not quantifiable	The electric vehicle charging network has continued to expand, with more charging points located at various locations throughout the City. These include 8 new rapid charging sockets in Bridge of Don (2), Craibstone Park and Ride (4) and Kingswells Park and Ride (2) and new double fast chargers at Chapel Street (2), Bridge of Don (2), Kingswells (2) and Craibstone Park and Ride (8). - EV charge point standards for new development parking now in Local Development Plan (2017) Transport and Accessibility Supplementary Guidance	Ongoing	Undertake n under the SGs/ Transport Scotland and Energy Saving Trust Grants
2.2a	Emissions Testing & Idling Enforcement	Public informa-tion	Roadside Emission Testing	ACC	Ongoing	Ongoing	No. of tests / fails	Not quantifiable	No tests undertaken in 2016/17		
2.2b			Idling Vehicles	ACC			No. cautions	Not quantifiable	Radio adverts and school patrols being undertaken in 2017		

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 LOWER EMISSIONS AND CLEANER VEHICLES											
2.3a	Taxis	Vehicle fleet efficiency	Non-idling signs	ACC	Ongoing	On hold	Spatial coverage of signs	Not quantifiable	Idling signage not currently being pursued	Ongoing	
2.3b			Licensing: vehicle inspect-ions, emiss-ions restrict-ions	ACC			Fleet emissions profile improvement	Not quantifiable			
2.4	Low Emission Zone	Environ-mental Permits	Low Emission Zone	ACC & Nestrans	2011	Not yet identified	Not yet identified	TBC through CAFS implementation	Update on initial Low Emission Study undertaken exploring priority air quality improvements	Complete	Potential actions being explored/ taken forward by steering group. Linked to City Centre Masterplan

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 ROAD INFRASTRUCTURE											
3.1	Pedestrian-isation	Transport planning and infrastructure	Union Street and Broad Street	ACC	2008	2016	N/A	TBC	City Centre Masterplan approved. Part-pedestrianis-ation of Broad Street now under construction	2017	Part of overall City Centre master-plan propos-als. Union Street now proposed as bus priority rather than pedest-rianised
3.2a	Road Building / Junction Alterations	Transport planning and infrastructure	Aberdeen Western Peripheral Route	AWPR Managing Agent	2008	2015-2017	Monitoring data from permanent traffic counters on Anderson Drive, Market Street and Wellington Road	0 – 1 µg/m3 for PM10 and NO2 (Market St and Anderson Dr)	Construction underway – opening autumn 2018	Late 2017/ early 2018	**Trunk Road**
3.2b			Haudagain Improvements	Transport Scotland	Implem-entation to comm-ence upon comple-tion of AWPR	2018	Delivery of scheme	TBC undergoing assessment	tendering underway for main works to commence after AWPR opens	2019	Haud-again upgrade will commen ce on comple-tion of the AWPR.

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
4 TRAFFIC MANAGEMENT											
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 implem-entation of AWPR and A90 south P&C		Not quantifiable	Feasibility study complete	Subject to implement ation of AWPR and A90 south P and R	Linked to Wellington Road improve-ment. STAG 1 Assess-ment underway.

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 TRAFFIC MANAGEMENT											
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 complete	Further detailed work required then implementation subject to funding availability	Linked to AWPR signage strategy
4.3b			Commercial Delivery Strategy (routing, timing, idling control)	ACC	2015	Further detailed work required	Actions contained within SUMP and Roads Hierarchy Study relating to this issue	Not quantifiable	Possible measures identified as part of City Centre Masterplan and the Sustainable Urban Mobility Plan however change to network from CCMP proposals will result in amendments to proposals	2017	SUMP requires revision. Will be impacted upon by Roads Hierarchy Study too.

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 TRAFFIC MANAGEMENT											
4.3c			Freight Consolida-tion Centre	ACC	Ongoing	Unknown	Delivery of study	Not quantifiable	Freight improvement feasibility funding contained within Civitas Portis application.	To be determined	

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 PLANNING AND POLICIES											
5.1a	Produce Supple-mentary Planning Guidance	Policy guidance and develop-ment control	Improve Development Control	ACC	Ongoing	Ongoing	Database of permitted development	Not quantifiable	New ASGs produced for Air Quality and Noise. Transport and Accessibility SG updated and contains policy relating to sustainable and low carbon transport.	2017	New developme nts now 'master-planned' and consider layout of the develop-ment for ped/ cycle/ public transport move-ments first.
5.1b			Section 75 monetary contributions	ACC	Ongoing	Ongoing	Database of contributions and what they have funded.	Not quantifiable	Contributions sought for sustainable transport improvements: core paths, car club, public transport infrastructure and pedestrian safety improvements such as pedestrian crossings, etc.	Ongoing	
5.1c			Construction Code of Practice	ACC			Database of developments signing CCoP	Not quantifiable			

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 PLANNING AND POLICIES											
5.2	Integration of AQAP with LTS and RTS	Policy guidance and develop-ment control		ACC and Nestrans	2013-15	2016-21	N/A	Not quantifiable	Air quality and noise embedded within the LTS with specific objectives and actions to improve	2021	LTS adopted in January 2016
5.3	Integration of AQAP with Health and Transport Action Plan (HTAP)	Policy guidance and develop-ment control	Highlight Health Impacts	ACC / NHS	Ongoing	On-going	N/A	Not quantifiable	HTAP agreed and Steering Group/Board being refreshed	On-going	
5.4	Road Hierarchy	Transport planning and infrastruc-ture	Reclassific-ation 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 complete for build out	2030	Linked to AWPR Locking in the Benefits and City Centre Masterplan / Sustain-able Urban Mobility Plan proposals

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 PLANNING AND POLICIES											
5.5a	Car Parking Policies	Policy guidance and develop-ment control	Low Emission Vehicle Parking Incentives	ACC	Ongoing	On hold	no. of low emissions permits as proportion of total	Not quantifiable	Considered as part of a package of measures as part of the Low Emission Strategy for the City and in Strategic Car Parking Review.	Unknown	Questionn aire for Strategic Car Parking Review has been undertaken
5.5b			Limit car parking for new developments	ACC	2013	Ongoing	N/A	Not quantifiable	Revised parking standards included in Local Development Plan 2017 and associated Supplementary Guidance.	Ongoing	City Centre Masterplan proposes zero parking for new office develop-ments
5.5c			Development of Local and Regional Car Parking Policies	ACC & Nestrans	Ongoing	Ongoing	N/A	Not quantifiable	Regional Car parking Strategy adopted 2012. Development underway Revised parking standards included in emerging Local Development Plan 2016. Strategic car Parking review near completion	Ongoing	Review of car parking being undertaken as part of Civitas Portis project. Question-naire for Strategic Car Parking Review has been undertaken

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 PLANNING AND POLICIES											
5.6a	National Lobbying	Transport planning and infrastruc-ture	Incentives/ funding/tax breaks for Low Emission Initiatives	ACC	2011	Ongoing	N/A	Not quantifiable	EVs continue to have some sort of subsidisation by the Government. Grants for home and workplace charging facilities available through Home Energy Scotland. Council continue to offer EV charging service for free until March 2019 at least (although users still expected to pay parking charges where they apply).	Ongoing	
5.6b			Shipping Emissions Reductions	ACC	2011	Ongoing	N/A	Not quantifiable	Work being undertaken as part of Civitas Portis project with Aberdeen Harbour	Ongoing	
5.6c			HGV/Bus Scrappage schemes	ACC	2011	Ongoing	N/A	Not quantifiable	Work taken forward by Nestrans with Freight Action Plan Implementation Group	Ongoing	

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 NON-TRANSPORT MEASURES											
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/ on-going	
6.2	Industry Permitting	Environmental permits		ACC and SEPA			N/A	Not quantifiable			
6.3	Tree Planting	Promoting low emission plants (!)	Pro-active planting of tree species with a positive air quality impact and avoid planting varieties that may have detrimental air quality impact	ACC			N/A	Not quantifiable	Policies contained within ALDP Supplementary Guidance (2016) robust policy to achieve this as part of development		
6.4	Shipping	Freight and delivery management	Consider actions available at Aberdeen Harbour	ACC & Aberdeen Harbour			Pollutant monitoring	Not quantifiable	Work being undertaken as part of Civitas Portis project with Aberdeen Harbour		

2.3 Cleaner Air for Scotland

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

Officers represent the Council on the CAFS Leadership and Governance Groups and the National Low Emissions Framework and National Modelling Framework working groups, supporting the development of actions to assist the delivery of CAFS and the introduction of Low Emission Zones (LEZs).

The Council's 2017 Manifesto instructed the Chief Executive to prepare a business case around the feasibility of a Low Emission Zone throughout the city. This instruction is consistent the Scottish Government's Programme for Governance 2017-18 which made a commitment to introduce a Low Emission Zones in one city by 2018 and the other 3 main cities, including Aberdeen by 2020. Several air quality reports and bulletins were presented to Full Council and the Council's Communities, Housing and Infrastructure Committee in 2016 and 2017 to inform elected members of developments both locally and nationally and the implications for the Council.

A major traffic count was carried out across the city over a 2 week period in March 2017 to enable the update of the Aberdeen air quality model. Meetings took place during 2017 with SEPA, who are updating the model, to progress the model development. The model will enable the source apportionment of pollution concentrations to vehicle classifications, scenario testing of possible interventions and support the LEZ feasibility study.

Section 2.2 and Table 2 summarise actions being progress as part of the AQAP. The City Centre Masterplan, adopted in June 2015, sets out the Council's long term vision to regenerate the City Centre and create a more energetic, enthusiastic and fascinating place to live, work and visit. A key 'Place Making' vision is to reduce city centre car journeys by 40% creating a more attractive environment to live, walk and cycle. The masterplan aims to provide a more sustainable transport network and compliments the actions within CAFS.

2.3.1 Transport – Avoiding travel – T1

All local authorities should ensure that they have a corporate travel plan (perhaps within a carbon management plan) which is consistent with any local air quality action plan. Aberdeen City Council's 2001 corporate travel plan, updated in 2006, is due to be refreshed. However, staff have access to pages on the Council Intranet which provide information about travel choices to work. As part of its corporate travel plan, the council undertakes a biannual staff travel survey to identify how staff usually travel to work and how they travel at work. The most recent survey was April 2016 when 1,031 responses were received and the next survey is due to take place in June 2018. The data will be used to inform any future travel plan.

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

Scottish Government expects any Scottish local authority which has or is currently developing a Sustainable Energy Action Plan (SEAP) to ensure that air quality considerations are covered. Aberdeen City Council has developed its own SEAP, Powering Aberdeen: Aberdeen's Sustainable Energy Action Plan. The plan was approved at Full Council on 6 October 2016. Details are available at:

Aberdeen's Sustainable Energy Action Plan

2.3.3 Projects in Aberdeen City

Portis Civitas EU project

A consortium of partners, including Aberdeen City Council and NESTRANS, was awarded a £23.2m EU grant for a north east transport project that aims to improve travel in the area. The funding is over 4 years and will be used to examine transport solutions with a connection to port operations, supporting sustainable urban mobility through changes in behaviour and attitude. Various work streams are being progressed including actions to 'lock in' the benefits of the AWPR, improve cross – city connectivity, walking and cycling initiatives and Travel Planning Quarterly meetings take place to manage the project and ensure work streams are progressing.

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 2017. 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 Appendix A.

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

The Union Street and Market Street continuous monitoring sites are on busy city centre roads and are representative of population exposure for NO_2, PM_{10} and $PM_{2.5}$. Union Street is the city's main shopping street with shops on the ground level and commercial premises and flats on the 1st, 2nd and 3rd floors. Almost all of the city's bus routes pass along at least part of Union Street and the inside lane of both sides of the road are designated bus lanes.

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

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

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

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

Errol Place provides urban back ground data.

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

3.1.2 Non-Automatic Monitoring Sites

Aberdeen City Council undertook non- automatic (passive) monitoring of NO_2 at 64 sites during 2017. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix A and are also 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 out with 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.

Diffusion tubes were installed at five locations in the Torry and Cove area in 2017 to monitor any changes in NO_2 levels before opening and during operation of the Energy from Waste Facility to be located at East Tullos Industrial Estate. Monitoring also commenced at two further sites in the Skene St area as a result of the elevated concentration measured in 2016.

3.2 Individual pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

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

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

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B.

All roadside automatic monitoring data in 2017 continued to show a downward trend in annual mean NO_2 levels. The levels are the lowest recorded in the last 5 years. Concetrations at all automatic sites met the annual mean air quality objective of 40 µg/m^3 except for Union Street which recorded 40 µg/m^3.

Diffusion tubes located along Union Street and the top end of Holburn Street suggest exceedances of the objective throughout these areas of the city centre AQMA. Levels recorded in these locations continue to be lower than the previous 5 years and it appears the downward trend of levels towards the objective continues. No monitoring occurred at DT13 due to buidling works at this location preventing access.

Monitoring location DT31 (Holburn Street) was relocated to DT76 due to access no longer being possible.

The automatic site at Market Street located within the city centre AQMA, recorded its lowest level since 2013 and is below the annual mean objective. However diffusion tubes DT9 and DT10 located in the Market Street area recorded levels above the objective suggesting excedances of the annual mean continues at more congested or enclosed areas. Levels at these sites are the lowest since 2013 and there is

downward trend towards objective levels. Diffusion tube DT16 located at Trinity Quay recorded an annual mean level below the objective for the first time since 2013.

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

The level of 39 µg/m^3 recorded at the Wellington Road automatic site located within the Wellington Road AQMA is below the annual mean objective for the first time in 5 years. Levels at the 2 diffusion tube locations (DT7, DT36) within the Wellington Road AQMA, which are corrected to represent public exposure, also continued to fall and are below the annual mean objective. Diffusion tube DT37 located on Wellington Road just outside of the AQMA is also well below the objective.

The only exceedance of the annual mean objective in the Anderson Drive AQMA was recorded at the Haudagain round about diffusion tube (DT39).

In 2016 diffusion tube DT61 at Skene Square, which is outside an AQMA recorded a level of 40µg/m^3 suggesting potential exceedance of the annual mean in this area. The validity of this measurement is uncertain due to the discovery of a domestic boiler flue located close to the monitoring location. Flue emissions may have caused localised elevated NO_2 levels at the location. Technical Guidance LAQM TG 16, advises that diffusion tubes should not be located within 10 meters from heater flues. Monitoring at this location has therfore stopped and a new monitoring location commenced at 27 Skene Square in 2018. The annualised concentration recorded at DT61 in 2017 was 37 µg/m^3.

Other monitoring locations on this stretch of road (DT73 and DT74) were just below/on the threshold of the annual mean objective. Monitoring commenced at these locations mid way through 2017 therefore the measurements were annualised. Monitoring continues at these sites. Major infrastructure works proposed in the Skene Street/Berryden area are discussed in section 4.1.

NO_2 diffusion tubes (DT69 to DT72 and DT75) were installed at several background locations in the Torry/Cove area in 2017 to monitor any changes in NO_2 levels before the opening and during the operation of the new Energy from Waste Facility to be located at East Tullos Industrial Estate.

The closure of Broad Street to all traffic in March 2017 had the potential to significantly increase traffic volume and congestion on parts the Union Street and the surrounding area, particularly between Union Street and West North Street as all buses using Broad Street diverted to this route. The annual mean concentrations at both diffusion tube DT21 (21 King St) and DT 12 (40 Union St) were lower in 2017 compared to previous years with a similar trend to other city centre sites. The road closure therefore does not appear to have had a significant impact on local air quality.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

There were no exceedances of the hourly mean at any automatic or diffusion tube sites in 2017. The hourly mean has not been exceeded at any automatic sites in the last 5 years.

3.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 18µg/m^3.

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

There were no exceedances of the annual mean or 24 hour mean objective at any of the continuous monitoring sites in 2017. The 24 hour mean objective has been met at all monitoring sites for the last 2 years. Measured concentrations are the lowest recorded over the last 5 years and there is a downward trend in concentrations at measurment locations across the city.

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/m^3.

A $PM_{2.5}$ monitor was installed at King Street in June 2017.

There are now 5 continuous monitoring sites measuring $PM_{2.5}$ levels in Aberdeen City.

No exceedances of the annual mean were recorded at any of the continuous monitoring sites.

3.2.4 Sulphur Dioxide (SO_2)

No monitoring of sulphur dioxide was carried out in 2017 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 2017 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

Aberdeen Western Peripheral Route (AWPR)

Construction of the route is ongoing with a completion date of autumn 2018. The new route will significantly reduce traffic flow within the AQMAs, particularly the Anderson Drive/Haudagain roundabout/Auchmill Road corridor and the Wellington Road AQMA. A further city wide traffic count is proposed following the opening of the AWPR to indicate the impact on key routes, including locations within and adjoining the three AQMAs. The traffic count will enable the update of the air quality modelling and support post AWPR opening air quality scenario testing.

Broad Street Pedestrianisation

Following a major public consultation process in 2016, the Council approved the partial pedestrianisation of Broad Street which is located in the City Centre and links directly to Union Street. Access will be restricted to pedestrians, cyclists and buses, other vehicles will be required to take alternative routes. The air quality assessment predicted an increase in NO_2 and PM_{10} emissions on the east section of Union Street and King Street within the AQMA, however decreased concentrations were predicted elsewhere within the AQMA. The pedestrianisation is the first major project of the City Centre Masterplan which aims to provide a more sustainable transport network and provide additional space for pedestrians and cyclists.

Broad street closed to all traffic in March 2017 and is due to reopen to busses only in July 2018. All buses using Broad Street are diverted onto Union Street, east of Broad St and on to West North Street, Mounthooly, Gallowgate and Littlejohn Street. This closure has resulted in over 800 additional daily bus movements on Union Street between Broad Street and West North Street.

By co-incidence, the major traffic count, to support the development of the air quality model, took place across the city at the same time as the road closure. Two days of traffic counts occurred before Broad Street closed with 7 days of counts after the closure. Data from these counts and the continuous traffic counter at the west of Union

Street indicated there has been little difference in traffic volumes on Union Street across the other vehicle classifications. Diffusion tube monitoring data suggest the road closure has not had a significant impact on pollution levels.

A further traffic count is proposed following the re-opening of Broad Street to buses to determine traffic flows and enable future air quality scenario testing and predictions within the air quality model.

Berryden Road Improvements

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

Diffusion tubes were installed in 2015 to monitor NO_2 concentrations at existing roads close to the new route where traffic flows were predicted to change. With the exception of 21 Skene Square, concentrations at all sites were well below the annual mean objective in 2016, the first full year of monitoring. The concentration recorded at 21 Skene Square in 2016 was 40.9ugm^{-3} suggesting levels are currently around the objective. Monitoring and screening carried out as part of previous review and assessments did not indicate a risk of exceedance of the objective in this area, however the increase in diesel car usage in recent years and a potential increase in traffic flow and congestion may have resulted in increased NO_2 emissions. As detailed in section 3.2.1, the diffusion tube at 21 Skene Street was relocated in 2017 following the discovery of a domestic flue close to the site. Two further diffusion tubes were installed in the Skene St area in 2017 as a result of the elevated 2016 concentrations. Monitoring results are discussed in section 3.2.1. It is anticipated that the proposed junction improvements will reduce congestion in this area and improve air quality, however these benefits may be offset by an increase in traffic flow. The air quality assessment required as part of the development process will provide further information on the risk of exceedance of the air quality objectives.

A90/A96 Haudagain Improvements

The Scottish Government has approved the final route layout and completed the necessary land purchases. Construction works are due to commence immediately following the completion of the AWPR. The improvements will create a new slip road around the Haudagain roundabout and improve traffic flow and air quality. The DMRB Environmental Statement details that there are no predicted exceedances of the annual mean NO_2 or PM_{10} levels with the scheme in place in 2018 and concludes that there will be no significant impact on local air quality as a result of the proposed scheme.

Wellington Road Improvements

A broad range of options to improve traffic management and flow on Wellington Road, including the section within the AQMA were reviewed during 2017. Council approval was subsequently granted to proceed to a Stage 1 STAG assessment (Strategic Transport Analysis Guide) the outcome of which will be reported to Council in 2018. The Stage 1 STAG report will generate options for progression to a Stage 2 assessment. Should the Council subsequently approve improvement measures, it is likely to be several years before major infrastructure works are implemented. Options are likely to include road widening within the Wellington Road AQMA adjacent to the former HM Craiginches prison site which has recently been developed for residential accommodation. While road widening is likely to improve traffic flow, the works may bring the road closer to residential properties. An air quality assessment will be carried out as part of the options appraisal process.

4.2 Other Transport Sources

Other transport sources include:

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

There were no new other transport sources in Aberdeen City in 2017.

4.3 Industrial Sources

Industrial sources include:

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

The Scottish Environmental Protection Agency have advised there is no regulated process that has increased its emissions to air by more than 30% in 2017. The following is a list of changes to PPC permits in Aberdeen City in 2017:

Site	Permit	Description
Muller-Wiseman (West Tullos)	Part A	Site in process of surrendering licence

There are no new, existing or significantly changed industrial sources in Aberdeen City in 2017.

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 2017.

4.5 New Developments with Fugitive or Uncontrolled Sources

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

New Source in 2016	Detail
Landfill sites	No new sources in 2017
Quarries	No new sources in 2017
Unmade haulage roads on industrial sites	No new sources in 2017
Other potential sources of fugitive particulate matter emissions.	There are some sections of the Aberdeen Western Peripheral Route Balmedie to Tipperty Road Project which falls in the Aberdeen City Boundary. There continues to be unpaved sections of road associated with this project.

5. Planning Applications

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

Football Stadium West Kingford

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

Air quality in the proposed location is currently good with nitrogen dioxide and particulate matter levels well below air quality objectives. Air quality dispersion modelling assessed any impact with the development and without the development in the year 2023, the proposed year of opening. The assessment concluded the impact from development traffic on air quality will be negligible and pollution concentrations will continue to meet national and EU air quality objectives. The application was approved in early 2018.

Aberdeen Harbour Nigg Bay

The Harbour Expansion Project was approved by the Scottish Government on 20 December 2016 with construction work commencing in Spring 2017. The air quality assessment predicted a minor to negligible significance with respect to the annual mean NO_2 and PM_{10} objectives.

PM_{10} and NO_2 concentrations within and adjacent to the proposed development site are currently well below the air quality objectives and there is no risk of exceedances either during the construction or operational phase provided good management practices to control dust emissions are implemented. Construction work is well underway and the project is due to be completed by May 2020.

Broadford Works, Marbley Street

Approval was granted in September 2016 for a major mixed use development on a brownfield site close to the city centre and the Berryden corridor.

The proposed development comprises 890 residential units (apartments for rent and student accommodation), cafes and bars, a nursery and office, retail and leisure facilities and 400 car parking spaces.

The development has the potential to increase congestion and adversely affect air quality both in the vicinity of the proposed residential properties and the wider area. An air quality assessment was carried out a number of years ago as part of a previous planning application. This assessment did not predict a significant adverse impact or risk of exceedance of the air quality objectives, however the 2016 application was approved subject to a further air quality assessment. The condition also requires mitigation measures should there be a significant adverse impact on air quality. The assessment methodology was agreed in 2017 and outcomes will be reported in the 2019 Progress Report.

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

Data from the Union Street continuous monitoring station and diffusion tubes confirmed NO_2 concentrations within the City Centre AQMA continue to exceed the annual mean objective. However, NO_2 levels at both Union Street and Market Street have continued to decrease since 2012.

Annual mean NO_2 levels at both the Anderson Drive and Errol Place continuous monitoring stations remain well below the annual mean objective. Although the Anderson Drive site is within the Anderson Drive/Haudagain roundabout/Auchmill Road AQMA, diffusion tube values at the Haudagain roundabout continue to exceed the annual mean objective.

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

The annual mean NO_2 level recorded at Wellington Road was below the objective. The non-automatic monitoring on Wellington Road also recorded NO_2 levels below the annual mean objective.

There were two diffusion tubes (DT73 and DT74) outside of an AQMA at Skene Square that were just below/on the threshold of the annual mean objective. Monitoring will continue at this location. Additionally the data has been provided to the consultants appointed to undertake air quality modelling for the Berryden Corridor road project, which aims to improve traffic flow.

There were no exceedances of the NO_2 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 and 24 hour PM_{10} objectives were met at all monitoring locations and the downward trend in concentrations at measurment locations across the city continues.

No exceedances of the $PM_{2.5}$ annual mean were recorded at the 5 continuous monitoring sites.

The 3 AQMAs in the City remain valid for NO_2 and PM_{10} annual means.

The NO_2 hourly mean has not been exceeded at any automatic sites in the last 5 years. Aberdeen City Council will consider amending the city centre AQMA order which refers to exceedance of the 1 hour objective.

The annual mean PM_{10} objective has not been exceeded in the Anderson Drive AQMA(CM4) in the last five years and Aberdeen City Council will consider amending the Anderson Drive AQMA order, in 2018 to remove this objective.

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

6.2 Conclusions relating to New Local Developments

The Aberdeen Football Club stadium, Broadford Works and Aberdeen Harbour planning applications have the potential to impact significantly on air quality. Dispersion modelling indicated the football stadium and Harbour developments will have a negligible impact due to the location of the facilities, proposed year of opening and nature of services provided.

An air quality assessment of the Broadford Works development will be undertaken in 2019.

6.3 Proposed Actions

- Continue monitoring (non automatic) near sensitive receptors along access routes to the 3rd Don Crossing.

- Continue monitoring (non automatic) near sensitive receptors along the route of the proposed Berryden Corridor improvement project.

- Progress LEZ feasibility study in accordance with national technical guidance and direction from the Cleaner Air for Scotland Governance Group.

- Additional traffic counts on strategic routes following the opening of the AWPR and Broad Street

- Continued implementation of the Actions within the Air Quality Action Plan 2011

- Submit the next air quality progress report.

- Amend the city centre AQMA to remove the NO_2 hourly mean.

- Amend the Anderson Drive AQMA to remove the PM_{10} 24 hourly mean.

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	Urban 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}, $PM_{2.5}$ 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	Fidas 200 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}, $PM_{2.5}$ NO_2 (NO, NO_x)	Y	Fidas 200 Chemiluminescence	5	4m	1.5
CM6	King Street	Roadside	X394333	Y808770	PM_{10}, $PM_{2.5}$, NO_2 (NO, NO_x)	N	BAM, Fidas 200 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.

Figure A.1a City Centre Automatic Monitoring Sites 2018

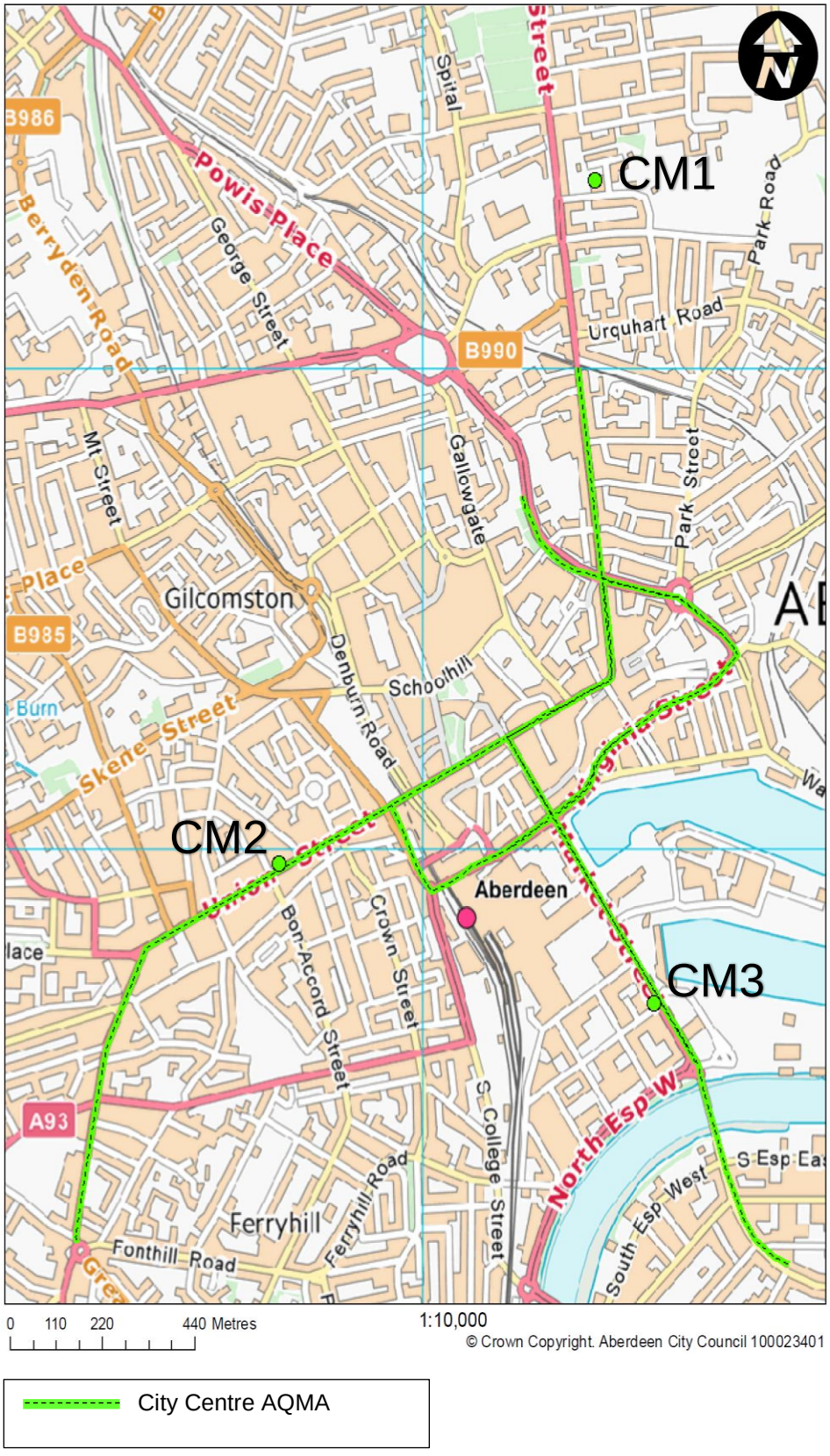

Figure A.1b Wellington Road Automatic Monitoring Site 2018

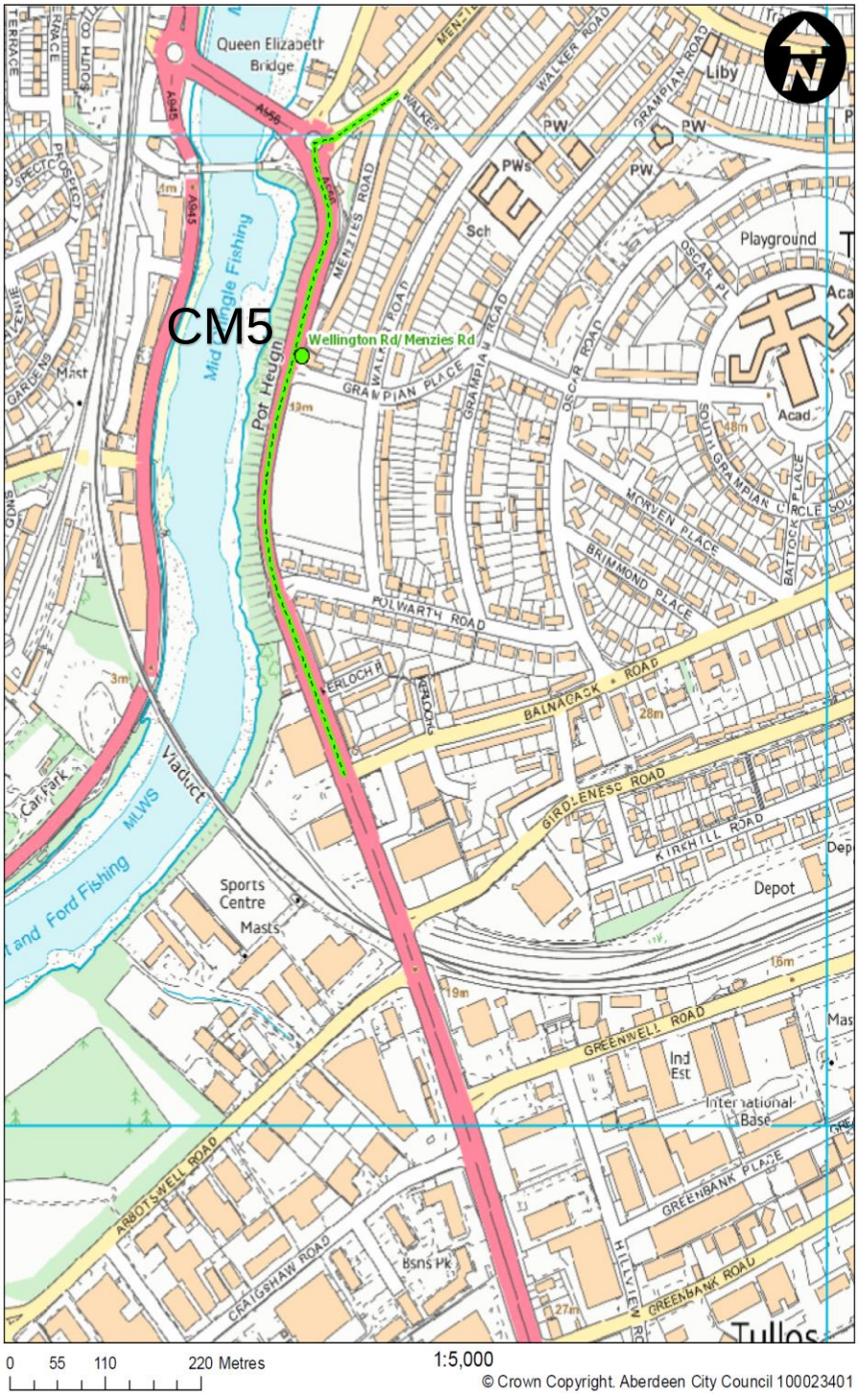

Figure A.1c Anderson Drive Automatic Monitoring Site 2018

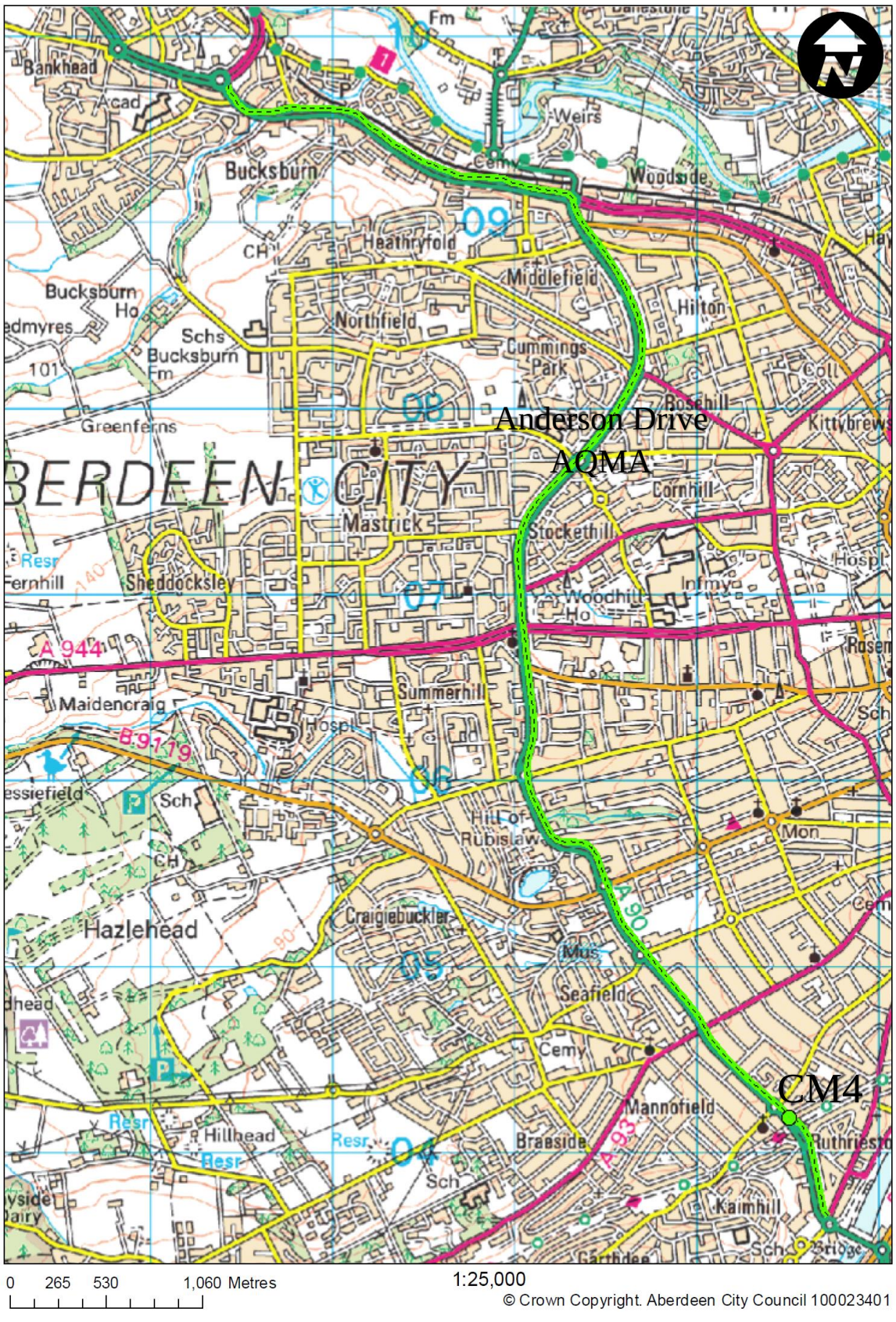

Figure A.1d King Street Automatic Monitoring Site 2018

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?
DT2	885 Gt Northern Rd	Roadside	391149	809164	NO_2	Y	11	3	N
DT3	549 N Anderson Dr	Roadside	391387	808941	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	Wellignton 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
DT11	105 King St	Roadside	394406	806637	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?
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
DT22	104 King St	Roadside	394425	806634	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?
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	335 Union St	Roadside	393619	805919	NO_2	Y	0	5	N
DT31	249 Holburn St	Roadside	393170	805120	NO_2	N	0	5	N
DT33	East North St	Roadside	394505	806531	NO_2	Y	0	4	N
DT34	404 King Street	Roadside	394317	807527	NO2	N	0	9	N
DT36	115 Menzies Rd/Wellington Rd	Roadside	394403	804799	NO2	Y	14	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?
DT37	137 Wellington Road	Roadside	394697	803735	NO2	N	17	14	N
DT39	819 Gt Northern Rd	Roadside	391293	809136	NO2	Y	0	3	N
DT40	852 Fullerton Ct (facade)	Facade	391353	809158	NO2	Y	0	7	N
DT41	852 Fullerton Ct (roadside)	Roadside	391352	809151	NO2	Y	7	0.1	N
DT45	111 S Anderson Dr	Facade	392311	804349	NO2	Y	0	13	N
DT46	West North Street	Roadside	394277	806671	NO2	Y	0	4	N
DT47	Powis Terrace	Roadside	393368	807511	NO2	N	5	0.1	N
DT48	139 Gt. Northern Road	Roadside	393088	808232	NO2	N	10	0.1	N
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
DT54	36 - 38 School Road	Roadside	394358	808434	NO_2	N	14	2	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?
DT55	Ellon Rd/Balgownie Crescent	Roadside	394629	809740	NO_2	N	9	2	N
DT56	59 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
DT59	735 Gt.Western Rd	Facade	391525	809080	NO_2	N	0	8	N
DT60	Anderson Drive/Beech Rd	Roadside	391287	807683	NO_2	Y	N/A	0.1	N
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
DT65	90 Tillydrone Av	Roadside	393331	809073	NO_2	N	8	3	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
DT66	10 Meadow Place	Roadside	393120	809284	NO_2	N	3	3	N
DT67	37 Inverurie Rd	Roadside	389756	809583	NO_2	N	6	3	N
DT69	Tullos Circle Torry Academy	Urban Background	394933	804762	NO_2	N	N/A	N/A	N
DT70	Kirkhill Place Tullos Primary	Urban Background	395476	804452	NO_2	N	N/A	N/A	N
DT71	Tullos Hill	Urban Background	39543	803410	NO_2	N	N/A	N/A	N
DT72	North Loirston Souter Head Road Cove Allotements	Urban Background	394988	801940	NO_2	N	N/A	N/A	N
DT73	61 Skene Square	Facade	393458	806768	NO_2	N	0	6	N
DT74	5 Caroline Place	Roadside	393350	806922	NO_2	N	5	3	N
DT75	Pentland Close	Urban Background	395964	805132	NO_2	N	N/A	N/A	N
DT76	275 Holburn Street	Facade	393161	805070	NO_2	N	0	6	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?
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.

Figure A.2a NO_2 Diffusion Tube Locations

Figure A.2b NO_2 Diffusion Tube Locations

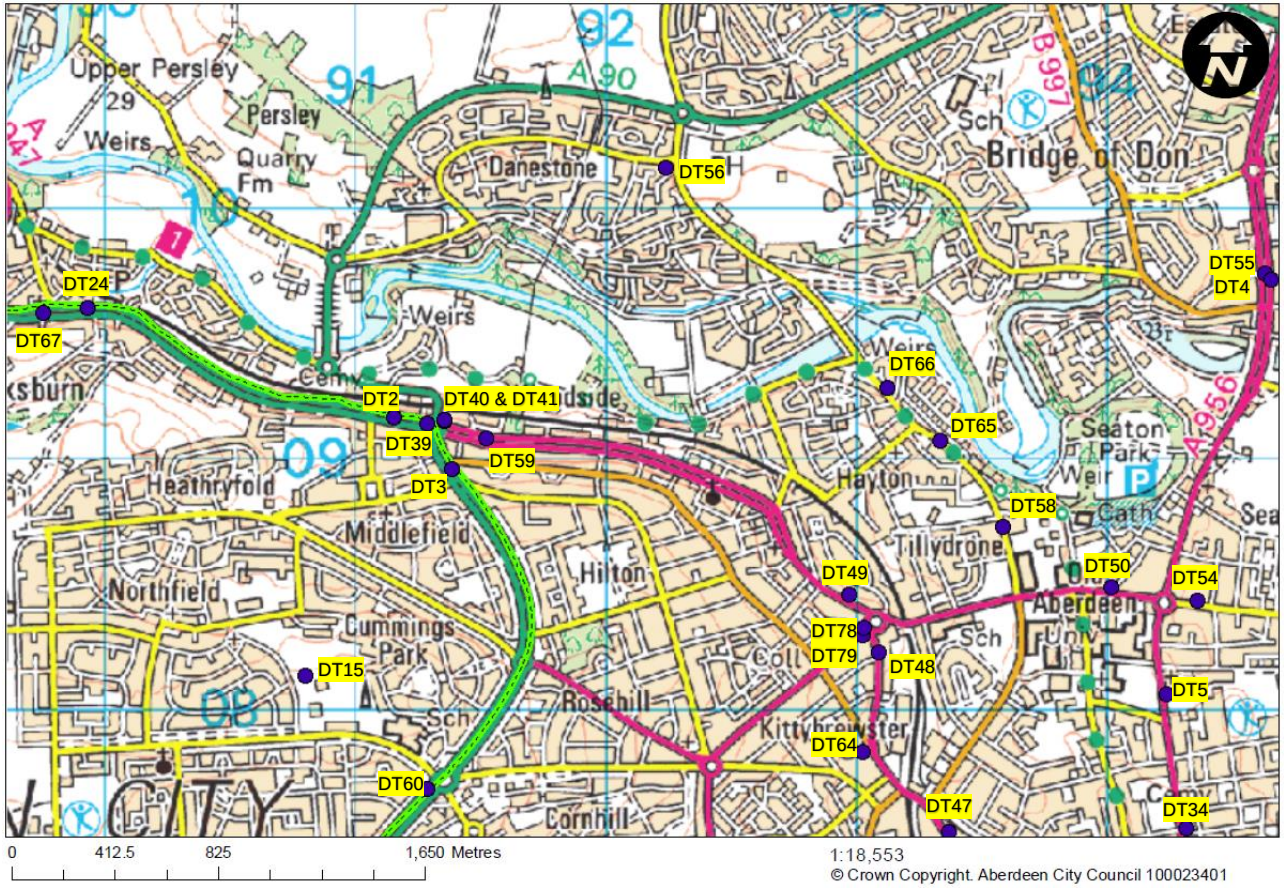

Figure A.2c NO_2 Diffusion Tube Locations

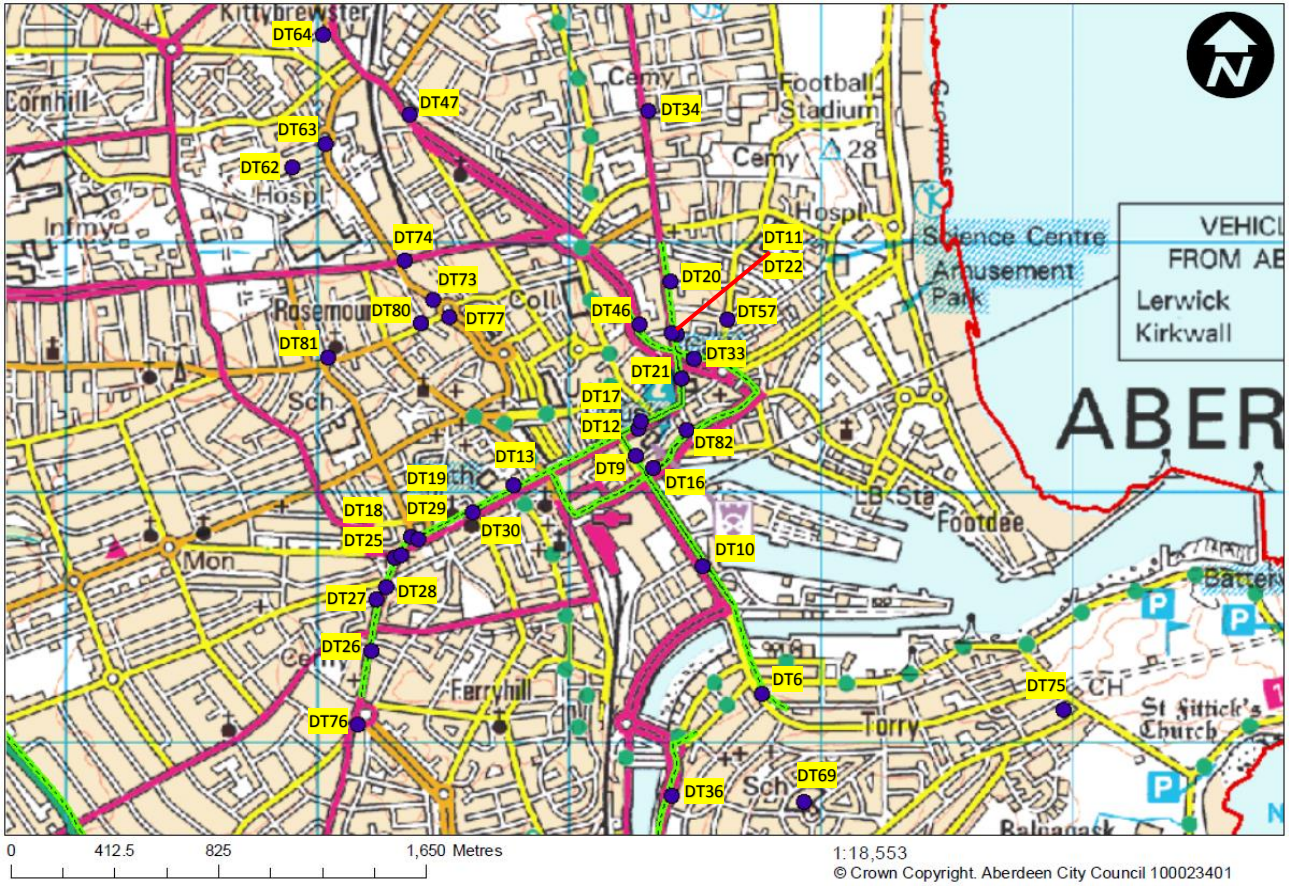

Figure A.2d NO_2 Diffusion Tube Locations

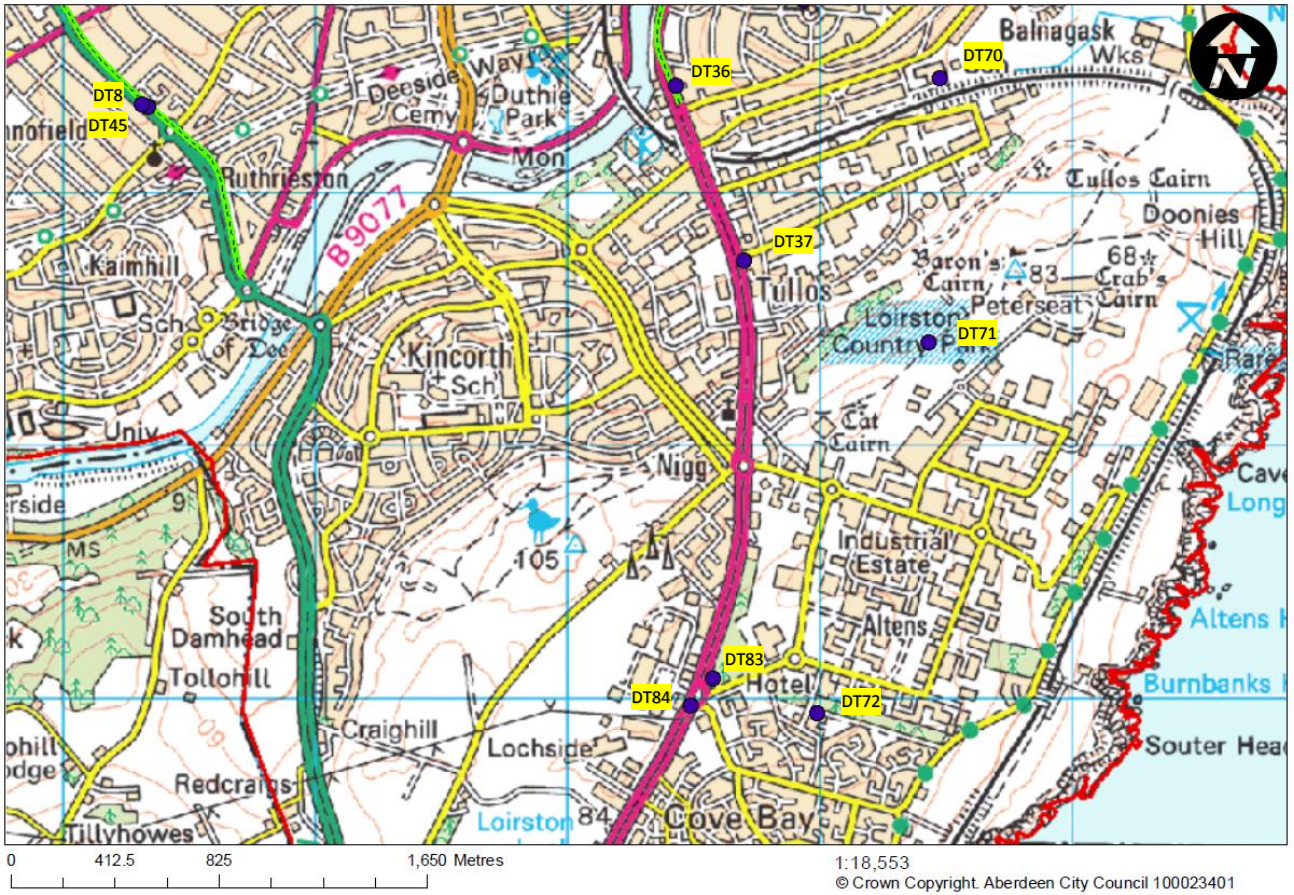

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2013	2014	2015	2016	2017
CM1	Background	Automatic		96	20(4)	21	23	21	22
CM2	Roadside	Automatic		96	**48**	**47**	**46**	**43**	**40**
CM3	Roadside	Automatic		95	**43**	40	36	35	31
CM4	Roadside	Automatic		97	22	26(4)	22	21	19
CM5	Roadside	Automatic		96	**52**	**48**(4)	40	**46**	39
CM6	Roadside	Automatic		94	28	27	28	28	23
DT2(5)	Roadside	Diffusion Tube		92	**42**	38.2	34.4	32.8	30.6
DT3(5)	Roadside	Diffusion Tube		100	27.5	26.7	24.8	24.3	22.8
DT4(5)	Roadside	Diffusion Tube		100	34.8	29.6	35.5	30.7	28.4
DT5(5)	Roadside	Diffusion Tube		92	28.4	24.9	25.3	20	21.9

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2013	2014	2015	2016	2017
DT6	Roadside	Diffusion Tube		100	34.4	35	31.3	32.5	27.8
DT7	Roadside	Diffusion Tube		100	**46.3**	**45.6**(4)	37.5	37.4	33.2
DT8(5)	Roadside	Diffusion Tube		100	39.1(4)	33.1	33.5	37.4	34.5
DT9	Roadside	Diffusion Tube		92	**57.6**	**57.5**	**50.9**	**50.2**	**47.9**
DT10	Roadside	Diffusion Tube		100	**70.4**	**53.9**	**56.1**	**54.1**	**47.6**
DT11	Roadside	Diffusion Tube		100	**64.7**	**55.3**	**54.4**	**51.1**	**48.1**
DT12	Roadside	Diffusion Tube		92	**54.3**	**51.3**	**49.8**	**48.9**	**45.9**
DT13	Roadside	Diffusion Tube		0	**43.4**	**40.5**	**41.0**	**40.9**	N/A
DT14	Urban background	Diffusion Tube		100	12.9(6)	10.5	10.0	9.6	10.1
DT15	Urban background	Diffusion Tube		92	14.5(6)	16.5	13.4	12.1	13.0
DT16	Roadside	Diffusion Tube		100	**52.3**	**48.6**	**45.4**	**43.8**	37.4

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2017 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2013	2014	2015	2016	2017
DT17	Roadside	Diffusion Tube		100	**58.2**	**55**	**51.8**	**46.7**	**42.8**
DT18	Roadside	Diffusion Tube		100	**50.1**	**47.5**	**50.2**	**48.5**	**41.6**
DT19	Roadside	Diffusion Tube		92	**54.9**	**51.4**	**53.3**	**45.4**	**40.9**
DT20	Roadside	Diffusion Tube		100	35.8	33.3	34.9	32.1	30.8
DT21	Roadside	Diffusion Tube		100	35.8	33.3	34.9	**44.1**	**41.6**
DT22	Roadside	Diffusion Tube		100	**51.1**	**45.2**	**44.1**	39.3	36.2
DT24	Roadside	Diffusion Tube		100	**47**	39.8[4]	28.8	31.6	28.0
DT25	Roadside	Diffusion Tube		83	**55**	**40.5**	**50.3**	**42.8**	37.1
DT26	Roadside	Diffusion Tube		100	33	31.7	28.7	26.6	23.8
DT27	Roadside	Diffusion Tube		100	31.6[4]	28.4	28.3	28.7	24.6
DT28[5]	Roadside	Diffusion Tube		100	**40.5**	**40.1**	36.4	34.9	30.6

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2013	2014	2015	2016	2017
DT29	Roadside	Diffusion Tube		100	**63.3**	**57.9**	**58.2**	**48.8**	**42.7**
DT30	Roadside	Diffusion Tube		100	**56.1**	**53.4**	**50.9**	**46.5**	**41.9**
DT31	Roadside	Diffusion Tube		50	37.2	33.2	32.1	34.7	32.3
DT33	Roadside	Diffusion Tube		92	**51**	**44.5**	**46.4**	**43.1**	**40.4**
DT34	Roadside	Diffusion Tube		100	33.9	31.2	29.2	28.7	27.6
DT36(5)	Roadside	Diffusion Tube		100	**43.4**	**41**	37.8	35.5	31.6
DT37(5)	Roadside	Diffusion Tube		100	30.9	26.9	28.8	28.2	23.7
DT39	Roadside	Diffusion Tube		100	**69**(4)	**63.8**	**54.2**	**47.4**	**45.4**
DT40	Facade	Diffusion Tube		100	36	36.6	39.0 (3)	n/a	31.0
DT41(5)	Roadside	Diffusion Tube		92	25.4	26.4	29.5	26	25.5
DT45	Facade	Diffusion Tube		100	37.1	**42.4**	**41.7**	30.6	25.2

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2017 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2013	2014	2015	2016	2017
DT46	Roadside	Diffusion Tube		100	33	30.4	30.1	26	25.5
DT47[5]	Roadside	Diffusion Tube		100	38.8	33.2	32.9	28.5	29.0
DT48[5]	Roadside	Diffusion Tube		100	25.9	23.2	23.2	18.9	20.0
DT49[5]	Roadside	Diffusion Tube		100	37.5	29.1	28.7	28.4	26.0
DT50[5]	Roadside	Diffusion Tube		100	25.3	22.8	22.7	18.3	19.8
DT54[5]	Roadside	Diffusion Tube		92	24.3	21.9	21.9	18.3	19.9
DT55[5]	Roadside	Diffusion Tube		92	31.3	28.1	26.9	22.9	20.9
DT56	Urban Background	Diffusion Tube		100	14.8	13.7	12.0	12.5	13.1
DT57[5]	Roadside	Diffusion Tube		100	33	30.3	30.7	29.9	23.9
DT58[5]	Roadside	Diffusion Tube		100	n/a	n/a	26[3]	20.8	22.3
DT59	Facade	Diffusion Tube		100	n/a	n/a	n/a	24.2	21.4

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2017 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2013	2014	2015	2016	2017
DT60	Roadside	Diffusion Tube		100	n/a	n/a	n/a	32.9	32.4
DT61	Roadside	Diffusion Tube		83	n/a	n/a	35.9 [3]	**40.3**	37.4
DT62	Urban Background	Diffusion Tube		92	n/a	n/a	14.5 [3]	14.4	14.0
DT63[5]	Roadside	Diffusion Tube		100	n/a	n/a	26 [3]	23	22.0
DT64	Urban Background	Diffusion Tube		100	n/a	n/a	16.9 [3]	16.9	17.2
DT65[5]	Roadside	Diffusion Tube		100	n/a	n/a	n/a	16.5[3]	18.5
DT66[5]	Roadside	Diffusion Tube		83	n/a	n/a	n/a	19[3]	21.6
DT67[5]	Roadside	Diffusion Tube		100	n/a	n/a	n/a	28.5[3]	32.2
DT69	Urban Background	Diffusion Tube		50	n/a	n/a	n/a	n/a	14.3
DT70	Urban Background	Diffusion Tube		50	n/a	n/a	n/a	n/a	14.7
DT71	Urban Background	Diffusion Tube		50	n/a	n/a	n/a	n/a	10.6

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2013	2014	2015	2016	2017
DT72	Urban Background	Diffusion Tube		50	n/a	n/a	n/a	n/a	7.8
DT73	Facade	Diffusion Tube		42	n/a	n/a	n/a	n/a	39.7
DT74(5)	Roadside	Diffusion Tube		42	n/a	n/a	n/a	n/a	32.6
DT75	Urban Background	Diffusion Tube		33	n/a	n/a	n/a	n/a	19.1
DT76	Facade	Diffusion Tube		17	n/a	n/a	n/a	n/a	19.3

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

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

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

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

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

(4) Although collection is almost 75% data has not been annualised in accordance with LAQM.TG(09) since the periods of data collection were sporadic over the 12 month period. Measured mean concentration is of data collected and therefore is a best estimate.

(5) Concentrations at nearest relevant receptor have been estimated using the "NO2 fall-off with distance calculator" described in LAQM.TG.16 and are discussed in section Appendix C.

(6) Data not bias adjusted due to lack of continuous Urban Background data.

Figure A.1: Trend in NO_2 Annual Mean Concentration (µg/m^3) Continuous Monitoring Sites 2013 – 2017

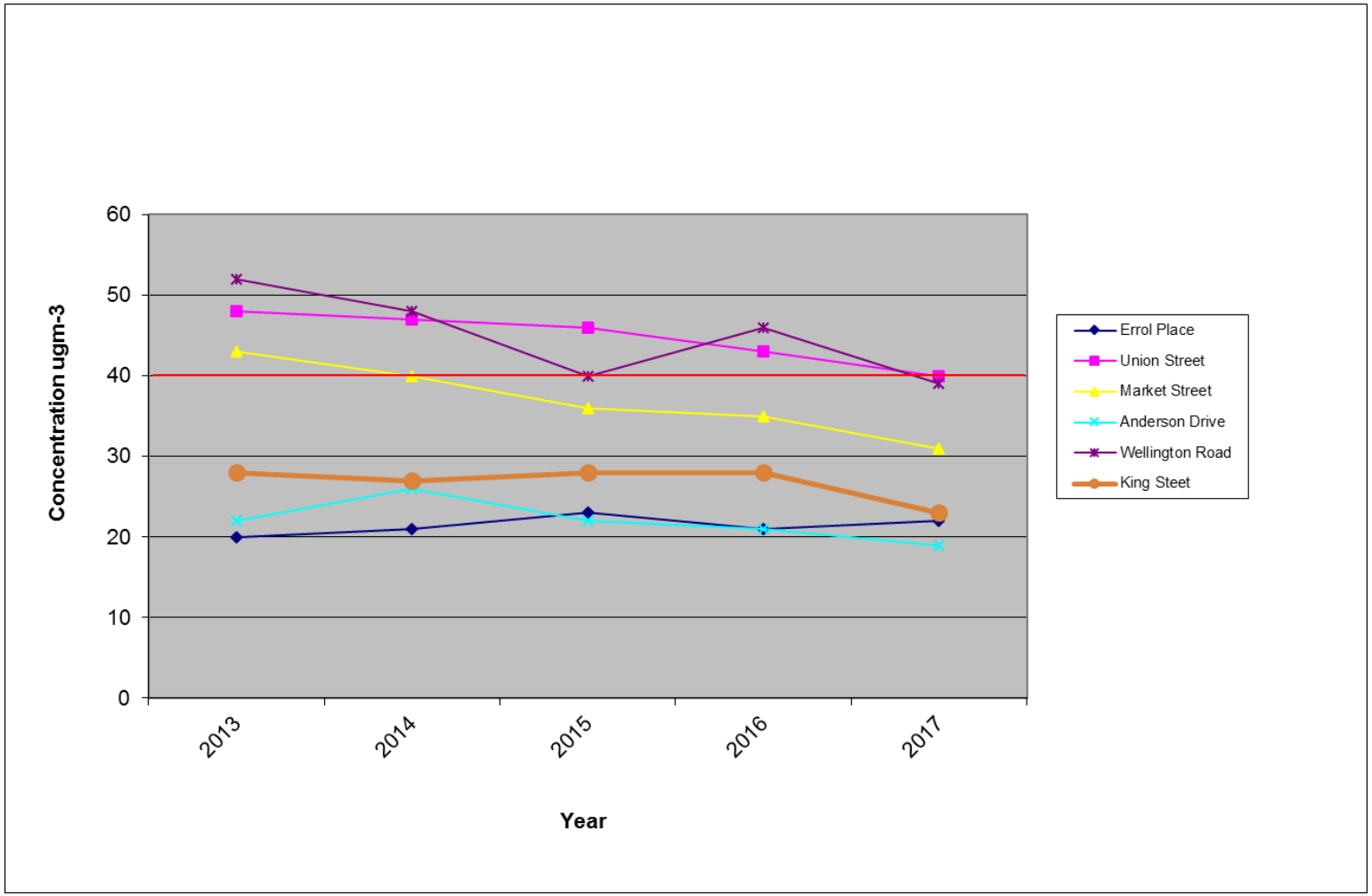

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2013	2014	2015	2016	2017
CM1	Background	Automatic		96	0 (86)	0	1	0	4
CM2	Roadside	Automatic		96	0	0	3	0	0
CM3	Roadside	Automatic		95	1	0	0	1	0
CM4	Roadside	Automatic		97	0	0(111)	0(109)	0	0
CM5	Roadside	Automatic		96	6	0(163)	0	2	0
CM6	Roadside	Automatic		94	0	0	0	0	0

Notes: Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold.**

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

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

(3) If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2013	2014	2015	2016	2017
CM1	Background		96	13	15	12	12	11
CM2	Roadside		96	**20**	18	17	13	13
CM3	Roadside		99	**26**	**26**	**19**	12	11
CM4	Roadside		85	15	15	13	12	12
CM5	Roadside		99	**22**	**21**	**20**	16	13
CM6	Roadside		91	**19**	**19**	17	16	12(4)

Notes: Exceedances of the PM_{10} annual mean objective of 18µg/m^3 are shown in **bold.**

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

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

(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.

(4) PM10 instruments: BAM from 1/1/17 to 22/6/17. Fidas from 22/6/17.

Figure A.2: Trend in PM_{10} Annual Mean Concentration (µg/m^3) Continuous Monitoring Sites 2013 - 2017

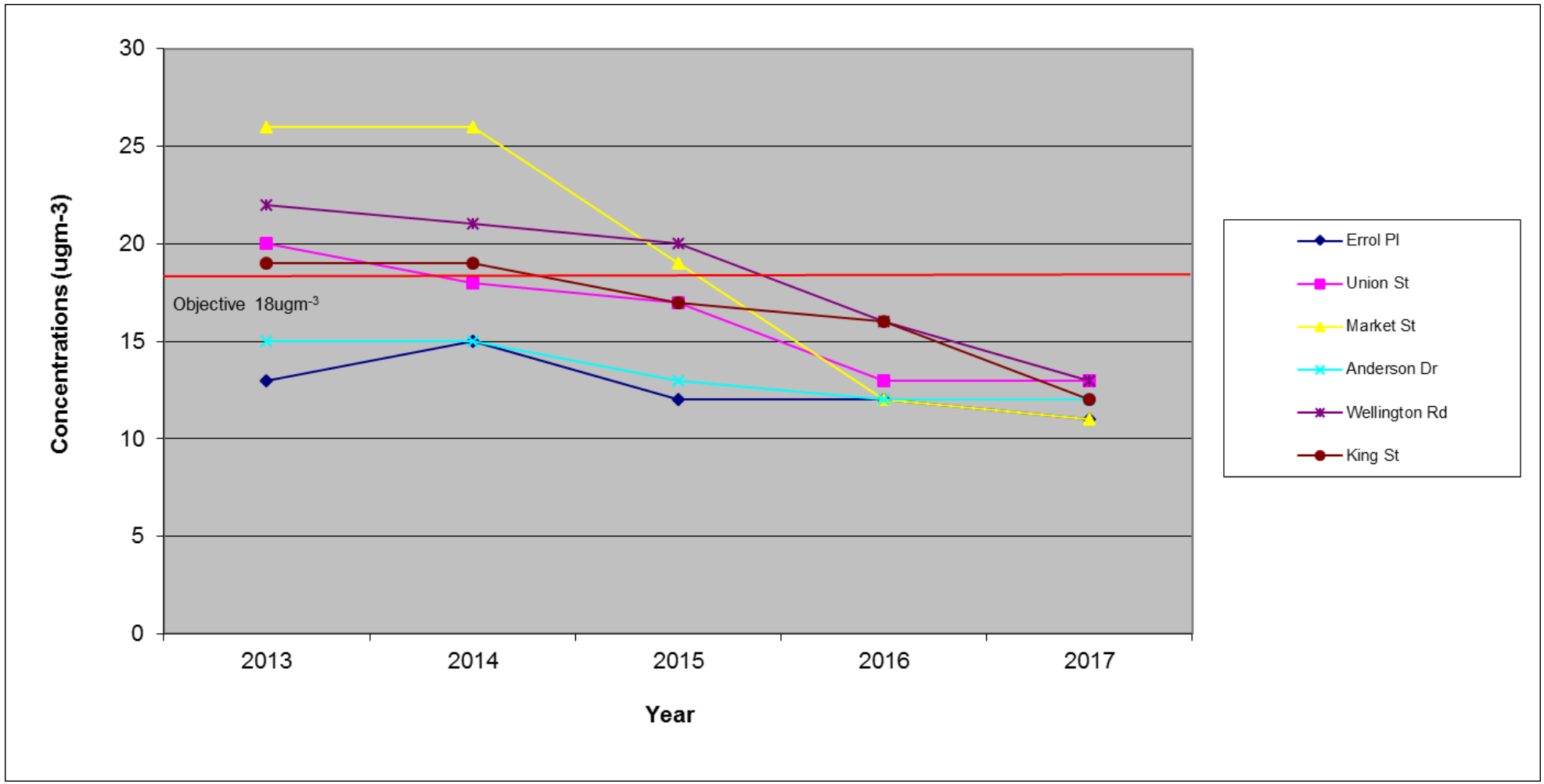

Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2013	2014	2015	2016	2017
CM1	Background		96	1 (42)	0	4	0	0
CM2	Roadside		96	4	0 (32)(4)	4(49)	0 (26)	0
CM3	Roadside		99	**59**	**22**	**12**	1	0
CM4	Roadside		85	1	0	2	0	0
CM5	Roadside		99	7	2	**16**	2(5)	0
CM6	Roadside		91	4	5	**8**	1	0(6)

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

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

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

(3) If the period of valid data is less than 85%, the 98.1st percentile of 24-hour means is provided in brackets.

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

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

(6) PM10 instruments: BAM from 1/1/17 to 22/6/17. Fidas from 22/6/17.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2013	2014	2015	2016	2017
CM1	Background		96	9	10	8	5	6
CM2	Roadside		96	n/a	n/a	**11**	7	7
CM3	Roadside		99	n/a	n/a	**11**	6	6
CM5	Roadside		99	n/a	n/a	n/a	n/a	6
CM6	Roadside		52	n/a	n/a	n/a	n/a	6

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

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO_2 Monthly Diffusion Tube Results for 2017

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)
DT2	59	55	52	44	54	46	47	48	53	48		55	51.0	39.9
DT3	40	42	52	26	48	34	36	34	38	34	37	39	38.3	30.0
DT4	65	45	46	36	32	34	30	37	43	42	51	45	42.2	33.0
DT5	57	40	43	35	34	33	28	35	44	43		50	40.2	31.4
DT6	39	32	40	33	35	31	30	32	34	35	42	43	35.5	27.8
DT7	51	46	47	35	42	34	34	38	40	40	54	49	42.5	33.2
DT8	75	66	73	61	26	54	55	54	56	62	77	79	61.5	48.1
DT9	64	64	56	49	61	52		59	60	59	75	75	61.3	47.9
DT10	65	58	64	57	58	53	53	59	59	62	74	69	60.9	47.6
DT11	70	62	62	56	52	54	52	60	64	62	76	68	61.5	48.1
DT12	64	60	61	47		51	49	57	57	62	70	67	58.6	45.9
DT13	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DT14	24	16	15	10	8	8	7	7	10	13	17	21	13.0	10.1
DT15	23	22	18	12	13	12		24	13	15	14	18	16.7	13.0
DT16	50	49	49	40	49	44	47	48	44	47	53	54	47.8	37.4
DT17	56	61	60	50	60	51	51	54	55	52	52	55	54.8	42.8
DT18	62	50	53	55	49	43	42	47	48	54	69	66	53.2	41.6
DT19	62	54	54	53	49	44	41	47	45	58	68		52.3	40.9
DT20	51	45	42	35	36	32	28	32	39	43	44	46	39.4	30.8
DT21	52	76	48	39	53	45	57	62	66	48	44	48	53.2	41.6
DT22	51	56	54	39	48	42	40	42	44	48	43	49	46.3	36.2

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)
DT24	61	33	42	36	28	25	25	26	28	33	48	45	35.8	28.0
DT25	57	54	55	41	51	43	42	39		46	46		47.4	37.1
DT26	40	36	34	23	34	27	24	22	26	28	34	37	30.4	23.8
DT27	40	36	39	27	30	28	24	24	27	29	35	39	31.5	24.6
DT28	50	46	49	34	42	37	33	33	37	38	44	48	40.9	32.0
DT29	68	66	68	50	52	54	49	54	15	55	58	66	54.6	42.7
DT30	66	56	66	44	57	51	45	48	47	49	51	63	53.6	41.9
DT31(2)	45	40	40		35	30			55				41.3	32.3
DT33		54	55	50	49	50	41	47	50	57	56	59	51.6	40.4
DT34	54	40	40	25	29	30	25	29	34	37	39	42	35.3	27.6
DT36	53	52	52	42	52	56	52	54	58	49	63	52	52.9	41.4
DT37	45	31	34	32	24	26	24	25	27	31	41	35	31.3	24.4
DT39	68	60	67	62	48	54	47	56	52	59	66	58	58.1	45.4
DT40	52	42	43	38	41	32	26	33	38	40	50	40	39.6	31.0
DT41	77	52	63	43	26	46		53	56	64	79	61	56.4	44.1
DT45	37	35	38	30	47	27	25	20	33	28	35	31	32.2	25.2
DT46	42	43	38	27	32	29	25	27	31	36	34	27	32.6	25.5
DT47	68	54	60	48	53	46	47	50	53	57	57	64	54.8	42.8
DT48	50	40	41	35	35	31	26	31	35	37	44	46	37.6	29.4
DT49	55	41	46	36	32	32	30	32	40	43	45	52	40.3	31.5
DT50	43	30	34	29	28	25	22	24	30	32	40	41	31.5	24.6
DT54	44	26	34	27	23	23	20		28	26	36	38	29.5	23.1
DT55	43	36	39	27	34	30	21	28		31	35	36	32.7	25.6
DT56	25	21	19	13	14	13	13	10	13	17	20	24	16.8	13.1

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT57	47	41	42	30	33	30	30	28	35	37	38	44	36.3	28.3
DT58	41	34	37	23	25	25	21	24	27	33	39	42	30.9	24.2
DT59	41	32	33	25	22	23	20	22	26	29	33	22	27.3	21.4
DT60	23	55	53	35	43	41	39	41	38	43	42	44	41.4	32.4
DT61	61	57		44	42	41	40		41	52	58	42	47.8	37.4
DT62	28	25	22	14	15	13	12	12	13	21	22	20/28	17.9	14.0
DT63	45	38	38	29	29	26	23	26	26	30	39	37	32.2	25.2
DT64	34	29	28	17	19	16	14	15	16	21	26	29	22.0	17.2
DT65	53	26	27	23	21	17	16	19	24	25	32	41	27.0	21.1
DT66	42	33	37	25	21		19	22		31	38	38	30.6	23.9
DT67	38	55	54	52	48	43	45	47	53	53	55	58	50.1	39.2
DT69(2)							17	12	17	18	25	24	18.3	14.3
DT70(2)							13	13	17	18	27	28	18.8	14.7
DT71(2)							12	9	12	14	18	19	13.6	10.6
DT72(2)							8	5	8	11	14	16	10	7.8
DT73(2)							49	38	53		65	61	50.8	39.7
DT74(2)							39	46	43		54	48	43.9	34.3
DT75(2)									22	27	36	38	24.5	19.1
DT76(2)											39	40	24.7	19.3

(1) See Appendix C for details on bias adjustment

(2) Annualised. See Appendix C for details.

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

QA/QC of Diffusion Tube Monitoring

Diffusion tube monitoring is carried out in accordance with the procedures contained in the guidance 'Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users' and LAQM.TG 16. All tubes, other than those co-located at the continuous analysers are attached to lampposts/downpipes at a height of approximately 2 meters above ground level and exposed for 4 to 5 weeks in line with the Defra calendar of exposure periods. Co-located tubes are located in triplicate close to the analyser air intake. All exposure times are recorded. Unexposed travel blanks are submitted to the laboratory with each batch of exposed tubes.

Aberdeen Scientific Services Laboratory 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 March 2017 to ensure laboratory guidance is being implemented. No problems were identified.

The laboratory participates in the Laboratory of the Government Chemist (LGC) AIR scheme and all results during 2017 were satisfactory (z-score < ±2).

The laboratory also participates monthly in the nitrogen dioxide "inter comparison" exercise, managed by the National Physical Laboratory. All results in April 2016 were satisfactory and the annual summary (produced by AEA Energy & Environment) indicates that the results were classified as "Good" throughout 2017 with a "Bias Correction Factor A" of 0.81.

Factor from Local Co-location Studies

Aberdeen City Council operates a co-location study at all automatic sites across the city. All results are submitted to the national bias adjustment factors (NBAFS). The national diffusion tube bias adjustment factor spreadsheet version 3/18 advises to use 0.78 for Aberdeen City. Although the Aberdeen Scientific Services Laboratory undertakes the analysis of diffusion tubes from neighbouring authorities, Aberdeen City Council is the only authority with continuous monitoring stations that can be used to calculate bias adjustment factors. Accordingly, a locally derived bias factor based on the co-located tubes at the Aberdeen continuous monitoring stations was used to adjust diffusion tube measurements at the other locations across the city. This process was considered appropriate due to the lack of other co-located studies using the laboratory for tube analysis, the remote location of Aberdeen from other conurbations and the good QA/QC performance of the laboratory.

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

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

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

Table C.1: Bias Factor Calculations

Type	DT Mean (ugm^{-3})	CM Mean (ugm^{-3})	Bias Factor A	Bias B (%)	CM Data Capture for periods used (%)	Number Monitoring Periods
Errol Place	27	21	0.78	28	96	13
Union Street	50	39	0.79	26	98	12
Wellington Rd	45	39	0.87	15	98	12
King Street	31	23	0.75	33	99	12
Market Street	41	30	0.73	37	99	12
Anderson Dr	31	23	0.75	33	99	12

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 **0.782**.

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

A separate adjustment factor is derived for background sites using the Bias A, from Errol Place, of **0.78**.

QA/QC of Automatic Monitoring

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

The Errol Place, Union Street and Wellington Road sites are part of the UK's Automatic Urban Network. All sites are part of the Scottish Government data reporting process and subject to independent audit by Ricardo AEA (RAEA) at 6 monthly intervals. Data validation and ratification is also performed by RAEA.

The analysers perform daily automatic calibrations which are used to assess the routine performance of the analysers and any long term response drift. Manual calibrations are performed by trained Council officers every two weeks using a calibration mixture traceable to national standards. These calibrations act as a check on the operation of the analysers and enable determination of the instrument response factors used to calculate the concentration of NO_2.

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 2017 for nine diffusion tube locations and the PM2.5 data at King Street. Annualisation was carried out in accordance with LAQM TG (16). Table C.2 details annualisation of diffusion tube data and C.3 for the PM2.5 data at King Street.

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

Table C.2: Annualising diffusion tube data 2017

Site ID	Type	Data	Data Capture 2015 (%)	Measured Mean Raw data (M)	Period of data	Errol Pl Annual Mean (Am)	Errol Pl Period Mean (Pm)	Ratio Am/Pm (Ra)	Estimate of annual mean at monitoring site (M x Ra)
DT31	Roadside	NO_2 Annual Mean	50	40.8	4/1/17 to 29/3/17 27/4/17 to 28/6/17 29/8/17 to 29/9/17	22.54	22.28	1.012	41.3
DT69	Roadside	NO_2 Annual Mean	50	18.8	28/6/17 to 4/1/18	22.54	23.19	0.972	18.3
DT70	Roadside	NO_2 Annual Mean	33	19.3	28/6/17 to 4/1/18	22.54	23.19	0.972	18.8
DT71	Urban Background	NO_2 Annual Mean	50	14	28/6/17 to 4/1/18	22.54	23.19	0.972	13.6
DT72	Urban Background	NO_2 Annual Mean	50	10.3	28/6/17 to 4/1/18	22.54	23.19	0.972	10.0
DT73	Roadside	NO_2 Annual Mean	42	53.2	28/6/17 to 29/9/17 1/11/17 to 4/1/18	22.54	23.61	0.954	50.8

Site ID	Type	Data	Data Capture 2015 (%)	Measured Mean Raw data (M)	Period of data	Errol Pl Annual Mean (Am)	Errol Pl Period Mean (Pm)	Ratio Am/Pm (Ra)	Estimate of annual mean at monitoring site (M x Ra)
DT74	Roadside	NO_2 Annual Mean	42	46	28/6/17 to 29/9/17 1/11/17 to 4/1/18	22.54	23.61	0.954	43.9
DT75	Urban Background	NO_2 Annual Mean	33	30.8	29/8/17 to 4/1/18	22.54	28.30	0.796	24.5
DT76	Roadside	NO_2 Annual Mean	17	39.5	1/11/17 to 4/1/18	22.54	36.06	0.625	24.7

Table C.2: Annualising King Street $PM_{2.5}$ automatic data 2017

Site ID	Type	Data	Data Capture 2015 (%)	Measured Mean Raw data (M)	Period of data	Errol Pl Annual Mean (Am)	Errol Pl Period Mean (Pm)	Ratio Am/Pm (Ra)	Estimate of annual mean at monitoring site (M x Ra)
CM6	Roadside	$PM_{2.5}$ Annual Mean	52	5	22/6/17 to 31/12/17	5.829	4.772	1.221	6

NO_2 fall-off with distance

Where it is not possible to monitor at locations representative of exposure the NO_2 concentration at the nearest relevant location for exposure has been calculated using the NO_2 fall-off with distance calculator available on the Defra website.

Background NO_2 concentration data is obtained from the Scottish Air Quality Database website. Erroll Place automatic site annual mean (urban background concentration) was used for diffusion tube DT66. This was due to the background concentration of 30.23ugm^{-3} on the SAQD website being greater than the levels measured by the monitoring location.

SAQD background data is derived from the emission inventory and for this location NOx concentrations are heavily influenced by shipping, resulting in the elevated NO_2 concentrations. Erroll Place is with 1km of the diffusion tube location and is therefore considered a more accurate value to use.

Table: C.3 Diffusion Tube concentrations showing calculations to façade (2017)

Site ID	Bias Measured Concentration	Background Concentration	Distance to kerb	Distance façade	Façade Concentration
	Cy	Cb	Dy	Dz	Cz
DT2	39.9	12.36	3	11	30.6
DT3	30.0	13.97	3	17	22.8
DT4	33.0	12.25	3	7	28.4
DT5	31.4	15.99	0.1	9	21.9
DT8	48.1	14.05	3	14	34.5
DT28	32.0	21.14	3	5	30.6
DT36	41.4	18.03	1	8	31.6
DT37	24.4	17.21	10	13	23.7
DT41	44.1	12.36	0.1	7	25.5
DT47	42.8	17.2	0.1	5	29.0
DT48	29.4	14.52	0.1	10	20.0
DT49	31.5	14.93	3	11	26.0
DT50	24.6	15.99	0.1	6	19.8
DT54	23.9	10.78	3	6	21.6
DT55	24.2	14.52	4	8	22.3
DT57	21.1	10.78	3	8	18.5
DT63	23.1	15.99	2	14	19.9
DT65	25.6	12.25	2	9	20.9
DT66	28.3	22(1)	0.1	16	23.9
DT67	25.2	17.2	2	11	22.0
DT74	39.2	11.55	3	8	32.2

Dy -distance to kerb at which concentrations were measured
Dz -distance to kerb at which concentrations are to be predicted
(1) Erroll Place measured background concentration.

PM Monitoring Adjustment

All TEOM data between 2009 to 2017 Anderson Drive and Wellington Road was corrected to gravitational equivalent by AEA using the Volatile Correction Model (VCM). Data from the BAM at King Street were also corrected by RAEA Technology (RAEA) using a gravitational factor of 0.83333.

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
APR	Air quality Annual Progress Report
ANPR	Automatic Number Plate Recognition
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
AWPR	Aberdeen Western Peripheral Route
CAFS	Clean Air for Scotland
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
LEZ	Low Emission Zone
NO_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
SAQD	Scottish Air Quality Database

Abbreviation	Description
SO_2	Sulphur Dioxide

References

1 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DETR March 2011.

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