Annual Progress Report (APR)

2018 Air Quality Annual Progress Report (APR) for The Highland Council

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

December 2018

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Report Reference number	**THCLAQMAPR2018**
Date	14th December 2018

Executive Summary: Air Quality in Our Area

Air Quality in The Highland Council

Air Quality in The Highland Council area is generally good. The existing air quality issues relate to Nitrogen dioxide pollution in Inverness City Centre. The Council monitors air quality though existing automatic network stations and with passive sampling methods to identify areas where air quality might be poor. We also use the planning process to ensure appropriate siting of development with the potential to pollute, and new sensitive receptors.

Figure 1 Passive monitoring in Inverness

An Air Quality Management Area (AQMA) was declared in 2014 for Nitrogen dioxide covering a small area around the junction between Queensgate and Academy Street where there is relevant exposure in the form of flats in upper stories.

Figure 2 Automatic Monitoring in Inverness

The Council has worked with partners, including SEPA, HITRANS, NHS Highland, Inverness BID to prepare an Action Plan to improve the Air Quality within the AQMA.

Actions to Improve Air Quality

Actions identified cover six broad areas:

- **Action 1 – Promote smarter travel choices**

  The Highland Council, in partnership with Enterprise Car Club an E-Car Club, have recently launched car clubs at multiple Council offices throughout the region.

- **Action 2 – Actively promote low emission vehicles and supporting infrastructure;**

  A Low Carbon and Active Travel Hub has been developed and located within Highland Council's centrally located Rose Street multi-storey car park.

  The hub will establish an electric vehicles charging hub with 13 multi-use electrical vehicle charging points that is capable of further expansion. It is hoped this will be a catalyst for encouraging the transition to ultra-low emission vehicles across the Highlands

- **Action 3 – use the planning system to ensure that air quality is fully considered for new development;**

- **Action 4 – Traffic management to reduce emissions within the AQMA;**

  The Council and HITRANS have been working with Sustrans Scotland and a range of city centre stakeholders on proposals to improve walking and cycling links to all three Railway Station entrances, following successful funding from the Scottish Government and Transport Scotland through Sustrans' Community Links Programme.

  HITRANS, the regional transport partnership for the Highlands and Islands, is launching a period of consultation over its Accessing Inverness proposals, which aim to make it easier and safer for pedestrians and cyclists to access the Railway Station from **Academy Street**, **Falcon Square**, and **Inverness**

Bus Station at Farraline Park/Rose Street and to enhance the surrounding streetscape.

The online consultation is due to begin on Thursday 6th December 2018 when interested parties can make their views known via The Highland Council web site – https://highland-consult.objective.co.uk/portal/ (external link).

- **Action 5 – Communication to inform the public about health impacts of air pollution and how they can change behaviour to reduce emissions and reduce exposure;**

- **Action 6 – Continue to monitor and assess air quality in line with government guidance for LAQM**.

Local Priorities and Challenges

The Highland Council will be working with partners to progress measures included in the action plan and the Action Points identified above.

How to Get Involved

Information on air quality within the Highlands can be obtained at www.highland.gov.uk/pollution

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1. Local Air Quality Management

This report provides an overview of air quality in **The Highland Council** 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) is summarises the work being undertaken by **The Highland Council** to improve air quality and any progress that has been made.

Table 1.1 – Summary of Air Quality Objectives in Scotland

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

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

2. Actions to Improve Air Quality

2.1 Air Quality Management Areas

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 **The Highland 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-ir.defra.gov.uk/aqma/details?aqma_ref=1580

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
Inverness City Centre	• NO_2 annual mean	Inverness	An area encompassing a number of properties at the junction of Academy Street and Queensgate/Strothers Lane.	Name and Link to Action Plan

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

The Highland 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 draft air quality Action Plan relating to each AQMA.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Train Station Cycle Parking	Transport Planning and Infrastructure	Enhancement to train station and cycle parking	Development and Infrastructure		Complete		Anticipated reduction in concentration, based on the result of quantitative appraisal (using dispersion modelling and/or screening tools)	Complete	Complete	Supported by HITRANS Active Travel Officer
2	Active Travel	Promoting Travel Alternatives	Further encouragement of active travel	Development and Infrastructure		Ongoing	Level of Awareness Revised travel and subsistence policy		Ongoing		Supported by HITRANS - Active Travel Officer Revised Travel and Subsistence Policy promotes active travel through new travel hierarchy
3	Pedestrian Friendly Academy Street	Traffic Management	Making Academy Street more pedestrian friendly (wider pavements, crossing points etc.	Development and Infrastructure	Ongoing		Delivery of Scheme				

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
4	Cycling Strategy	Promoting Travel Alternatives	Cycling strategy to encourage greater levels of cycling and support the 'Cycling City' concept	Development and Infrastructure			Delivery of Cycling Strategy				
5	Highland Council Travel Plan	Promoting Travel Alternatives	Travel Plan for The Highland Council	Chief Executive			Delivery of Travel Plan				
6	School Engagement	Promoting Travel Alternatives	School Travel Plans	Community Services		Ongoing	Number of School with Travel Plans				Every School in Highland now has a School Travel Plan
7	Car and Lift Sharing	Alternatives to Private vehicle Use	Promotion and Encouragement of online tool for car sharing	Development and Infrastructure		Ongoing	Number of Users				The Highland Council Launched its own Liftshare platform in 2018: https://liftshare.com/uk/community/hitravel
8	Low emission buses	Promoting low emission transport	Investigate the feasibility of increasing the number of low emission buses in Inverness	Community Services							
9	Limits on Euro Standards of Buses	Promoting low emission transport	Limits on Euro Standards of buses could be implemented through the SQP	Community Services							

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
10	Electric Vehicle Charge Points	Promoting low emission transport	Further electric charging points in Inverness City Centre and on the road network in the Highlands	Development and Infrastructure					Ongoing		
11	Lower Emission Council Fleet	Vehicle Fleet Efficiency	Investigating using lower emission vehicles within the Council fleet	Community Services			Number of low emission vehicles in Council Fleet		Ongoing		Pilot car club scheme incorporating 14 hybrid vehicles to 5 sites in 2018 and secured additional 5 EVs through Switched On Fleets Initiative
12	Reduce Taxi Emissions	Promoting low emission transport	Investigate using taxi licensing system to reduce emissions from taxis	Community Services							
13	Investigate parking Charge differentiat-ion for LEVs	Promoting low emission transport	Feasibility study investigating the use of parking charge differentiation for LEVs	Community Services							
14	Ecostars	Promoting low emission transport	Consider ecostars for council fleet or promotion of ecostars to external parties	Community Services							
15	Identify relevant planning applications	Policy Guidance and Development Control	Ensuring that relevant planning applications are identified in consultation process	Development and Infrastructure							

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
16	Air quality impact assessment of development	Policy Guidance and Development Control	Ensuring that planning application with potential air quality impacts are fully assessed for their impacts, at relevant locations using appropriate methodologies	Development and Infrastructure					Ongoing		
17	Encouraging travel plans	Promoting Travel Alternatives	Encouraging travel plans for relevant new development	Development and Infrastructure					Ongoing		
18	Encourage Electric vehicle infrastructure	Promoting low emission transport	Encouraging electric vehicle infrastructure through the planning system	Development and Infrastrusture					Ongoing		
19	Providing Sustainable Transport Information	Policy Guidance and Development Control	Providing information re sustainable transport for residents of new development	Development and Infrastructure					Ongoing		
20	Traffic management on Academy Street	Traffic Management	Use SCOOT system more effectively to ensure traffic is not queueing on Academy Street	Development and Infrastructure					Ongoing		

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
21	Microsimulat -ion modelling	Traffic management	Study using microsimulation modelling to more accurately investigate impacts of traffic light phasing at the Academy Street – Queensgate junction	Development and Infrastructure							
22	Bus Movements Review	Transport Planning and Infrastructure	Review bus movements round Inverness, in terms of routes in and out of the bus station, bus stops and routes around the city centre	Community Services							
23	Completion of Phase 1 West Link	Transport Planning and Infrastructure	Reduction of through city centre traffic by completion of A82 to A9 bypass	Development and Infrastructure					Complete 2018		
24	Investigate Shortening Delivery Hours	Freight and Delivery Management	Investigate the feasibility of shortening delivery hours to reduce the impact of delivery vehicles on peak time congestion	Community Services							

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
25	Investigate Refuse Collection Vehicle Delivery times	Freight and Delivery Management	Investigate the feasibility of taking refuse collection vehicles out of the city centre at peak times	Community Services							
26	Commun-icate with residents	Public Information	Communicate with residents in the AQMA, and more widely, about the issues and this action plan	Community Services							
27	Improve Bus Information Provision	Public Information	Improve bus information provision	Community Services							
28	Real time bus information	Public information	Provide real time bus information	Community Services							
29	Active Travel Campaigns	Promoting travel alternatives	Support existing active travel campaigns (step count challenge/Big Bike Revival/Cycling Scotland Workplace Grant)	Development and Infrastructure					ongoing		In conjunction with HITRANS The Highland Council to launch pilot pool bike scheme in September 2018
30	Signposting to Car parks and other destinations	Transport Planning and Infrastructure	Review signposting around city centre to encourage traffic away from AQMA	Community Services							

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
31	Improve commun-ication within the council	Policy Guidance and Development Control	Workshop for council officers	Chief Executive							

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. Progress by The Highland Council against relevant actions within this strategy is demonstrated below.

2.3.1 Transport – Avoiding travel – T1

All local authorities should ensure that they have a corporate travel plan (perhaps within a carbon management plan) which is consistent with any local air quality action plan. The Highland Council has a local transport strategy and in partnership with The Highlands and Islands Strategic Transport Partnership (HITRANS), The Highland Council is developing a series of Active travel audits and masterplans.

The purpose of these plans is to help establish a network for walking, cycling and access to public transport. The audits and masterplans will identify a core active travel network and prioritised action plans in each location which will serve as a framework for future investment and new development. These are accessible via the link:https://www.highland.gov.uk/info/1523/transport_and_streets/121/local_transport_planning

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

Scottish Government expects any Scottish local authority which has or is currently developing a Sustainable Energy Action Plan to ensure that air quality considerations are covered.

Carbon CLEVER is a Highland Council-led initiative with a target of a carbon neutral Inverness in a low carbon Highlands by 2025. By 2025, the Highlands will be a region where its residents and visitors can move around easily by low carbon and sustainable forms of transport. Information on Carbon CLEVER is available via the link: https://www.highland.gov.uk/info/1210/environment/321/climate_change/2 .

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.

The Highland Council undertook automatic (continuous) monitoring at 1 site during 2017. In addition DEFRA undertook monitoring, as part of the Automatic Urban and Rural Network at 3 sites. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at http://www.scottishairquality.co.uk/data/data-selector .

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.

3.1.2 Non-Automatic Monitoring Sites

The Highland Council undertook non- automatic (passive) monitoring of NO_2 at 29 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. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

Four sites were removed for the 2017 monitoring year and 5 new sites were added.

3.2 Individual pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for annualisation, laboratory bias and distance from the carriageway. 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.

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

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. There were three monitoring sites where the recorded annual mean exceeded the air quality objective of 40µg/m^3.

These were:

- site IV2G (41.7ug/m^3) – this diffusion tube site is toward the southeast end of Academy Street. There is no relevant exposure for the Annual Mean Objective in this section of Academy Street.
- Site IV9A (47.5ug/m^3) – this diffusion tube site is within the AQMA on the south side of Queensgate at the junction with Academy Street. The diffusion tube is mounted on street furniture at kerbside. There is no relevant exposure for the Annual Mean Objective adjacent to this site. The nearest relevant exposure is on the north side of Queensgate on the other side of the street. The automatic monitor (IV3) and the diffusion tube site IV9B are on the side of the street adjacent to relevant exposure and returned annual mean of 38ug/m^3 and 30ug/m^3 respectively.
- Site IV9C (42.9ug/m^3) – this diffusion tube site is within the AQMA on the north side of Academy Street at the junction with Queensgate. The diffusion tube is mounted on street furniture at the façade of a retail unit. Again there is no relevant exposure for the Annual Mean Objective adjacent to the site. The nearest relvant exposure is on the north side of Academy Street west of the junction with Strothers Lane. Diffusion tube site IV9D adjacent to this relevant exposure has returned an annual mean of 27.7ug/m^3 .

There were no recorded annual means greater than 60ug/m3 recorded, which might indicate an exceedance of the 1-hour Mean Objective.

3.2.2 Particulate Matter (PM_{10})

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

Table A.6 in Appendix A compares the ratified continuous monitored 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 air quality objectives for this pollutant within Highland in 2017.

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.

There were no exceedances of the air quality objectives for this pollutant within Highland in 2017.

3.2.4 Sulphur Dioxide (SO_2)

The Highland Council does not undertake any monitoring for Sulphur dioxide

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

The Highland Council does not monitor for these pollutants and there has been no change in their status since the previous report was submitted

4. New Local Developments

4.1 Road Traffic Sources

There are no new: narrow congested streets with residential properties close to the kerb; busy streets where people may spend one hour or more close to traffic; roads with a high flow of buses and/or HGVs; junctions; new roads constructed or proposed; roads with significantly changed traffic flows; and bus or coach stations.

4.2 Other Transport Sources

There are no new 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 tem exposure within 30m; or ports for shipping.

4.3 Industrial Sources

Liberty Aluminium Wheels manufacturing, Fort William.

In 2017 planning application was approved for an Aluminium Wheels manufacturing facility at Fort William in Lochaber. An air quality assessment was included as part of the environmental impact assessment for the development. The development will be subject to PPC regulation by SEPA.

The air quality assessment concluded the development would result in negligible or insignificant impacts upon local air quality.

4.4 Commercial and Domestic Sources

There were six new biomass combustion sources identified in 2017. None of the developments was likely to result in significant air quality impacts. Details of the developments are included in Appendix D. All of the developments were screened out of further consideration for LAQM.

4.5 New Developments with Fugitive or Uncontrolled Sources

There were no new potential sources of fugitive or uncontrolled particulate matter identified.

5. Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

Monitoring in 2017 has not identified any relevant locations outside existing AQMA with potential or actual exceedances.

Not all monitoring results within the AQMA are below the air quality objective such that it may be appropriate to revoke the AQMA.

5.2 Conclusions relating to New Local Developments

No New developments were identified with the potential to introduce a new exceedance of relevant objectives or exacerbate existing ones

5.3 Proposed Actions

There are no new exceedances of AQS objectives have been identified by monitoring within Highland. There is no evidence at present for additional AQMA or for the existing AQMA boundary to be amended or revoked.

There is ongoing work considering installation of multiple real time sensors (non-reference method) to provide short time span (seconds) recording to allow identification of key sources and potential traffic solutions affecting the existing AQMA (Queensgate)

Although the action points have progress in 2018, work is still ongoing to have the completed draft Action Plan finalised and published.

The next APR will be due in June 2019.

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)
IV4	Inverness	Roadside	265709	845670	NO2; PM10; PM2.5	N	Chemiluminescent; Daily Gravimetric	2.5	4	3
FW	Fort William	Suburban	210857	774431	NO2; Ozone	N	Chemiluminescent	77	47	2.5
SV1	Strath Vaich	Rural	234831	875029	Ozone	N	Chemiluminescent	717	n/a	3
IV3	Inverness Academy Street	Roadside	266650	845446	NO2	Y	Chemiluminescent	0	4	1.3

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

(2) N/A if not applicable.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
IV1	Union Street	Roadside	266681	845361	NO2	N	0	4	N
IV2E	Academy Street E	Kerbside	266610	845487	NO2	N	1.5	1.5	N
IV2F	Academy Street F	Roadside	266629	845473	NO2	N	N/A	2	N
IV2G	Academy Street G	Roadside	266704	845413	NO2	N	N/A	2	N
IV3A	Queensgate A	Roadside	266650	845428	NO2	Y	0	4	N
IV3C	Queensgate C	Roadside	266609	845404	NO2	N	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?
IV3H	Queensgate H	Roadside	266650	845446	NO2	Y	0	4	Y
IV3K	Queensgate K	Roadside	266650	845446	NO2	Y	0	4	Y
IV3L	Queensgate L	Roadside	266650	845446	NO2	Y	0	4	Y
IV4A	Telford Street A	Roadside	265710	845672	NO2	N	2.5	4	Y
IV4B	Telford Street B	Roadside	265710	845672	NO2	N	2.5	4	Y
IV4C	Telford Street C	Roadside	265710	845672	NO2	N	2.5	4	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
IV6A	Church Street A	Roadside	266586	845337	NO2	N	0	2	N
IV6B	Church Street B	Roadside	266513	845476	NO2	N	2.5	2.5	N
IV7	Strothers Lane	Roadside	266706	845506	NO2	N	0	3	N
IV8	Margaret Street	Roadside	266654	845532	NO2	N	0	3	N
IV9A	Academy St /Queensgate A	Kerbside	266666	845441	NO2	Y	N/A	3	N
IV9B	Academy St /Queensgate B	Kerbside	266657	845447	NO2	Y	3.5	0.5	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?
IV9C	Academy St /Queensgate C	Roadside	266677	845451	NO2	Y	N/A	2	N
IV9D	Academy St /Queensgate	Kerbside	266659	845467	NO2	Y	2.5	0.5	N
NK1	Drumsmittal Road, North Kessock	Suburban	264950	848387	NO2	N	0	32	N
RC1	Wyvis Terrace, Dingwall	Roadside	254430	858968	NO2	N	7.5	1	N
RC2	Station Road, Dingwall	Roadside	255200	858185	NO2	N	0	1	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
RC3	Kintail Place, Dingwall	Urban Background	255112	859866	NO2	N	4	1	N
RC4	Burns Crescent, Dingwall	Urban Background	254420	859288	NO2	N	4	1	N
FW2	McAndie Court, Fort William	Roadside	211342	774369	NO2	N	3	2.5	N
FW3	McAndie Court, Fort William	Roadside	211355	774386	NO2	N	0	5	N

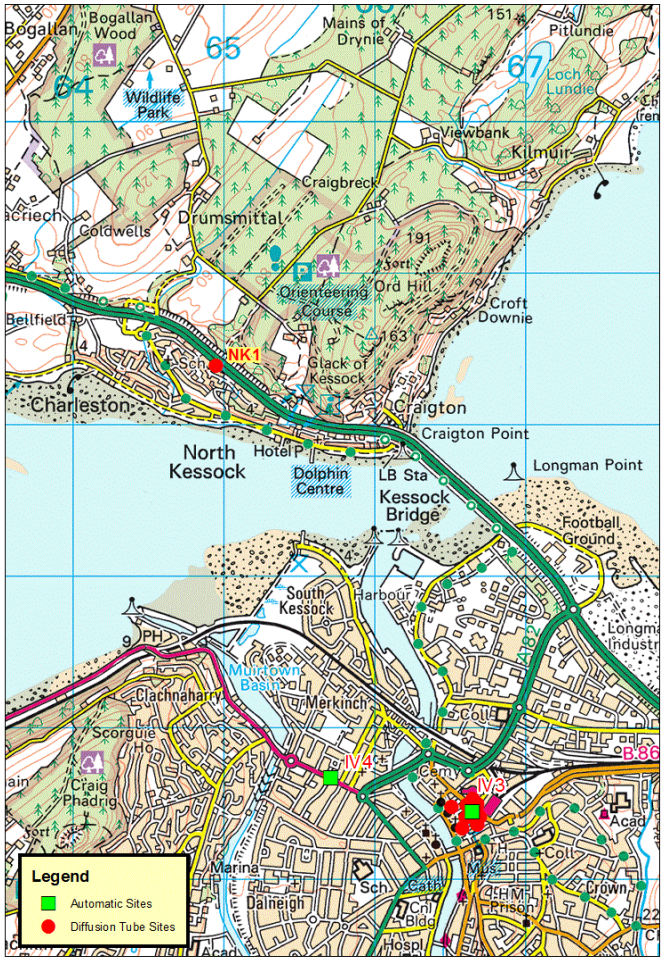
Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
FW4	Belford Road, Fort William	Roadside	211148	774294	NO2	N	6.8	2	N
FW5	Belford Road, Fort William	Roadside	210818	774188	NO2	N	10	2	N

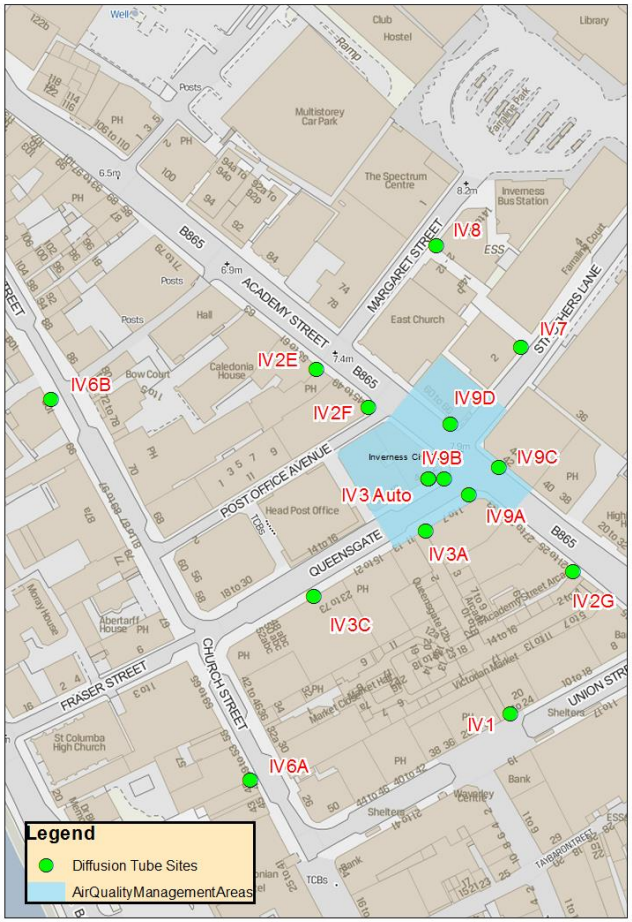
(1) 0 if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

Maps of Monitoring Sites

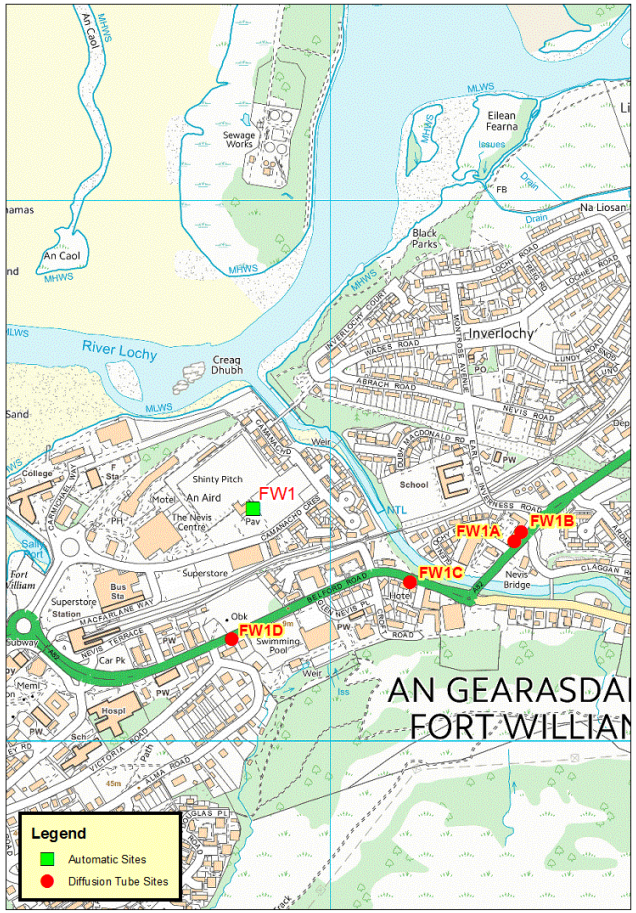
Inverness Sites

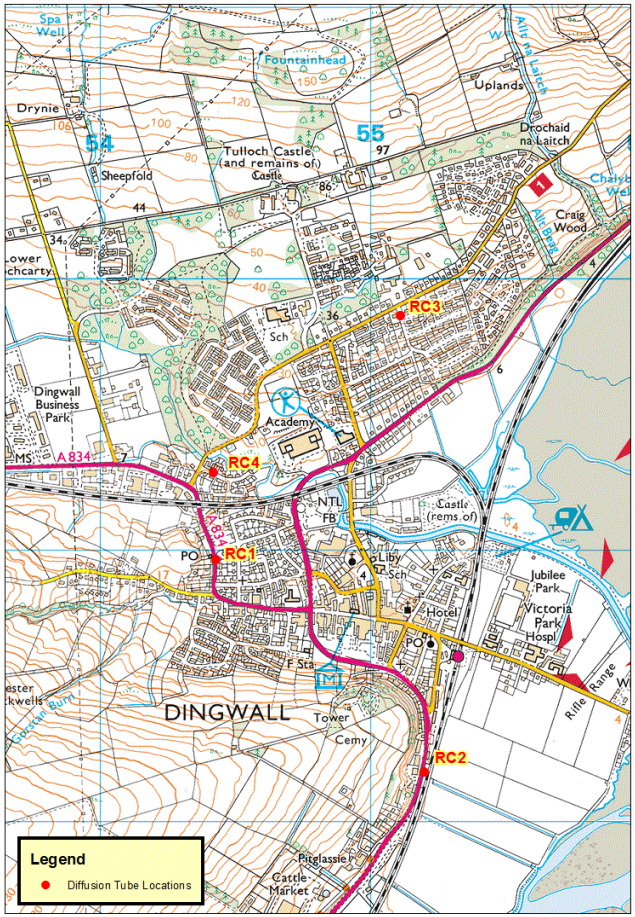




Maps of Monitoring Sites

Fort William and Dingwall sites





Maps of Monitoring Sites

Strath Vaich

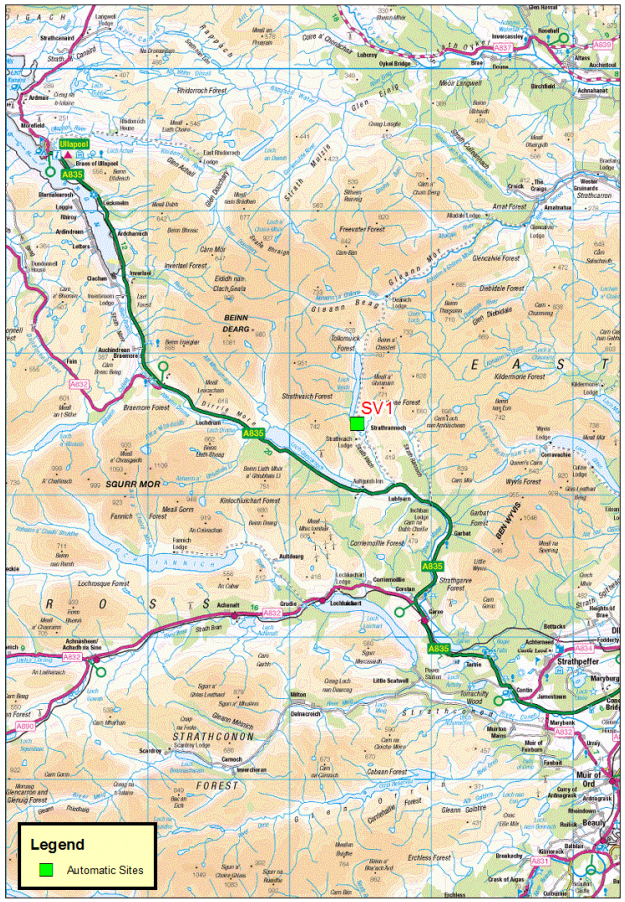


Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2013	2014	2015	2016	2017
IV4	Roadside	Auto	97	97	21	21	25.3	26.4	20.1
FW1	Suburban	Auto	94	94	9	11	12.7	10.1	10
IV3	Roadside	Auto	95	95				36.8	38
IV1	Roadside	Passive	33.3	33.3	27.4	26.4	20.4	26.7	20.1
IV2E	Roadside	Passive	91.7	91.7	**42.1**	39.2	36.6	37.2	35.3
IV2F	Roadside	Passive	75	75	39.9	38.2	38.1	**42.4**	40
IV2G	Roadside	Passive	91.7	91.7	**40.8**	38.7	39.3	**45.7**	**41.7**
IV3A	Roadside	Passive	75	75	38.4	37.1	32.1	38	35.9
IV3C	Roadside	Passive	91.7	91.7	34.4	31.3	35.2	37.5	30.9
IV3H	Roadside	Passive	83.3	83.3				33.2	38.5
IV3K	Roadside	Passive	91.7	91.7				33.3	38.4
IV3L	Roadside	Passive	83.3	83.3				32.7	38.7
IV4A	Roadside	Passive	91.7	91.7	22.3	21.2	21.5	25	20.5
IV4B	Roadside	Passive	91.7	91.7	22.9	20.6	20.8	25.4	21.2
IV4C	Roadside	Passive	91.7	91.7	22.8	20.2	21	25.4	20.7
IV6A	Roadside	Passive	91.7	91.7	29.4	31.2	25	31.8	25.4
IV6B	Roadside	Passive	91.7	91.7	19.2	19	17.1	18.1	19.1
IV7	Roadside	Passive	83.3	83.3	33.9	30.3	24.3	29.6	29.7
IV8	Roadside	Passive	91.7	91.7	25.5	22.5	21.9	24.4	23.2
IV9A	Kerbside	Passive	91.7	91.7		37.8	**44.8**	**49.9**	**47.5**
IV9B	Kerbside	Passive	91.7	91.7		29.1	36.2	29.0	30
IV9C	Roadside	Passive	83.3	83.3		33.1	32.6	37.7	**42.9**
IV9D	Kerbside	Passive	83.3	83.3		28.9	31.7	26.7	27.7
NK1	Roadside	Passive	90	75					12.1

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
RC1	Roadside	Passive	91.7	91.7	17.6	16.2	17.6	13.6	14.4
RC2	Roadside	Passive	91.7	91.7	30.8	28.7	27.6	32.1	33.6
RC3	Urban Background	Passive	91.7	91.7	7.1	6.9	6.7	7.9	6.6
RC4	Urban Background	Passive	91.7	91.7	8.9	8.1	7.9	8.5	8.2
FW1	Roadside	Passive	100	16.7					17.4
FW2	Roadside	Passive	100	16.7					15.8
FW3	Roadside	Passive	100	16.7					12.8
FW4	Roadside	Passive	100	16.7					12.1

Notes: Exceedences of the NO_2 annual mean objective of $40\mu g/m^3$ are shown in **bold**.

NO_2 annual means exceeding $60\mu g/m^3$, indicating a potential exceedence 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%. Where appropriate means have been corrected for distance from relevant exposure to kerbside as LAQM.TG(16). See Appendix C for details.

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
IV4	Roadside	Automatic	97	97	0	0	0(106)	0	0
FW1	Urban Background	Automatic	94	94	0	0	0(70)	0	0
IV3	Roadside	Automatic	96	96	-	-	-	0(115)	0

Notes: Exceedences 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.

Figure A1 - Trend in Nitrogen dioxide annual mean 2008 – 2017 for automatic sites

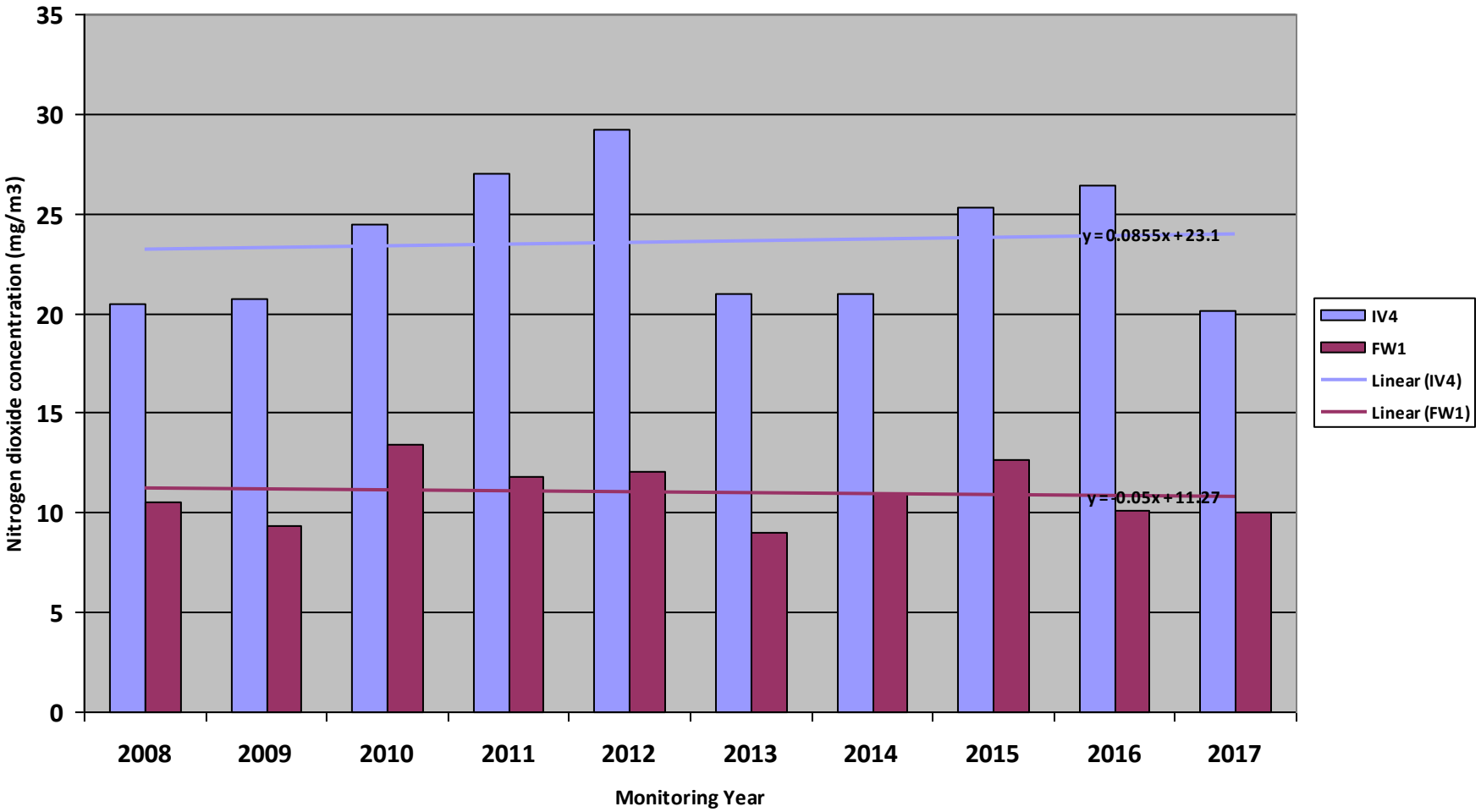


Figure A2 - Trend in Nitrogen dioxide annual mean 2008 – 2017 for selected passive sites

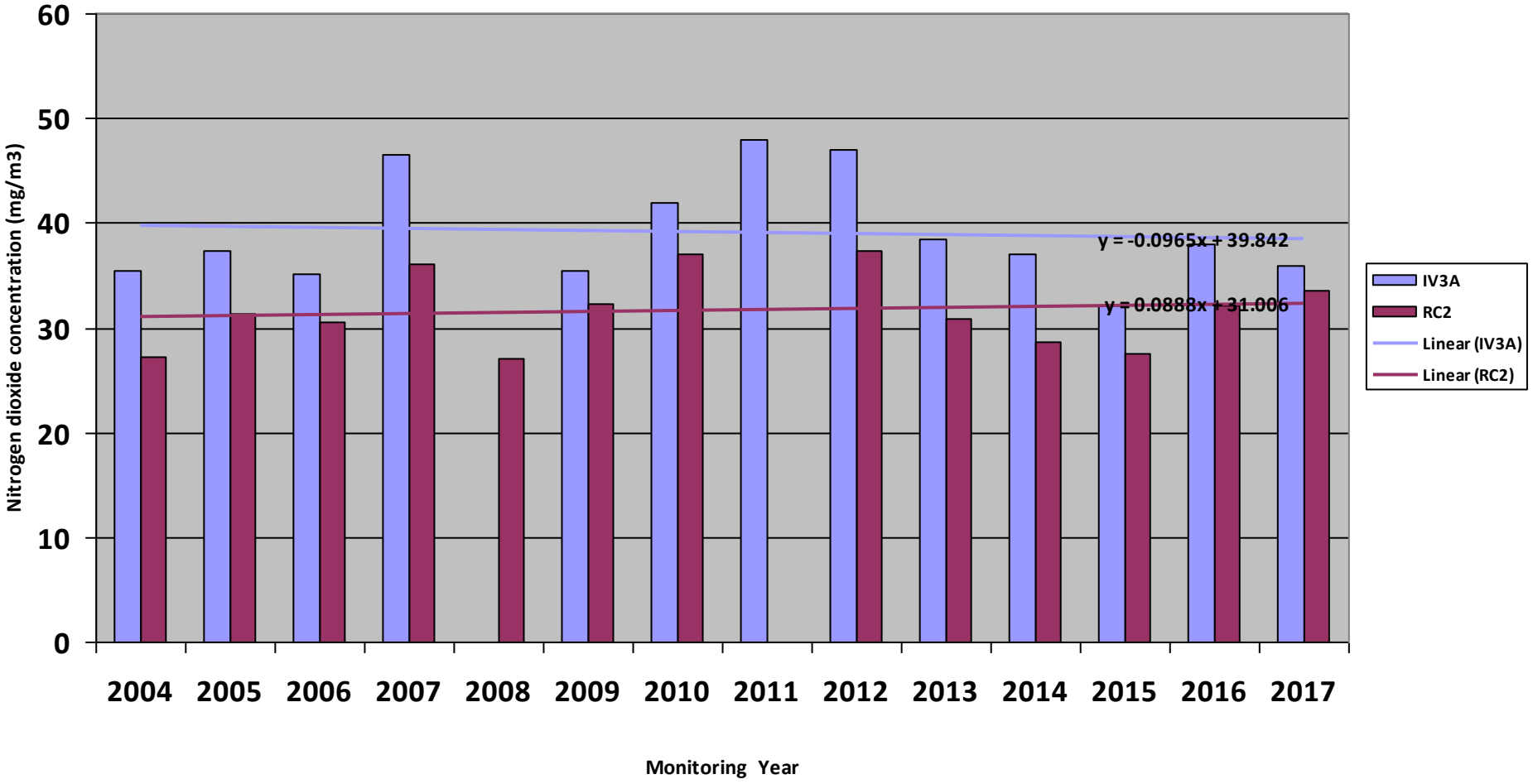


Table A.5 – Annual Mean PM_{10} Monitoring Results

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
IV4	Roadside	93	93	12	11	9	9	10

Notes: Exceedences 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.

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
IV4	Roadside	93	93	0	0	0	0	0

Notes: Exceedences 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.

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
IV4	Roadside	96	96	6	6	5	5	4

Notes: Exceedences 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 ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
IV1	22.6	27.8	23.9	22.1	-	-	-	-	-	-	-	-	24.1	23.1
IV2E	38.9	52.1	45.4	40.8	-	42.1	39.5	37.8	43.9	37.5	40.2	42.1	41.8	40.2
IV2F	40.5	53	42.1	42.3	-	-	36.5	36.9	-	38.8	41.2	44	41.7	40
IV2G	40	47.5	50.8	40.8	-	43.2	36.7	39.3	45.5	39.6	47.8	46	43.4	41.7
IV3A	-	-	34.8	38.8	-	35.2	36.9	37.1	40.3	36.5	37	40.4	37.4	35.9
IV3C	28.5	36	37.2	31.6	-	31.8	32.4	30	33.6	28.3	31.3	33.5	32.2	30.9
IV3H	35.9	42.2	35.2	38.2	-	37.4	31.5	33.7	37.4	33.3	35.4	-	36	38.5
IV3K	36.1	40.6	37.4	37.3	-	36.7	30.7	33.6	36	36.5	38.5	31.8	35.9	38.4
IV3L	30.7	38.7	38.5	38.3	-	40.2	32.3	33.5	40.2	33.5	35.6	-	36.2	38.7
IV4A	25.2	27.8	26.2	22.2	-	20.4	15.2	18.1	24.4	22.8	28.9	28.5	23.6	20.5
IV4B	28.4	30.3	26.8	23	-	17.5	15.8	19.4	23.8	22.6	30	30.1	24.3	21.2
IV4C	28.9	29.2	24.7	19.9	-	18.7	16.1	18.4	23	22.7	28.4	31.5	23.8	20.7
IV6A	24.4	23.4	41.7	19.3	-	31.1	26.3	23.6	24.6	24.9	25.2	26.7	26.5	25.4
IV6B	29.6	30.3	25.4	13.2	-	19.7	17.8	18.1	20.3	18.4	20.5	30.8	22.2	21.3

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
IV7	27.4	-	34.8	31.5	-	29.5	25.9	36.8	24.6	30.7	33.5	34.9	30.9	29.7
IV8	23.5	30	24.8	23.3	-	23.2	20.6	21.9	24.3	26.3	21.7	26.3	24.2	23.2
IV9A	35.9	44.9	42.9	39.5	-	46	51.4	50.2	48.4	62.9	51.9	70.3	49.5	47.5
IV9B	51.4	60.7	59.2	46.4	-	41.3	34.9	35.4	42.9	35.7	42	39.3	44.5	42.7
IV9C	-	48.9	48.1	45.1	-	45.6	44.1	41.1	46.9	37.5	47.9	41.5	44.7	42.9
IV9D	-	44.4	37.2	35	-	44.7	39.6	31.8	41.2	31.8	39.2	38.4	38.3	36.8
NK1	-	-	15	6.9	-	13	8.7	9.5	10.9	12.1	15.7	22.1	12.6	12.1
RC1	34.1	26.7	25.4	17.3	-	21.1	14.8	16.5	22.5	23.3	32.9	32.7	24.3	23.3
RC2	43.2	40.9	32.9	30.6	-	35.3	27.7	29.3	34.7	33.9	39.3	37.2	35	33.6
RC3	12.6	10.4	5.2	6	-	11.2	5.4	6.5	7.3	8.6	11.6	13.1	8.9	8.5
RC4	17.3	15.7	6.4	7.2	-	11.3	6.4	7.3	10.6	10.9	15.1	15.6	11.3	10.8
FW1	-	-	-	-	-	-	-	-	-	-	31.8	34.8	33.3	32
FW2	-	-	-	-	-	-	-	-	-	-	23.5	27.3	25.4	24.4
FW3	-	-	-	-	-	-	-	-	-	-	26.6	30.5	28.6	27.4
FW4	-	-	-	-	-	-	-	-	-	-	25.7	31.2	28.5	27.4

(1) See Appendix C for details on bias adjustment

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

Adjustment of data to account for short term monitoring

Adjustments were made to the diffusion tube results of the sites identified in the table below to take account of short monitoring periods. The method described in the LAQM.TG(16) has been followed in making this adjustment. The Nitrogen dioxide concentrations reported in the main document have been corrected for the sites identified in the table with the Mean Ra value.

Automatic background site data from Aberdeen and Dundee were used in the calculation.

Table C1 Period Mean Adjustment Calculation Outputs

Site(s)	Am	Pm	Ra
IV1			
Aberdeen Errol Place	22.2	24.5	0.9
Dundee Mains Loan	12.2	14.5	0.84
		Mean Ra	**0.87**
FW1, FW2, FW3, FW4			
Aberdeen	22.2	35	0.63
Dundee	12.2	18	0.67
		Mean Ra	**0.65**

Adjustment of Data to Account for Distance from Carriageway

Nitrogen dioxide concentrations fall away sharply with distance from the carriageway. Where the monitoring location is nearer, or further away, from the carriageway than the location of relevant exposure a correction has been applied to the concentrations reported.

The NO2 Fall off with Distance from Roads Calculator version 4.2, produced by Bureau Veritas has been used to make this correction.

Table C3 – Distance from Roads Calculator Outputs.

Site ID	Distance (m)		Nitrogen dioxide Annual Mean (ug/m3)		
	Monitoring site to Kerb	Receptor to Kerb	Background Concentration	Measured Concentration (bias adjusted)	Predicted Concentration at receptor
IV4	4.0	6.5	5.1	20.1	18.1
IV2E	1.5	3.0	8.2	40.2	35.3
IV6B	2.5	5.0	8.2	21.3	19.1
IV9B	0.5	4.0	8.2	42.7	30
IV9D	0.5	3.0	8.2	36.8	27.1
RC1	1.0	8.5	2.7	23.3	14.4
RC3	1.0	5.0	2.6	8.6	6.6
RC4	1.0	5.0	2.9	10.8	8.2
FW1	2.5	5.5	3.4	20.8	17.4
FW3	2.0	8.8	3.4	17.8	12.8
FW4	2.0	10	2.8	17.8	12.1

Choice of Bias Adjustment Factor for diffusion tube monitoring

A bias adjustment factor is applied to diffusion tube monitoring results to account for bias between diffusion tube results and a reference method automatic monitor.

Bias adjustment factors are derived by undertaking a colocation study, where diffusion tubes are exposed alongside an automatic monitor.

There are two local colocation studies being undertaken in Highland. Both are in Inverness at the Automatic monitoring stations on Telford Street (IV4) and Queensgate (IV3).

The 2017 bias adjustment factor obtained by the Telford Street study was 0.87. This study included 11 periods of data.

The factor calculated using the Queensgate study returned a bias adjustment factor of 1.07. This study included 9 valid periods of data.

The two factors have been used to generate a combined local bias factor of 0.96.

DEFRA compiles a database of colocation studies from which can be obtained a national combined bias adjustment factor. The combined bias adjustment factor for Gradko 20% TEA in Water for 2017 is 0.89 and is based upon 34 studies.

LAQM.TG(16) provides advice as to which bias factor (local or national combined) should be used but ultimately states that it is up to a local authority to decide which factor is most appropriate to use in their particular circumstance.

The following decisions have been made in relation to the application of bias factors to diffusion tube monitoring data obtained by The Highland Council in 2017.

- Sites IV4(A,B&C) and IV3(H,K&L) – these are the two co location study sites so the local bias adjustment factor for each site (Bias 1 and Bias 2 respectively) has been applied to the reported data.
- All sites starting FW, RC and NK – the National database combined bias adjustment factor (Bias 4) has been applied to these sites as they are geographically distant from both local co location studies.
- All other sites have been adjusted with the combined local bias factor (Bias 3).

As an example of how choice of bias can influence reported pollutant concentrations the table below shows the resultant concentration with each bias applied for some of the diffusion tube sites with the highest concentration in this study.

Table C3 – Bias Adjustment Examples

Site ID	Raw Data	Bias 1 (0.87)	Bias 2 (1.07)	Bias 3 (0.96)	Bias 4 (0.89)
IV9A	**49.5**	**43.1**	**53**	**47.5**	**44**
IV9C	**44.7**	38.9	**47.8**	**42.9**	39.8
IV9B	**44.5**	38.7	**47.6**	**42.7**	39.6
IV2G	**43.4**	37.7	**46.4**	**41.7**	38.6
IV2E	**41.8**	36.4	**44.7**	**40.1**	37.2
IV9D	38.3	33.3	**41**	36.8	34.1
IV3A	37.4	32.5	**40**	35.9	33.3

QA/QC of Automatic Monitoring

The AURN sites in Highland are operated for DEFRA by Bureau Veritas with QA/QC provided by Ricardo E and E.

Site IV3 is operated by The Highland Council as part of the Scottish Air Quality Database (SAQD). QA/QC for the SAQD is provided by Ricardo E and E.

QA/QC of diffusion tube monitoring

Gradko who supply and analyse the tubes reported here have supplied the following QA/QC statement:

Supply and Analysis of Nitrogen Dioxide (NO2) Diffusion Tubes

Analysis of the NO2 diffusion tubes is carried out using ion chromatography techniques in accordance with Gradko International Ltd U.K.A.S. accredited (ISO/IEC 17025) internal laboratory procedure GLM 7, which is a recommended UV spectrophotometric method.
Reporting of the NO2 analysis results is sent to electronically to each authority in PDF format or if requested EXEL format. The report is issued within 10 working days from receipt of the exposed diffusion tubes to the Gradko Laboratory.

Quality Assurance: The laboratory has a fully documented Quality Management System, which has been assessed and accredited by U.K.A. S. (Accreditation No. 2187). A copy of the Quality Manual Contents Index is available on request.

Quality Control Procedures: All tube components are maintained in a high state of cleanliness. New absorbent is prepared by the Laboratory and checked for levels of nitrogen dioxide.
The diffusion tubes are prepared in a dedicated clean laboratory and stored under refrigerated conditions to maintain stability. A sample of each batch of tubes prepared is checked by the analyst for blank levels. If the tubes are stored for more than one week, a further sample is taken and checked for any increases in blank levels. If the levels reach a pre-determined value, the batch of tubes is discarded Analytical Quality Control Procedures are implemented by the use of internal standards checks using certified standards from two different sources, and the use of external proficiency schemes such as AIR/PT Scheme.

AIR is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT is a new scheme, started in April 2014, which combined two long running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme.
https://laqm.defra.gov.uk/assets/AIR-PT-Rounds-13-to-24-Apr-2016-Feb-2018.pdf

100% of submissions by Gradko to the proficiency scheme were satisfactory over the monitoring period.

Tube Exposure Procedure

The Highland Council exposes diffusion tubes according to the method described in “Passive Diffusion Air Monitors – Instruction Manual for Exposure and Location” by Gradko International Ltd. Guidance is also found in “Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance” by AEA for DEFRA.

Appendix D: Information about New Sources

Table D.1 Biomass Installations screened

Name	Location	NGR X	NGR Y	Capacity (kW)	Screening Outcome
Upper Bighouse	Strath Halladale, Caithness	288889	957586	800	Air Quality Assessment Undertaken – Detailed Assessment not required
Loch Ness Youth Hostel	Altsigh, Loch Ness	245748	819040	70	Detailed Assessment not required
Kingshouse Hotel	Glencoe, Lochaber	225924	754676	534	Detailed Assessment not required
Westfield	Thurso, Caithness	306377	964356	577	Air Quality Assessment Undertaken – Detailed Assessment not required
Wilton	Skitten Farm, Wick, Caithness	331906	956583	867	Air Quality Assessment Undertaken – Detailed Assessment not required
Kinnahaird	Contin	247071	855317	577	Detailed Assessment not required

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
APR	Air quality Annual Progress Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References