Annual Progress Report (APR)

2019 Air Quality Annual Progress Report (APR) for The Highland Council

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

July 2019

Local Authority Officer	John Murray, Senior EHO Nick Thornton, EH Technical officer
Department	Community Services
Address	38 Harbour Road, Inverness
Telephone	01349868436
E-mail	john.murray@highland.gov.uk nick.thornton@highland.gov.uk
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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. The planning process is also used 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***
- ***Action 2 – Actively promote low emission vehicles and supporting infrastructure;***
- ***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;***
- ***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.

Current Council Initiatives

The Highland Council "**Safer Routes to School**" is helping to tackle increasing traffic congestion at schools by improving safety and removing barriers to walking and cycling to school. Funding is available on application to schools for cycle storage, improving routes to school and addressing road safety issues to encourage active travel. Further information can be found at:
https://www.highland.gov.uk/info/20005/roads_and_pavements/87/road_safety/5

In addition to this there is the "**Go For It**" walking and cycling reward card incentive for pupils to avoid car travel to and from school. Walk or cycle 50 times to or from school to earn one Go For It Reward Card from the Road Safety Unit. One reward card is redeemable against one Activity Reward or one Prize Reward which include complimentary admissions to various leisure centres, cinemas and adventure parks. For full details available here:
https://www.highland.gov.uk/info/20005/roads_and_pavements/87/road_safety/2

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 2018. 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-air.defra.gov.uk/aqma/
- https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=374

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.	Currently in Final Draft

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 2018 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in the air quality Action Plan relating to the AQMA

Key completed measures are:

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

  Since the launch of the car club in May 2018, over **500,000 miles** have been driven in car club vehicles, with over **1,100 members of staff** across Highland signed up to use the scheme.

  A variety of low emission hybrid vehicles can now be booked from a number of locations including **Inverness**, **Fort William**, **Dingwall**, **Golspie**, **Portree**, **Wick** and **Aviemore**. From July onwards, vehicles will be available at the following new locations: **Bettyhill**, **Thurso**, **Alness**, **Nairn**, **Fodderty** and **Bridge Street** (Inverness). Additional vehicles will also be added to the existing fleet in Portree, Fort William and Wick.

- Lift share

  Lift share is a car sharing portal where people can advertise car journeys to people who are looking for a lift. Likewise the portal can also be used by passengers looking for a lift.

  Colleagues using the car club, car hire or their own vehicle can sign up to the Liftshare portal and check in the first instance whether someone else is making that trip, and if not, add their journey so that it can potentially be shared (this can include daily commutes). The Highland Council have a private group for sharing with other Council employees.

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

Funding has been secured for Low Carbon Travel and Transport (LCTT) hub to be developed within Highland Council's centrally located Rose Street multi-storey car park, adjacent to the AQMA.

The hub will also include 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.
The Highland Council has appointed a EV Development Officer within the Development and Infrastructure Service tasked with developing the EV infrastructure and encouraging EV uptake.

- ***Action 4 – Traffic management to reduce emissions within the AQMA;***
- Inverness Railway Station onward active travel

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. It is expected that work on the Railway Station entrance improvements will be commenced by Abellio Scotrail in 2019.

- Accessing Inverness

HITRANS, the regional transport partnership for the Highlands and Islands, after completing a period of consultation, is progressing the development of 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.

- Inverness West Link (Stage 1)

Stage 1 of the Inverness West Link was completed and opened in 2018. This new crossing of the River Ness west of the city allows travel between south east and north west of the city avoiding the city centre. In particular this connects the A82(T) with the A9(T) and A96(T). Stage 2 is expected to begin construction in 2019 and will add a new crossing of the Caledonian Canal easing congestion caused by the current single swing bridge.

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	Train Station Cycle Parking	Transport Planning and Infrastructure	Enhancement to train station and cycle parking	Development and Infrastructure	complete	ongoing	Completion of Scheme		Ongoing	2019	Improvement works being undertaken in 2019. Enhancements to all entrances – cycle routes run parallel
2	Low Carbon Transport and Travel (LCTT) Hub	Transport Planning and Infrastructure	Improvement of Public Transport Hub with integrated active travel	Development and Infrastructure	Ongoing		Completion of Scheme		In Planning phase	2020	Inverness Low Carbon and Active Travel Hub. LCTT funding received. Project includes EV charging hub and Active travel Hub at Rose Street Car Park adjacent to the AQMA and satellite hub at Raigmore Hospital
3	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 – NHS Active Travel Policy in place

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	Pedestrian Friendly Academy Street	Traffic Management	Making Academy Street more pedestrian friendly (wider pavements, crossing points etc.	Development and Infrastructure	Ongoing		Delivery of Scheme		Ongoing		Tactile Paving in place and other associated improvement works completed – Currently investigating further improvements as part of Academy Street redevelopment
5	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				See IMFLDP
6	School Engagement	Promoting Travel Alternatives	School Travel Plans	Community Services		Ongoing					Schools in Highland now have 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					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		Ongoing					6 EVs in place

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
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	complete		Impovement in EURO standard mix of bus fleet			2020	Draft SQP but not signed as yet. Will be picked up when new transport bill goes live.
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	ongoing			Ongoing		EV promotion officer post appointed within THC in 2019. Additional £800k secured from Transport Scotland for Rolling out EV Charging Points
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. Car club scheme live now in 2019. £124k secured for expending EV fleet. Investigating provision of ERCV
12	Reduce Taxi Emissions	Promoting low emission transport	Investigate using taxi licensing system to reduce emissions from taxis	Community Services			Number of LEV and ULEV Taxis operating		Ongoing		EV points provided adjacent to AQMA to encourage ULEV Taxi uptake
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			Implemented scheme		Complete		No parking Charge for EV whilst Charging

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
14	Ecostars	Promoting low emission transport	Consider ecostars for council fleet or promotion of ecostars to external parties	Community Services			Implemented scheme		No progress to date		
15	Identify relevant planning applications	Policy Guidance and Development Control	Ensuring that relevant planning applications are identified in consultation process	Development and Infrastructure	n/a	Ongoing	Relevant Planning Applications identified		Ongoing	n/a	Use of GIS system to ensure development influencing AQMA is identified
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	n/a	Ongoing	AQIAs completed		Ongoing	n/a	
17	Air Quality Mitigation in the development Planning Process	Policy Guidance and Development Control	Ensuring that appropriate mitigation is not only proposed but also implemented where relevant impacts are identified	Development and Infrastructure	n/a	Ongoing	Mitigations identified and implemented		Ongoing	n/a	
18	Encouraging travel plans	Promoting Travel Alternatives	Encouraging travel plans for relevant new development	Development and Infrastructure	n/a	ongoing	Travel plans completed		Ongoing	n/a	Policy - Developer requirement for major projects

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
19	Encourage Electric vehicle infrastructure	Promoting low emission transport	Encouraging electric vehicle infrastructure through the planning system	Development and Infrastrusture	n/a	ongoing	EV Infrastructure installed		Ongoing		New EV Development Officer Post created and filled in 2019
20	Providing Sustainable Transport Information	Policy Guidance and Development Control	Providing information re sustainable transport for residents of new development	Development and Infrastructure	n/a				Ongoing		
21	Traffic management on Academy Street	Traffic Management	Use SCOOT system more effectively to ensure traffic is not queueing on Academy Street	Development and Infrastructure	n/a	ongoing			Ongoing	2020	SCOOT system major repair work scheduled for 2019
22	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							No progress on this however overtaken by Academy Street redevelopment (see measure 4)
23	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	n/a	ongoing	Review Undertaken		ongoing	n/a	Some services now stopping on Union Street so reduced traffic on Queensgate

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
24	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	complete	Traffic reduction +10,000 journeys removed from city		Complete 2018		Work completed and new link opened in 2018
25	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	No progress to date						
26	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							
27	Commun-icate with residents	Public Information	Communicate with residents in the AQMA, and more widely, about the issues and this action plan	Community Services	ongoing	2016 and ongoing	Awareness Increased		ongoing		Already undertaken successful consultation exercise. Use publicity to increase awareness through campaigns like Clear Air Day

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
28	Improve Bus Information Provision	Public Information	Improve bus information provision	Community Services	n/a	Ongoing	Bus Information Provision Improved		ongoing		Live Bus information network widely implemented. Bus tracker app published. Smart Cities funding being considered for increasing real time information network
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	n/a	Ongoing	Uptake fo Active travel alternatives		ongoing		In conjunction with HITRANS The Highland Council launched pilot pool bike scheme in September 2018. Info on number of Bikes provided? No of journeys undertaken?
31	Signposting to Car parks and other destinations	Transport Planning and Infrastructure	Review signposting around city centre to encourage traffic away from AQMA	Community Services	In progress	2019/20	Delivery of scheme			2020	Development of Network Mesh ongoing which will provide capacity for smart signposting
32	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 https://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 **2018. In addition data was obtained from 3 automatic (continuous) monitoring operated by DEFRA. Maps of Monitoring Sites**

Inverness Sites

Maps of Monitoring Sites

Fort William and Dingwall sites

Maps of Monitoring Sites

Strath Vaich

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: Monitoring Results. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC.

In July 2018 DEFRA replaced the Partisol gravimetric PM10 and PM2.5 samplers at Telford Street, Inverness, with a FIDAS optical measurement system.

3.1.2 Non-Automatic Monitoring Sites

The Highland Council undertook non- automatic (passive) monitoring of NO_2 at **29 sites** during 2018. 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.

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.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Figure A-5

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 was one monitoring site where the recorded annual mean exceeded the air quality objective of 40µg/m3.

This was:

- Site IV9A (42.4ug/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 an annual mean of 37.8ug/m^3 and 33ug/m^3 respectively.

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

Trends

Figures A-1 in the appendix illustrate the variation in Nitrogen dioxide concentration over time at Inverness Telford Street. The highest concentration can be seen to occur in the hours at the start and end of the working day. It can also be seen that there is a strong seasonal variation with highest concentrations occuring in winter.

Figure A-2 provides the same analysis of the data from Inverness Academy Street. At this location highest concentrations occur on Saturday, demonstrating that this area is influenced by retail and weekend entertainment traffic.

Figure A-3 shows the long term trend at automatic monitoring sites. Both Inverness Telford Street and Fort William have shown a gradually decreasing trend over the last 10 years although this trend is very slight and with some significant variation year on year, There is insufficient data at Inverness Academy Street to demonstrate a long term trend.

Figure A-4 shows the long term trend at two of the longest running passive diffusion tube sites: IV3A which is withing the AQMA on Queensgate; and RC2 which is on Station Road in the county town of Dingwall. Again the trend is very slight,

Figure A-5 shows the detailed time history of Nitrogen dioxide concentrations at the Inverness Academy Street site through December 2018. There is a clear large reduction in pollutant concentration on the public holidays of the 25th and 26th December, clearly demonstrating the influence of traffic on pollutant concentrations within the AQMA.

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 air quality objectives for this pollutant within Highland in 2018.

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 2018.

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

There are no new industrial installations; or existing installations where emissions have substantially increased; or new or significantly changed installations with no previous air quality assessment.

There are no new major fuel storage depots storing petrol, petrol stations, or poultry farms.

4.4 Commercial and Domestic Sources

There were three new biomass combustion sources identified in 2018. 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. Planning Applications

The following developments currently in the development planning process will be considered in terms of impact upon local air quality:

- Ardersier Port Development
- Inverness West Link (Stage 2)
- Alness Academy Biomass Heating
- Upper Remore Quarry
- Mid Lairgs Quarry (extension)

Table D-2 in the appendix contains more detail of these developments.

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

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

Within the AQMA most monitoring sites recorded Nitrogen dioxide annual mean concentrations that are below the air quality objective in 2018. There was one diffusion tube site where the Nitrogen dioxide annual mean concentration was above the objective, although this site is not at a location within the AQMA where there is relevant exposure adjacent.

6.2 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

6.3 Proposed Actions

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.

Funding has been secured to obtain multiple non-reference real time sensors which will be implemented in and around the AQMA.

In summer 2019 a second Nitrogen dioxide reference instrument will be installed in the AQMA on Queensgate. It is intended that running alongside the existing instrument and sampling air at first floor level, where there is exposure relevant to the annual mean objective, a better understanding of the impact of pollution within the street canyon will be achieved.

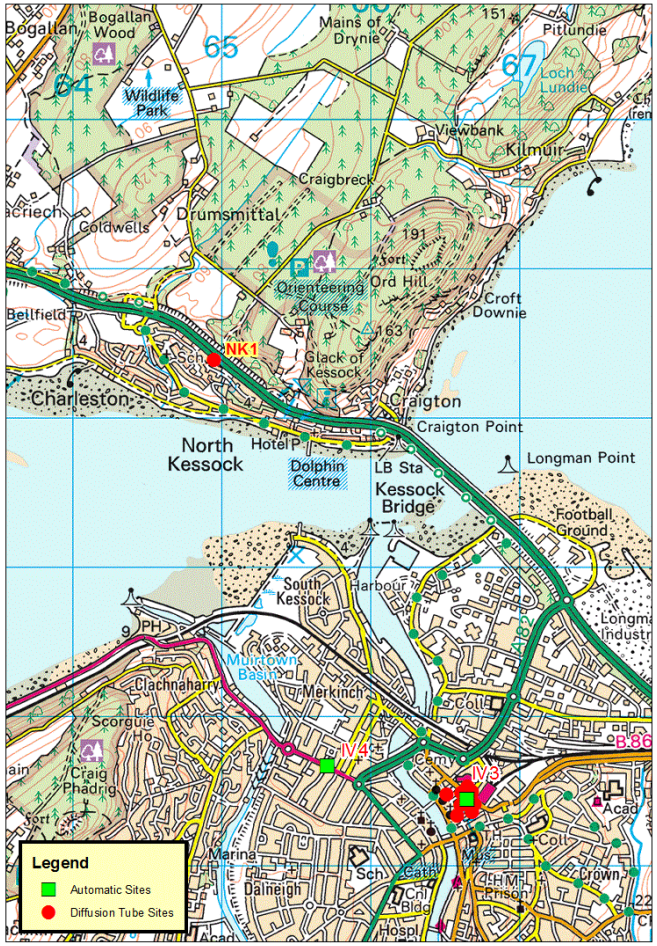
Work will continue to progress action points within the Action Plan. Work is ongoing to have The draft Action Plan will be finalised and published.

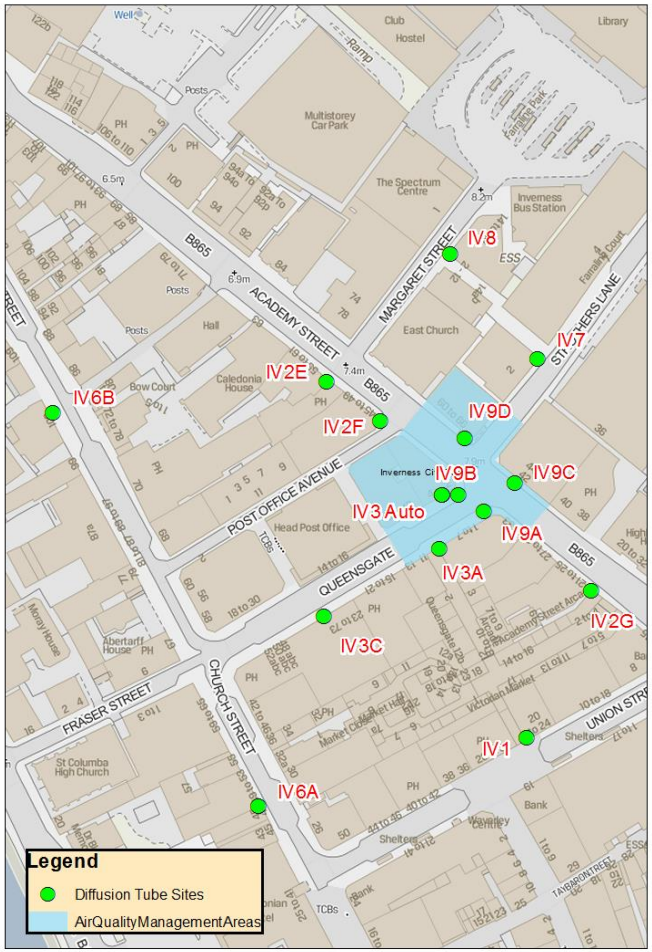
The next APR will be due in June 2020.

Appendix A: Monitoring Results

Maps of Monitoring Sites

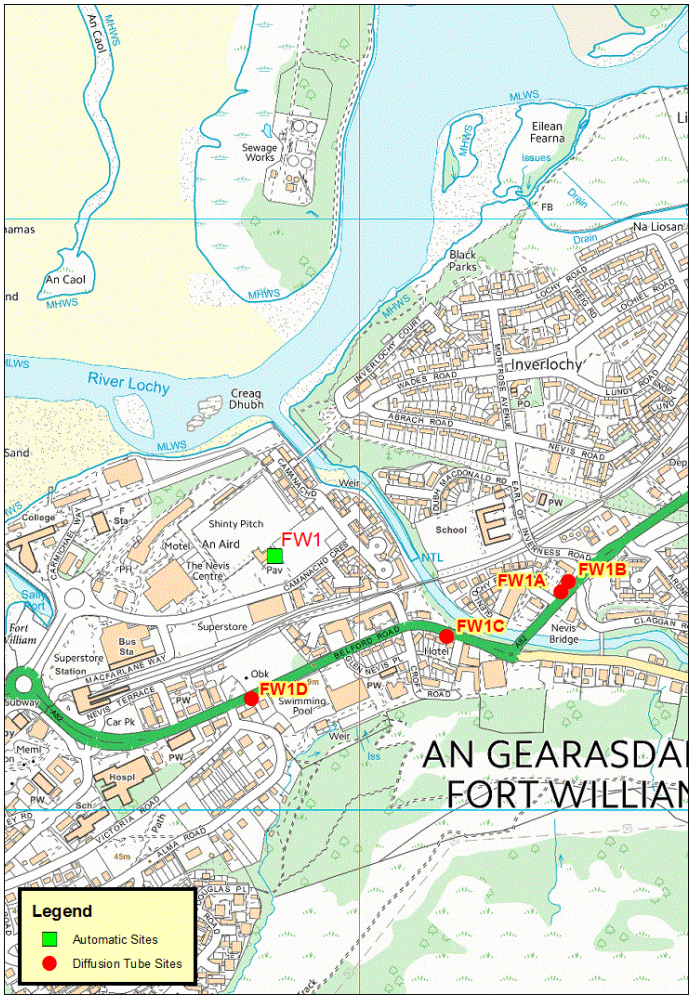
Inverness Sites

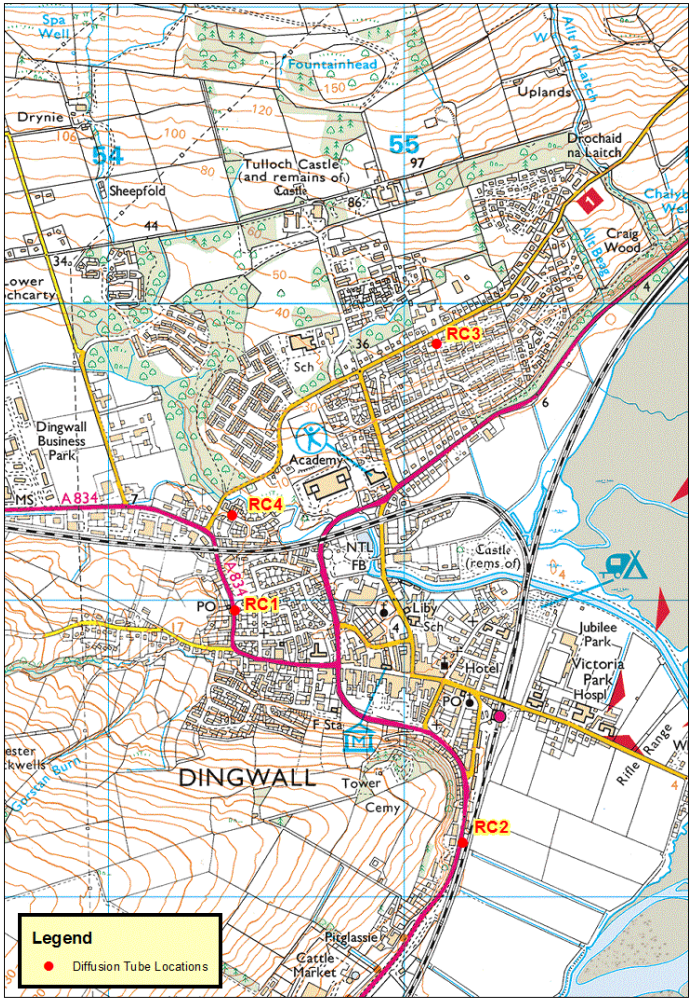




Maps of Monitoring Sites

Fort William and Dingwall sites





Maps of Monitoring Sites

Strath Vaich

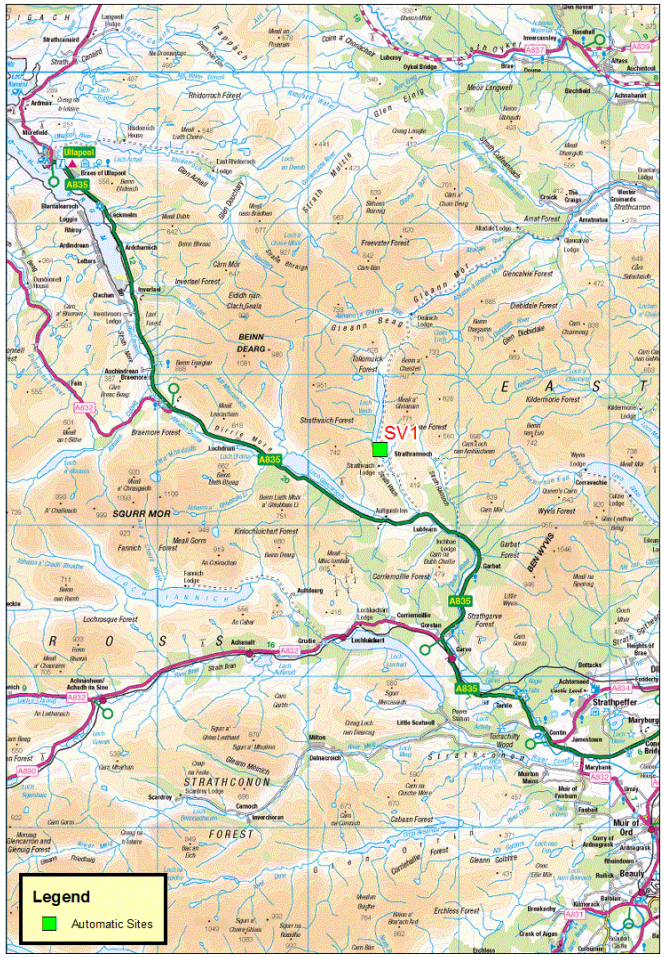


Table A.1 – Details of Automatic Monitoring Sites

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 (until July) Optical (from July)	2.5	4	3
FW1	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
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
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
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
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
FW1A	McAndie Court, Fort William	Roadside	211342	774369	NO2	N	3	2.5	N
FW1B	McAndie Court, Fort William	Roadside	211355	774386	NO2	N	0	5	N
FW1C	Belford Road, Fort William	Roadside	211148	774294	NO2	N	6.8	2	N
FW1D	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.

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 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
IV4	Roadside	Automatic	99	99	21	25.3	26.4	20.1	17.8
IV3	Roadside	Automatic	99	99			36.8	38	37.8
FW1	Suburban	Automatic	99	99	11	12.7	10.1	10	8.8
IV1	Roadside	Non automatic	100	41.7	26.4	20.4	26.7	20.1	18.8
IV2E	Roadside	Non automatic	91.7	91.7	39.2	36.6	37.2	35.3	35.2
IV2F	Roadside	Non automatic	100	100	38.2	38.1	**42.4**	40	36.5
IV2G	Roadside	Non automatic	100	100	38.7	39.3	**45.7**	**41.7**	34.8
IV3A	Roadside	Non automatic	100	100	37.1	32.1	38	35.9	34.9
IV3C	Roadside	Non automatic	100	100	31.3	35.2	37.5	30.9	29.9
IV3H	Roadside	Non automatic	100	100			33.2	38.5	37.6
IV3K	Roadside	Non automatic	100	100			33.3	38.4	38
IV3L	Roadside	Non automatic	100	100			32.7	38.7	37.9
IV4A	Roadside	Non automatic	100	100	21.2	21.5	25	20.5	16.7
IV4B	Roadside	Non automatic	100	100	20.6	20.8	25.4	21.2	17.1
IV4C	Roadside	Non automatic	100	100	20.2	21	25.4	20.7	16.8
IV6A	Roadside	Non automatic	91.7	91.7	31.2	25	31.8	25.4	23.1
IV6B	Roadside	Non automatic	91.7	91.7	19	17.1	18.1	19.1	21.2
IV7	Roadside	Non automatic	100	41.7	30.3	24.3	29.6	29.7	27.0
IV8	Roadside	Non automatic	100	100	22.5	21.9	24.4	23.2	21.5
IV9A	Kerbside	Non automatic	100	100	37.8	**44.8**	**49.9**	**47.5**	**42.4**
IV9B	Kerbside	Non automatic	100	100	29.1	36.2	29.0	30	33.7
IV9C	Roadside	Non automatic	100	100	33.1	32.6	37.7	**42.9**	38.5
IV9D	Kerbside	Non automatic	100	100	28.9	31.7	26.7	27.7	33.5
NK1	Suburban	Non automatic	100	25				12.1	11.0

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
RC1	Roadside	Non automatic	100	100	16.2	17.6	13.6	14.4	20.7
RC2	Roadside	Non automatic	100	100	28.7	27.6	32.1	33.6	30
RC3	Urban Background	Non automatic	100	100	6.9	6.7	7.9	6.6	8.3
RC4	Urban Background	Non automatic	100	100	8.1	7.9	8.5	8.2	10.7
FW1A	Roadside	Non automatic	91.7	91.7				17.4	21.5
FW1B	Roadside	Non automatic	100	100				15.8	18.8
FW1C	Roadside	Non automatic	100	100				12.8	21.1
FW1D	Roadside	Non automatic	100	100				12.1	23.7

Notes: Exceedances 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 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.

Figure A-1

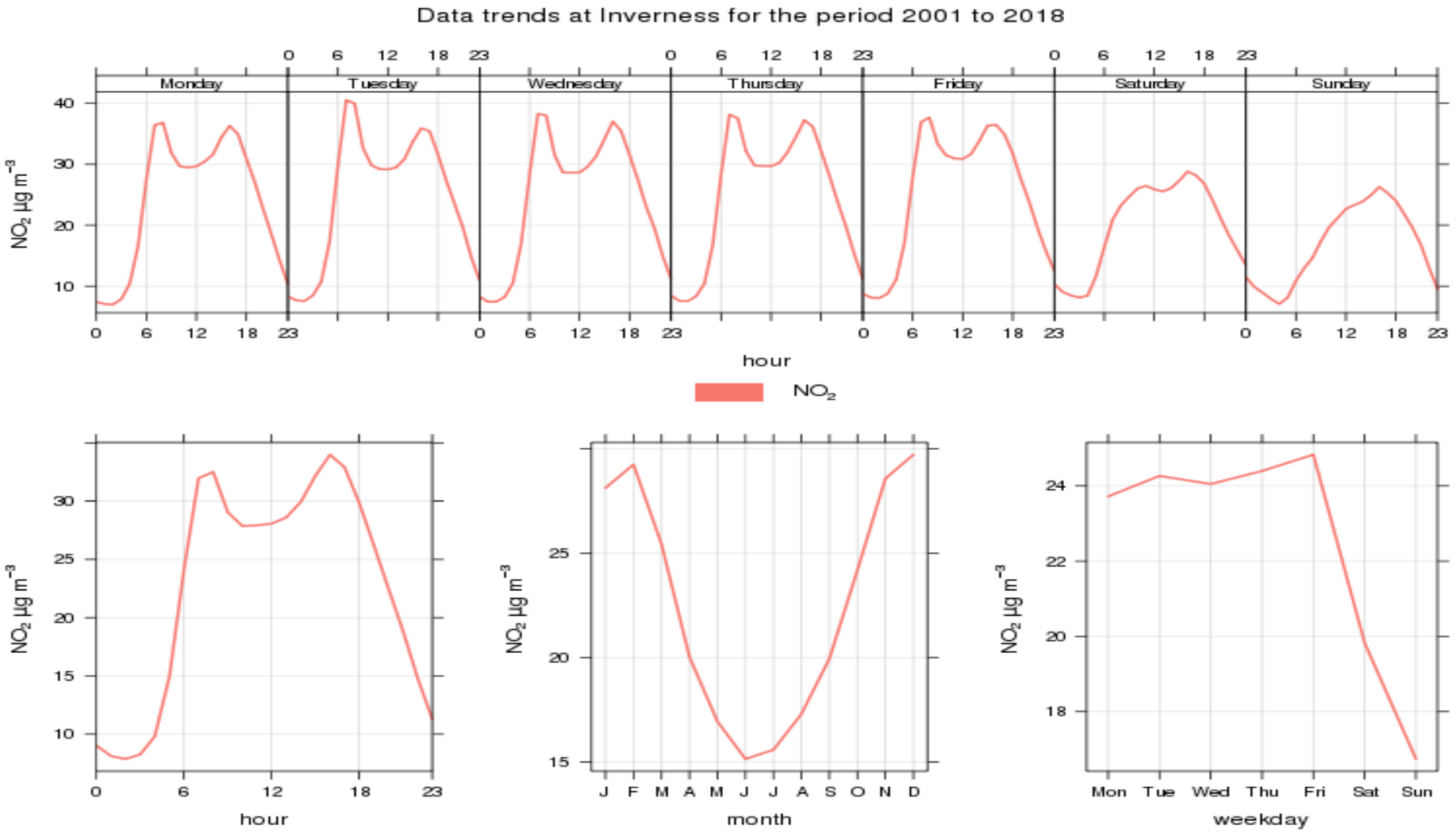

Data trends at Inverness for the period 2001 to 2018
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
NO2 µg m-3
hour
NO2
month
J F M A M J J A S O N D
weekday
Mon Tue Wed Thu Fri Sat Sun

Figure A-2

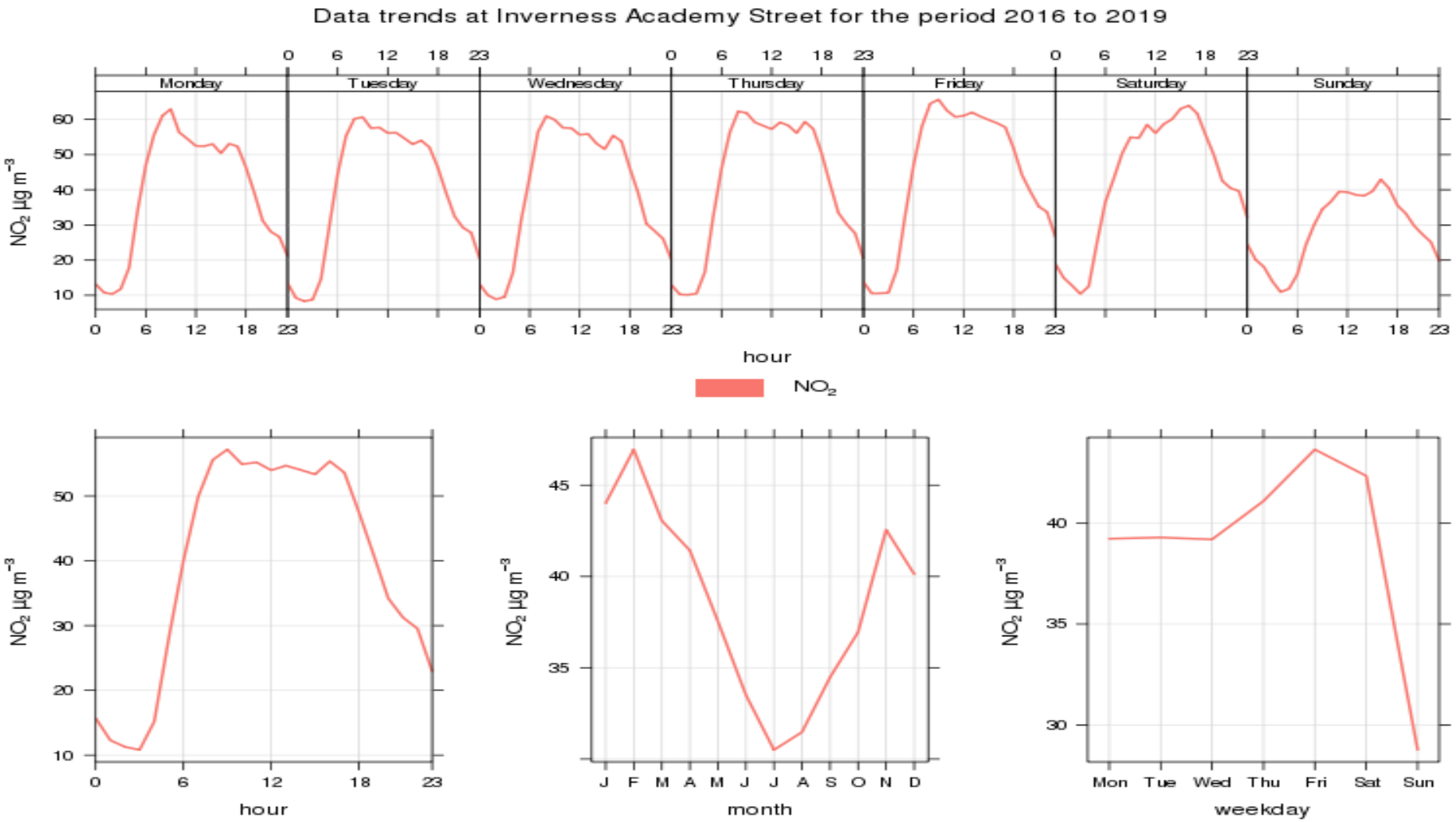

Data trends at Inverness Academy Street for the period 2016 to 2019
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
NO2 µg m-3
hour
NO2
month
J F M A M J J A S O N D
weekday
Mon Tue Wed Thu Fri Sat Sun

Figure A-3

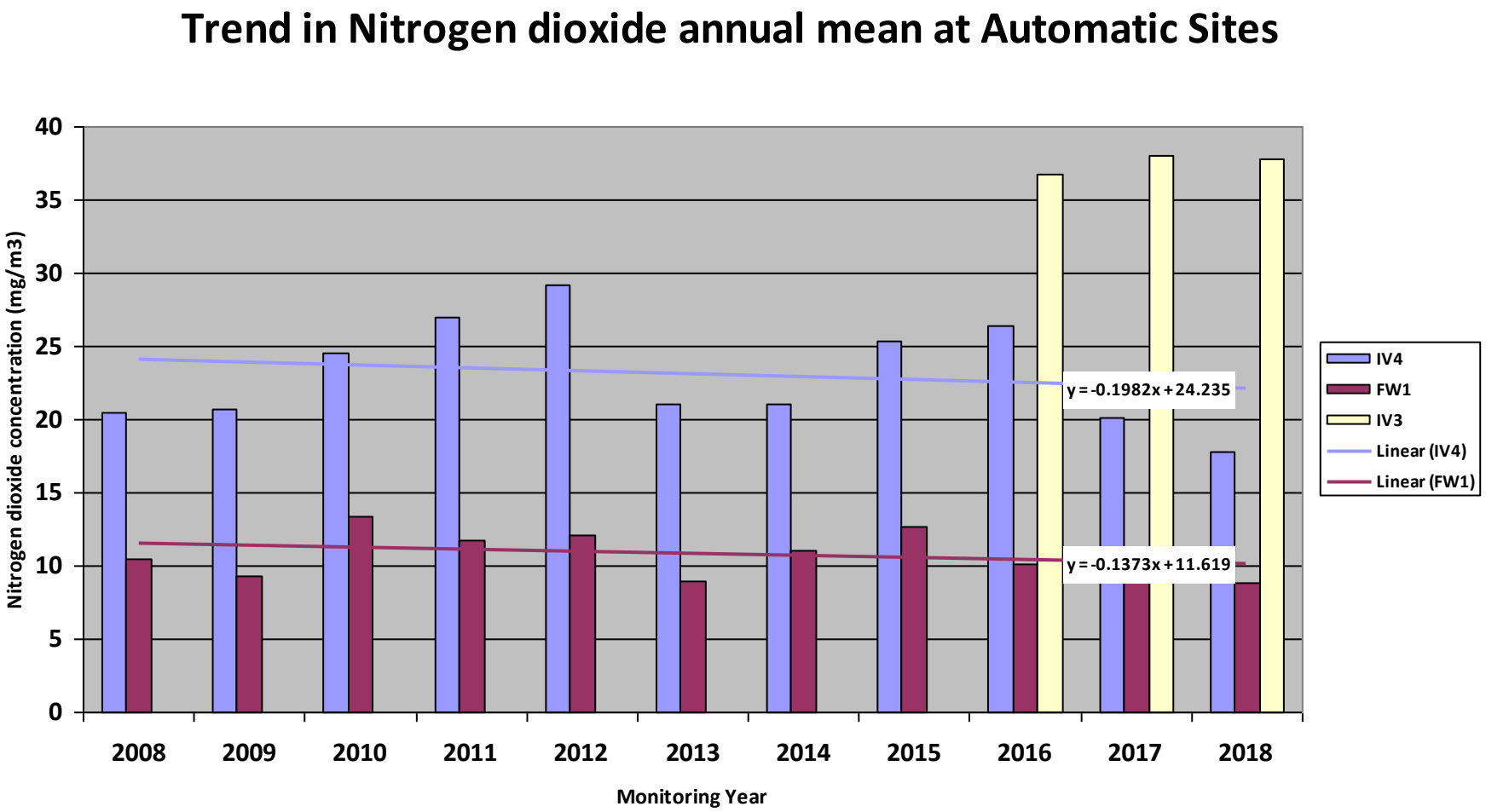

Trend in Nitrogen dioxide annual mean at Automatic Sites
Nitrogen dioxide concentration (mg/m3)
40
35
30
25
20
15
10
5
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Monitoring Year
y = -0.1982x + 24.235
y = -0.1373x + 11.619
IV4
FW1
IV3
Linear (IV4)
Linear (FW1)

Figure A-4

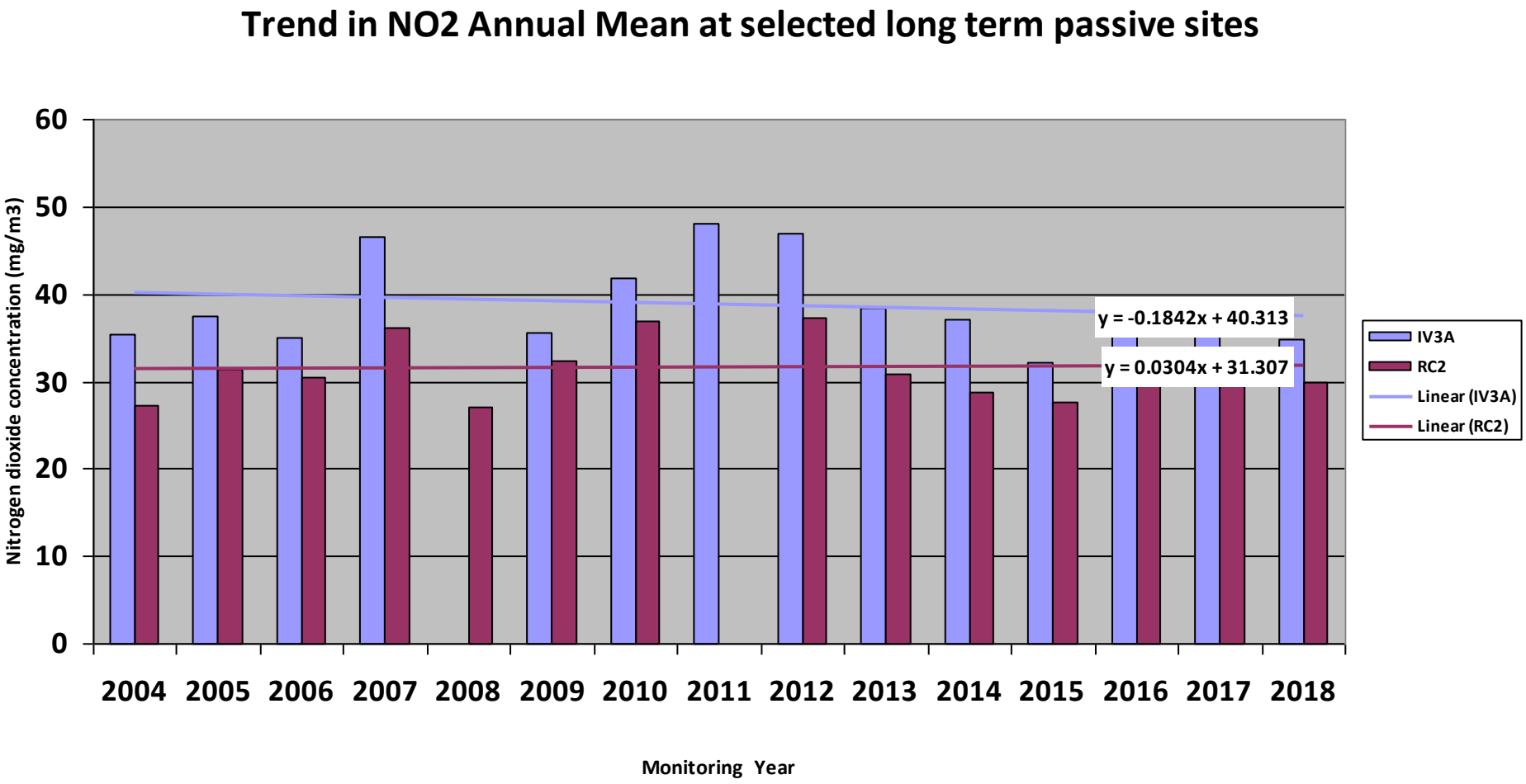

Trend in NO2 Annual Mean at selected long term passive sites
Nitrogen dioxide concentration (mg/m3)
60
50
40
30
20
10
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Monitoring Year
y = -0.1842x + 40.313
y = 0.0304x + 31.307
IV3A
RC2
Linear (IV3A)
Linear (RC2)

Figure A-5

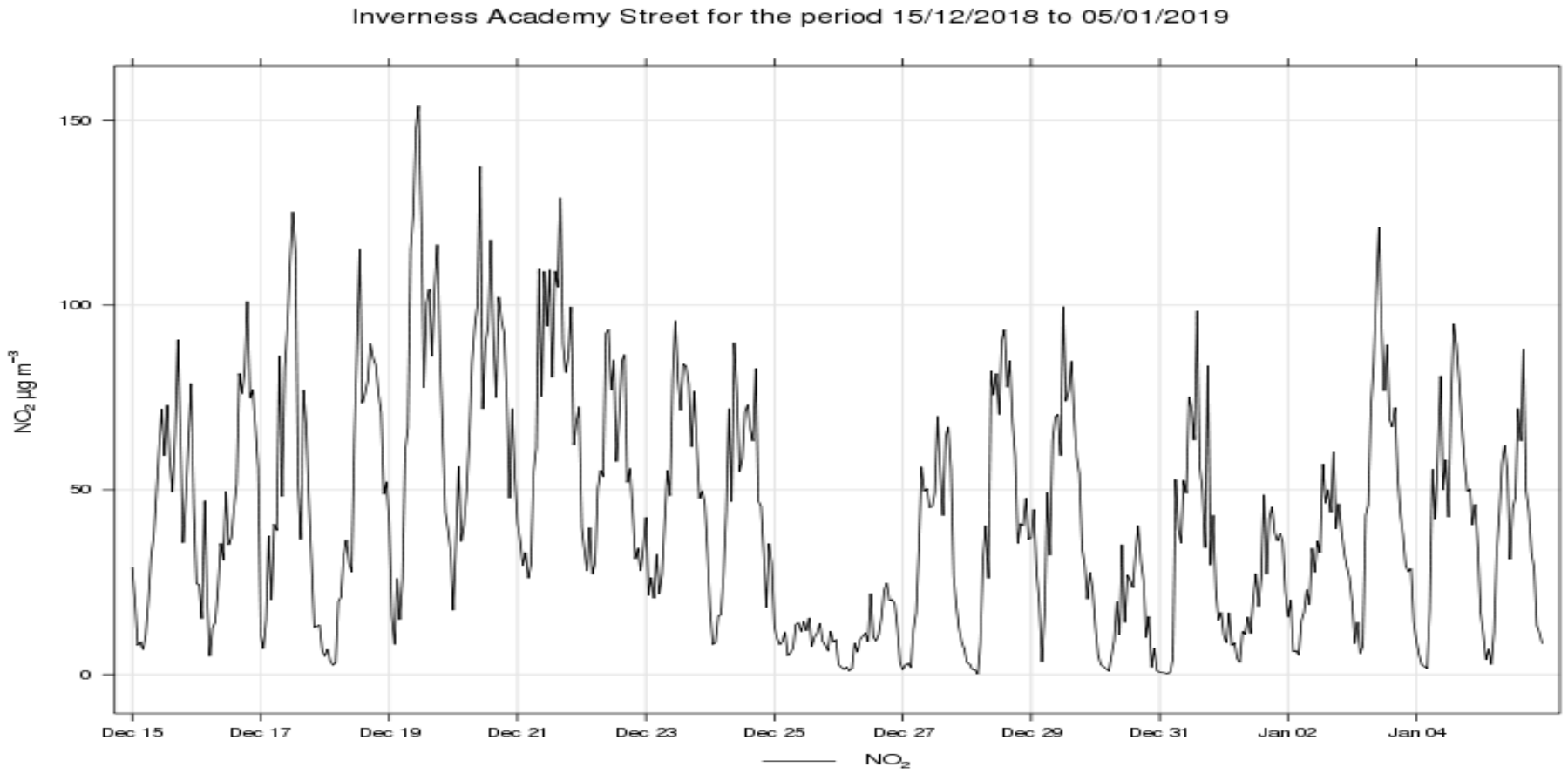

Inverness Academy Street for the period 15/12/2018 to 05/01/2019
150
100
50
0
NO2 µg m-3
Dec 15
Dec 17
Dec 19
Dec 21
Dec 23
Dec 25
Dec 27
Dec 29
Dec 31
Jan 02
Jan 04
NO2

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2014	2015	2016	2017	2018
IV4	Roadside	Automatic	99	99	0	0(106)	0	0	0
IV3	Roadside	Automatic	99	99			0(115)	0	0
FW1	Suburban	Automatic	99	99	0	0(70)	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 2018 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
IV4 (FIDAS)	Roadside	100	44					9
IV4 (Partisol)	Roadside	77	45	11	9	9	10	12

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.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2014	2015	2016	2017	2018
IV4 (FIDAS)	Roadside	100	44					0(23)
IV4 (Partisol)	Roadside	77	45	0	0	0	0	0(32)

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.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
IV4 (FIDAS)	Roadside	100	44					6
IV4 (Partisol)	Roadside	90	50	6	5	5	4	5

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 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results for 2018

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 (2)	Bias Adjusted (1)
IV1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15.76	15.29	18.69	31.08	25.63	21.08	18.76
IV2E	37.57	46.45	45.71	33.98	37.75	38.84	39.86	N/A	39.49	37.29	40.72	37.17	39.53	35.18
IV2F	37.79	44.5	43.36	37.67	36.45	37.55	38.66	37.22	40.85	43.16	49.71	45.44	41.03	36.52
IV2G	40.25	39.57	44.86	34.84	40.87	36.67	34.3	32.32	39.8	38.99	44.08	42.71	39.11	34.80
IV3A	41.21	43.44	43.22	39.55	36.95	34.54	39.36	32.4	35.02	33.33	47.52	43.77	39.19	34.88
IV3C	34.82	41.4	41.99	31.78	40.68	30.26	28.66	23.28	24.77	34.09	39.67	31.19	33.55	29.86
IV3H	35.16	40.94	39.12	34.37	34.1	36.22	30.67	33.02	35.11	35.59	38.69	40.98	36.16	37.61
IV3K	33.21	42.14	40.13	31.73	35.61	35.83	32.39	33.06	34.37	34.08	43.51	42.1	36.51	37.97
IV3L	34.44	33.24	40.92	48.49	36.55	34.42	32.48	32.6	33.89	33.66	39.69	37.29	36.47	37.93
IV4A	28.35	28.52	26.4	17.03	13.81	13.63	15.78	17.34	21.62	25.13	34.68	29.33	22.64	16.75
IV4B	31.65	29.08	27.33	17.07	14.14	13.38	16.54	18	20.52	25.33	34.13	29.48	23.05	17.06
IV4C	28.41	27.63	25.53	17.31	14.43	14.78	17.44	18.16	22.19	25.82	31.06	29.44	22.68	16.79
IV6A	28.45	30.36	29.98	25.52	31.46	N/A	19.55	18.38	19.08	20.33	32.77	29.87	25.98	23.12
IV6B	55.79	23.81	22.51	19.66	24.06	N/A	15.18	13.52	14.18	19.34	30.8	23.45	23.85	21.22

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 (2)	Bias Adjusted (1)
IV7	36.44	34.9	37.34	29.3	32.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30.31	26.98
IV8	24.59	27.3	31.16	23	26.56	20.58	19.76	20.62	18.66	21.39	31.22	24.88	24.14	21.49
IV9A	52.34	53.03	50.6	39.55	45.09	43.98	46.01	45.46	46.8	41.56	51.75	55.27	47.62	42.38
IV9B	37.36	44.55	39.55	34.97	36.64	35.36	33.94	33.4	34.62	36.05	45.38	43.28	37.93	33.75
IV9C	40.16	50.21	45.76	43.87	53.38	40.67	40.48	37.92	37.48	39.84	47.76	42.27	43.32	38.55
IV9D	36.61	48.2	44.18	37.85	43.15	40.76	30.72	29.35	26.56	32.21	44.91	37	37.63	33.49
NK1	16.88	17.32	15.19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12.35	10.99
RC1	27.41	28.07	22.87	15.62	16.65	14.08	17.87	18.1	20.19	28.49	40.56	28.78	23.22	20.67
RC2	41.45	43.22	36.49	26.45	28.04	25.58	27.74	27.44	33.59	34.1	48.83	31.83	33.73	30.02
RC3	15.77	13.03	9.44	6.58	5.29	4.77	5.33	5.49	6.26	9.82	17.29	13.02	9.34	8.31
RC4	19.29	15.86	11.8	8.36	7.59	6.12	7.81	7.92	9.33	14.35	20.43	15.72	12.05	10.72
FW1A	22.84	31.62	N/A	28.34	22.4	19.03	24.42	18.57	19.76	24.45	28.12	26.15	24.15	21.5
FW1B	17.34	26.31	21.86	22.97	19.37	21.09	24.83	16.16	15.87	20.45	26.55	20.71	21.13	18.8
FW1C	20.41	25.74	24.91	25.71	21.4	25.12	30.32	19.63	19.25	19.73	26.97	24.72	23.66	21.06
FW1D	21.14	27.85	28.08	30.79	25.54	23.71	35.65	24.41	22.51	25.41	29.61	25.28	26.67	23.73

(1) See Appendix C for details on bias adjustment

(2) Sites with less than 75% data capture have been “annualised” as per LAQM.TG(16). See appendix C.

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.

In July 2018, the daily gravimetric fine particles monitors at IV4 Inverness were replaced with a FIDAS unit. The two datasets have been individually adjusted to obtain an annual mean derived from each dataset.

Automatic background site data from Aberdeen, Dundee and Edinburgh were used in all these calculations.

Table C1 Period Mean Adjustment Calculation Outputs (Nitrogen dioxide)

Site(s)	Am	Pm	Ra
IV1 (Nitrogen dioxide)			
Aberdeen Errol Place	20.25	19.2	1.05
Dundee Mains Loan	12.25	12.8	0.96
Edinburgh St Leonards	17.83	18.6	0.96
		Mean Ra	**0.99**

Table C1 (Continued)

IV7 (Nitrogen dioxide)			
Aberdeen	20.25	24.2	0.84
Dundee	12.25	13.6	0.90
Edinburgh	17.83	19.4	0.92
		Mean Ra	**0.89**
NK1 (Nitrogen dioxide)			
Aberdeen	20.25	28.33	0.71
Dundee	12.25	16.00	0.77
Edinburgh	17.83	23.00	0.77
		Mean Ra	**0.75**

Table C2 Period Mean Adjustment Calculation Outputs (Fine Particles)

Site(s)	**Am**	**Pm**	**Ra**
IV4 (Partisol Gravimetric PM10)			
Aberdeen Errol Place	14.17	15.57	0.91
Dundee Mains Loan	9.08	10	0.91
Edinburgh St Leonards	10.75	12.14	0.88
		Mean Ra	**0.90**

Table C2 (Continued)

IV4 (FIDAS PM10)			
Aberdeen	14.17	12.5	1.13
Dundee	9.08	7.83	1.16
Edinburgh	10.75	9.33	1.15
		Mean Ra	**1.15**
IV4 (Partisol Gravimetric PM2.5)			
Aberdeen	6.83	7.43	0.92
Dundee	5.42	6	0.90
Edinburgh	6.25	6.86	0.91
		Mean Ra	**0.91**
IV4 (FIDAS PM2.5)			
Aberdeen	6.83	6.17	1.11
Dundee	5.42	4.5	1.20
Edinburgh	6.25	5.5	1.14
		Mean Ra	**1.15**

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	5.93	20.1	18.1
IV2E	1.5	3.0	9.36	40.2	35.3
IV6B	2.5	5.0	9.36	21.3	19.1
IV9B	0.5	4.0	9.36	33.7	24.8
IV9D	0.5	3.0	9.36	33.5	25.9
RC1	1.0	8.5	3.52	20.7	13.3
FW1A	2.5	5.5	5.94	21.5	18.5
FW1C	2.0	8.8	5.94	21.1	15.8
FW1D	2.0	10	5.94	23.9	17.1

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 2018 bias adjustment factor obtained by the Telford Street study was 0.74. This study included 12 periods of data with good precision.

The Queensgate study returned a bias adjustment factor of 1.04. This study included 11 periods of data with good precision.

The two factors have been used to generate a combined local bias factor of 0.89.

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 0.93 and is based upon 30 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 (0.74)	Bias 2 (1.04)	Bias 3 (0.89)	Bias 4 (0.93)
IV9A	**47.6**	**35.2**	**49.5**	**42.4**	**44.3**
IV9C	**43.3**	32.0	**45.0**	38.5	40.3
IV2F	**41.0**	38.7	**47.6**	36.5	38.1
IV2E	39.5	29.2	**41.1**	35.2	36.7
IV3A	39.2	29.0	**40.8**	34.9	36.4
IV2G	39.1	28.9	**40.7**	34.8	36.4
IV9B	37.9	28.0	39.4	33.7	35.2

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 EXCEL 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/laqmno2performancedatauptofebruary2019v1.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
Inverness High School	Inverness	265940	845118	800	Air Quality Assessment Undertaken – Detailed Assessment not required
Dundonnell Hotel	Dundonnell, Wester Ross	208934	888101	374	Detailed Assessment not required
HRN Tractors	Dun Watten, Caithness	319648	957242	1100	Detailed Assessment not required

Table D.2 Planning Aplications

Name	Location	NGR X	NGR Y	Screening Outcome
Ardersier Port (Planning in Principle)	Ardersier	281286	857616	
Inverness West Link (Stage 2)	Torvean, Inverness	265433	843686	Detailed Assessment not required
Alness Academy Biomass (1.2MW)	Alness	265884	869312	Detail of development not yet available
Upper Remore Quarry	Nairn	294373	848357	
Mid Lairgs Quarry (extension)	Farr	271092	836595	

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

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