

Annual Progress Report (APR)



2021 Air Quality Annual Progress Report (APR) for The Highland Council

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

June 2021

Information	The Highland Council
Local Authority Officer	Gregor MacCormick Senior EHO Nick Thornton EH Technical Officer
Department	Communities and Place – Environmental Health
Address	38 Harbour Road, Inverness, IV1
Telephone	01349868436
E-mail	nick.thornton@highland.gov.uk gregor.maccormick@highland.gov.uk
Report Reference Number	THC/LAQM/APR/2021
Date	2/12/2021

Executive Summary: Air Quality in Our Area

Air Quality in The Highland Council Area

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 through 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 A 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 B Automatic Monitoring in Inverness



During 2019 the Council secured funding and installed a second automatic monitor for nitrogen dioxide at first floor level within the Inverness Air Quality Management Area, to better determine the impact of pollution upon the residences.

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 is working to develop a Low Carbon Travel and Transport Hub, including City Centre EV charging, and an active travel hub giving access to active travel information, cycle hire, a bike workshop and outreach programmes adjacent to the bus and train stations. The proposal will also develop EV and active travel satellite hubs at other locations in the city.

The Highland Council secured funding for a project to promote air quality issues in schools, along with portable air quality monitors that can be used alongside the educational work. This project will be progressed once COVID-19 restrictions allow.

How to Get Involved

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

Table of Contents

Executive Summary: Air Quality in Our Area	i
Air Quality in The Highland Council Area.....	i
Actions to Improve Air Quality	ii
Local Priorities and Challenges	ii
Current Council Initiatives.....	ii
How to Get Involved	iii
1 Local Air Quality Management.....	1
2 Actions to Improve Air Quality.....	2
2.1 Air Quality Management Areas	2
2.2 Cleaner Air for Scotland.....	2
2.2.1 Transport – Avoiding Travel – T1	3
2.2.2 Climate Change – Effective co-ordination of climate change and air quality policies to deliver co-benefits – CC2	3
2.3 Progress and Impacts of Measures to address Air Quality in The Highland Council	4
3 Air Quality Monitoring Data and Comparison with Air Quality Objectives	23
3.1 Summary of Monitoring Undertaken.....	23
3.1.1 Automatic Monitoring Sites	23
3.1.2 Non-Automatic Monitoring Sites	24
3.2 Individual Pollutants	24
3.2.1 Nitrogen Dioxide (NO ₂)	24
3.2.2 Particulate Matter (PM ₁₀)	25
3.2.3 Particulate Matter (PM _{2.5}).....	25
3.2.4 Sulphur Dioxide (SO ₂).....	25
3.2.5 Carbon Monoxide, Benzene and 1,3-Butadiene.....	25
4 New Local Developments	26
4.1 Road Traffic Sources	26
4.2 Other Transport Sources	26
4.3 Industrial Sources	26
4.4 Commercial and Domestic Sources.....	26

4.5	New Developments with Fugitive or Uncontrolled Sources	26
5	Planning Applications.....	27
6	Impact of COVID-19 upon LAQM.....	28
7	Conclusions and Proposed Actions.....	29
7.1	Conclusions from New Monitoring Data	29
7.2	Conclusions relating to New Local Developments.....	29
7.3	Proposed Actions.....	29
Appendix A: Monitoring Results		31
Appendix B: Full Monthly Diffusion Tube Results for 2020		52
Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC		54
	New or Changed Sources Identified Within The Highland Council During 2020.....	54
	Additional Air Quality Works Undertaken by The Highland Council During 2020	54
	QA/QC of Diffusion Tube Monitoring	54
	Diffusion Tube Annualisation.....	56
	Diffusion Tube Bias Adjustment Factors	56
	NO ₂ Fall-off with Distance from the Road.....	56
	QA/QC of Automatic Monitoring	57
	PM ₁₀ and PM _{2.5} Monitoring Adjustment	57
	Automatic Monitoring Annualisation	57
	NO ₂ Fall-off with Distance from the Road.....	57
Glossary of Terms		60
References		61

List of Tables

Table 1.1 – Summary of Air Quality Objectives in Scotland.....	1
Table 2.1 – Declared Air Quality Management Areas.....	2
Table 2.2 – Progress on Measures to Improve Air Quality.....	6
Table A.2 – Details of Non-Automatic Monitoring Sites	33
Table A.3 – Annual Mean NO ₂ Monitoring Results (µg/m ³)	36
Table A.4 – 1-Hour Mean NO ₂ Monitoring Results, Number of 1-Hour Means > 200µg/m ³	38
Table A.5 – Annual Mean PM ₁₀ Monitoring Results (µg/m ³)	41
Table A.6 – 24-Hour Mean PM ₁₀ Monitoring Results, Number of PM ₁₀ 24-Hour Means > 50µg/m ³	43
Table A.7 – Annual Mean PM _{2.5} Monitoring Results (µg/m ³)	44
Table B.1 – NO ₂ 2020 Monthly Diffusion Tube Results (µg/m ³).....	52
Table C.1 – Bias Adjustment Factor	56
Table C.2 – Annualisation Summary (concentrations presented in µg/m ³).....	58
Table C.3 – Local Bias Adjustment Calculations	58

List of Figures

Figure A Passive monitoring in Inverness.....	i
Figure B Automatic Monitoring in Inverness	i
Figure 3 Trend in nitrogen dioxide monitoring at AURN sites	39
Figure 4 Trend in nitrogen dioxide monitoring at Inverness AQMA.....	40
Figure 5 Trend in PM10 annual mean monitoring.....	42
Figure 6 Map of Automatic Monitoring Sites in Highland	45
Figure 7 Map of Automatic Monitoring Sites in Inverness	46
Figure 8 Map of non-automatic Monitoring Sites in Inverness	47
Figure 9 Map of non-automatic Monitoring Sites in Inverness AQMA.....	48
Figure 10 Map of non-automatic Monitoring Sites in Dingwall	49
Figure 11 Map of non-automatic Monitoring Sites in Nairn	50
Figure 12 Map of non-automatic monitoring sites and AURN site in Fort William.....	51

1 Local Air Quality Management

This report provides an overview of air quality in The Highland Council during 2020. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Progress Report (APR) summarises the work being undertaken by 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 Concentration	Air Quality Objective Measured as	Date to be Achieved by
Nitrogen dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
Nitrogen dioxide (NO ₂)	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
Particulate Matter (PM ₁₀)	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
Sulphur dioxide (SO ₂)	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
Sulphur dioxide (SO ₂)	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

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/local-authorities?!a_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 AQMA	NO ₂ annual mean	Inverness	An area encompassing a number of properties at the junction of Academy Street, Queensgate and Strothers Lane.	Air Quality Action Plan: Inverness, Highland https://www.highland.gov.uk/downloads/file/16577/inverness_action_plan

2.2 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 on [the Scottish Government’s website](#). Progress by The Highland Council against relevant actions within this strategy is demonstrated below.

Initially published in Nov 2015, the update [Cleaner Air for Scotland 2 - Towards a Better Place for Everyone](#) (CAFS 2) was published in July 2021.

CAFS 2 reports completion in over 30 of the 40 original CAFS objectives as detailed in the [March 2020 progress report](#). The remainder have been carried over and supplemented by new objectives for continued air quality improvement in Scotland. The CAFS 2 objectives will be reported upon in future Highland Council annual air quality reports (2022 onwards).

2.2.1 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. This has involved a Bike Life report on cycling in Inverness by Sustrans. 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

2.2.2 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

2.3 Progress and Impacts 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 2020/21 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 the AQMA. Actions are underway to have the DRAFT Action Plan adopted in 2022. Key completed measures are:

- **Schools Engagement** – All Highland Council Schools have completed active travel plans
- **Investigate carparking differentiation** – No parking charge for ULEV in city centre car park
- **West Link Road** completed with estimated 10K city journeys per year removed.
- **Improved bus information provision** – real time displays in place.

Progress on the following measures has been slower than expected.

- **Low Carbon Transport and Travel Hub** – revised proposal to reflect changes since original award. The revised project scope has been confirmed by the funders, and the project intends to deliver EV charging provision at three locations, and an extension of the pilot e-bike rental scheme.
- **Statutory Quality Partnership (SQP)** –The Transport (Scotland) Act 2019 established a framework for Bus Service Improvement Partnerships, replacing SQP. However, guidance on implementation has been delayed due to the Covid-19 pandemic. The Highland Council are preparing a BSIP plan, and a statutory process of notification and consultation is currently underway.

The Highland Council expects the following measures to be completed over the course of the next reporting year:

- **Low Carbon Transport and Travel Hub** – This development will provide additional EV charging and improved access to low carbon/active alternative transport for visitors to the city centre.

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		nil		<p>Improved cycle parking not provided.</p> <p><u>Transport Scotland</u> have included Inverness Station for consideration of redevelopment to enhance operational functionality and improved integration within locality as part of an integrated transport interchange. A Master-planning Steering Group met in Jan 2021.</p> <p>No timescale on proposals which will be dependent on funding allocation, planning requirements and public consultation.</p>

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
2	Low Carbon Transport and Travel (LCTT) Hub	Transport Planning and Infrastructure	Improvement of Public Transport Hub with integrated active travel	Development and Infrastructure	complete	Ongoing	Completion of Scheme		Ongoing	2022	A revised proposal has been approved and includes EV charging hub at Rose Street Car Park (11 EV chargers) plus various EV and AT satellite hubs throughout the city.

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
3	Active Travel	Promoting Travel Alternatives	Further encouragement of active travel	Development and Infrastructure		Ongoing	Level of Awareness Revised travel and subsistence policy		Ongoing		<p>Multiple initiatives including Inverness Active Travel network series of projects awarded TS/Sustrans funding including Raigmore Active Travel Link (due for completion in 2021), Milburn Road; and Riverside Way improvements. Supported by HITRANS - Active Travel Officer.</p> <p>New Active Travel map for City.</p> <p>Revised Travel and Subsistence Policy promotes active travel through new travel hierarchy – NHS Active Travel Policy in place.</p> <p>Pilot e-bike hire scheme within Inverness City Centre, including docking points at the train station and key destinations. https://www.hi-bike.co.uk/</p>

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		<p>Tactile Paving in place and other associated improvement works completed.</p> <p>Spaces for people have widened footpaths along both sides of Academy St as Covid-19 response. These measures to be retained until a permanent scheme is delivered ~2024.</p>
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				<p>See IMFLDP 2. Public consultation in March 2022. Preferred Sustainable Transport Policy proposed.</p> <p>Sustrans published Bike Life report on cycling in Inverness in 2019, and will publish an update in 2022.</p>

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
6	School Engagement	Promoting Travel Alternatives	School Travel Plans	Community Services		Ongoing			Complete		<p>Schools in Highland now have a School Travel Plan.</p> <p>A “School Street” pilot is underway at an Inverness Primary with support from Sustrans.</p>
7	Car and Lift Sharing	Alternatives to Private vehicle Use	Promotion and Encouragement of online tool for car sharing	Development and Infrastructure		Ongoing (see note)			Ongoing		<p>The Highland Council Launched its own Liftshare platform in 2018: https://liftshare.com/uk/community/hitravel</p> <p><i>Note - Due to the Covid-19 pandemic, and Scottish Government advice to work from home where possible, active promotion of the liftshare scheme has paused.</i></p>

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
8	Low emission buses	Promoting low emission transport	Investigate the feasibility of increasing the number of low emission buses in Inverness	Community Services	Ongoing	Paused					<p>Stagecoach have redeployed 6 EV outside Highland. Future deployment of low emission buses likely to be a key performance indicator within the new Bus Service Improvement Partnership (BSIP).</p> <p>A hydrogen fuelled bus service was piloted in Inverness during COP 26.</p>
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	Ongoing		Improvement in EURO standard mix of bus fleet				This will be considered under BSIP.

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	ongoing			Ongoing		<p>The Highland Council currently host over 50 EV charge points, with 40 new charger installation in progress, and more planned for the future.</p> <p>https://chargeplacescotland.org/</p> <p>The Council have a Local Authority Installation Programme funded by Transport Scotland, delivered by an EV Infrastructure project team.</p>

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
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	2025 (light fleet) 2030 (larger goods fleet)	<p>The Highland Council, in collaboration with Enterprise Car Club, now operate a fleet of around 80 shared asset car club vehicles across Highland, the majority of which are plug-in hybrids or EV.</p> <p>A significant number of light commercial fleet vehicles have been transitioned to EVs.</p> <p>The Council has committed to a Greening Fleet Action Plan with target dates for decarbonising the fleet.</p>
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		Rapid EV points provided adjacent to AQMA to encourage ULEV Taxi uptake

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
13	Investigate parking Charge differentiation 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
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

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	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	

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
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
19	Encourage Electric vehicle infrastructure	Promoting low emission transport	Encouraging electric vehicle infrastructure through the planning system	Development and Infrastructure	n/a	ongoing	EV Infrastructure installed		Ongoing		Ties in with measure 10 and 11. The Council have a Local Authority Installation Programme funded by Transport Scotland, delivered by an EV Infrastructure project team.
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		

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	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 70% operational capacity at present. Repairs paused until Academy St redevelopment underway.
22	Microsimulation 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 Overtaken by Academy Street redevelopment (see measure 4) and COVID-19 changes which have altered street geometry.

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
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	<p>Some services now stopping on Union Street so reduced traffic on Queensgate. BSIP will include this within proposed plan.</p> <p>In 2020, Highland Council was awarded funding from SG Bus Priority Rapid Deployment Fund for a new bus gateway which reduces the number of buses exiting Inverness bus station via Academy Street by up to 8 buses per hour. This opened in July 2021.</p> <p>In June 2021, Highland Council was successful in bidding for £2.1million from the Bus Partnership Fund for other bus priority schemes within Inverness City Centre.</p>

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						No progress. However, an e-cargo bike pilot has begun in Inverness with provision of 4 e-cargo bikes for local businesses to promote modal shift from van/car delivery. Funding secured to Feb 2022.

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
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	No Progress						
27	Communicate 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
28	Improve Bus Information Provision	Public Information	Improve bus information provision	Community Services	n/a	Ongoing	Bus Information Provision Improved		Complete; ongoing maintenance of system		Real time bus information display provision upgraded and extended. GO-HI app launched with access to integrated transport options including bus.

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
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 of Active travel alternatives		ongoing		<p>Various campaigns held throughout 2021 including Low Carbon Day at Inverness Campus.</p> <p>Highland Council has a Bikeability Coordinator who supports delivery of cycle training in schools.</p> <p>NHS Highland have an Active Travel facebook page.</p> <p>A local active travel pressure group, Kidical Mass North, have recently started a monthly cycle campaign ride through Inverness.</p>
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		ongoing	2020	Development of Network Mesh ongoing which will provide capacity for smart signposting

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
32	Improve communication within the council	Policy Guidance and Development Control	Workshop for council officers	Chief Executive	No Progress						

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 2 sites during 2020. Sites INV03 and INV04 are part of the Scottish Air Quality Network. Both sites are located within the Inverness City Centre AQMA. The sites are at the same location however one instrument measures nitrogen dioxide at street level and the other measures at first floor level, where there is relevant exposure.

There are, in addition, 3 sites that are part of the Automatic Urban and Rural Network (AURN) operated by the Environment Agency on behalf of DEFRA. The site INV02, adjacent to Telford Street, in Inverness measures nitrogen dioxide, and fine particles. Site FW, in Fort William, measures nitrogen dioxide and ozone. Site SV, at Strath Vaich, is remote rural site measuring ozone.

Table A. 1 – Detail of automatic monitoring sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique
INV02	Inverness	Roadside	265709	845670	NO ₂ ; PM ₁₀ ; PM _{2.5}	N	Chemiluminescent (2018 onwards) Daily Gravimetric (until 2017)
FW	Fort William	Suburban	210857	774431	NO ₂ ; Ozone	N	Chemiluminescent
SV	Strath Vaich	Rural	234831	875029	Ozone	N	Chemiluminescent
INV03	Inverness Academy Street	Roadside	266650	845446	NO ₂	Y	Chemiluminescent
INV04	Inverness Academy Street First Floor	Roadside	266650	845446	NO ₂	Y	Chemiluminescent
INV05	Inverness Telford	Roadside	265945	845573	NO ₂ , PM ₁₀ , PM _{2.5}	N	Low cost sensor

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique
	Roundabout						
INV06	Inverness Castle Street	Roadside	266711	845144	NO2, PM10, PM2.5	N	Low cost sensor
INV07	Inverness Raigmore	Roadside	268605	844554	NO2, PM10, PM2.5	N	Low cost sensor
CUL01	Culloden Academy	Roadside	272349	846611	NO2, PM10, PM2.5	N	Low cost sensor
N01	Nairn A96	Roadside	288120	856436	NO2, PM10, PM2.5	N	Low cost sensor
INV08	Inverness Kenneth Street	Roadside	266285	845117	NO2, PM10, PM2.5	N	Low cost sensor
UL01	Ullapool Shore Street	Roadside	212802	893949	NO2, PM10, PM2.5	N	Low cost sensor

(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.

in Appendix A shows the details of the sites. National monitoring results are available at <http://www.scottishairquality.scot/>.

Maps showing the location of the monitoring sites are provided in Appendix A. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

The Highland Council obtained 7 low-cost automatic air pollution monitors in early 2020. The original plan for these monitors was that they would be used to further AQMA Action plan work within schools in Highland. Due to the lockdowns of the coronavirus pandemic, it was not possible to pursue this project as originally planned. The instruments were deployed mostly around Inverness to gather data about the changing air quality conditions that existed in 2020. Detail of when and where the instruments were deployed is included in Table A.1 in Appendix A. The results of monitoring are not reported here. It is hoped that as appropriate QA/QC is determined for this developing technology that the data obtained by the instruments may be recorded in a format suitable for inclusion in future LAQM reporting.

3.1.2 Non-Automatic Monitoring Sites

The Highland Council undertook non- automatic (passive) monitoring of NO₂ at 33 sites during 2020. Table A.1 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 (NO₂)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40 µg/m³.

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B.

Table A.3 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past five years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year.

There were no exceedences of the air quality objectives at any of the sites within Highland in 2020.

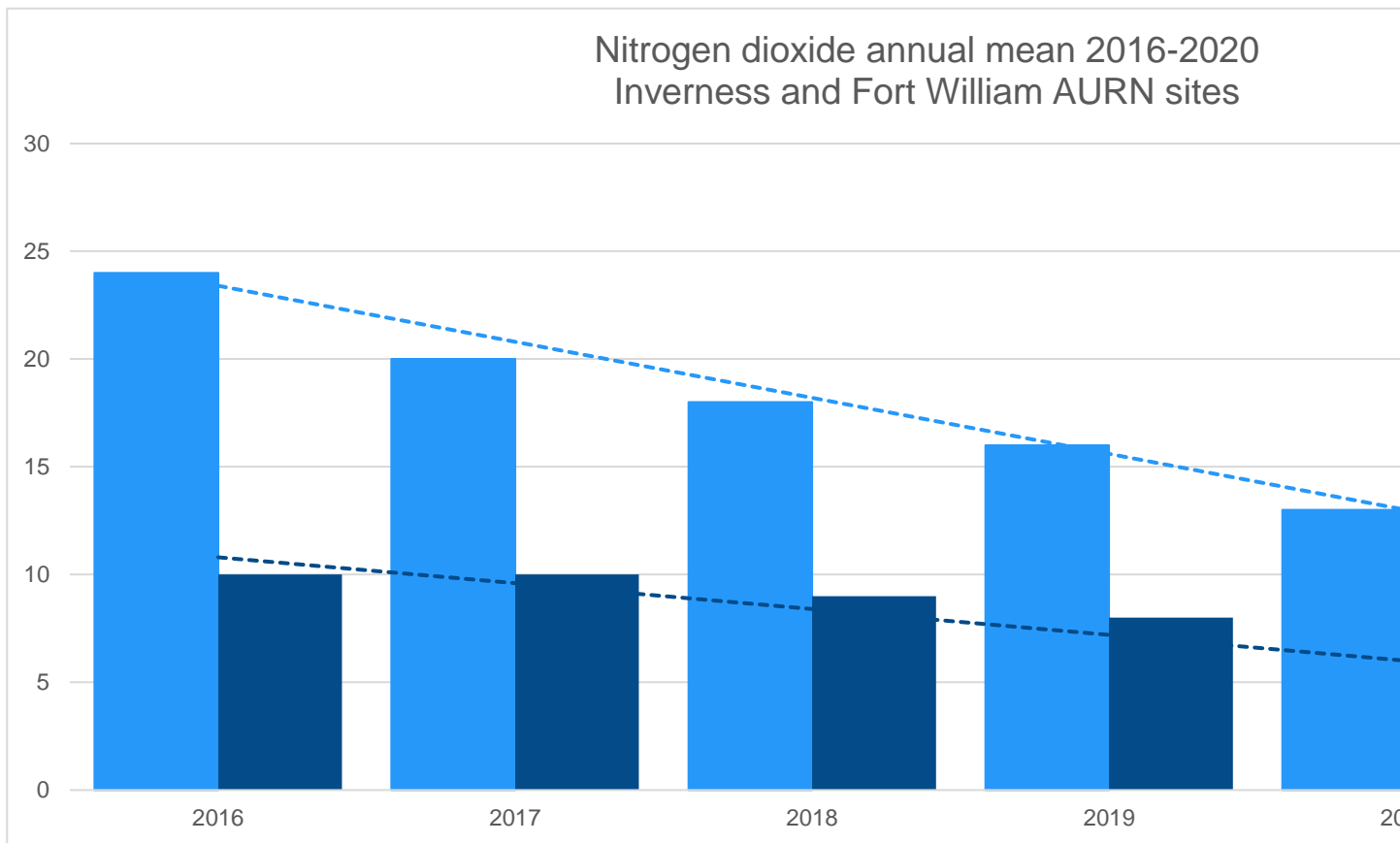
Prior to 2020 both of the AURN sites showed a continuing trend of reducing nitrogen dioxide annual mean concentration. Both sites have also shown a significant further reduction in 2020 as a result of the COVID-19 pandemic lockdowns, movement restrictions and increased home working.

The sites within the AQMA have only been operating for 4 years and 2 years respectively. It is therefore too soon to identify trends in that dataset. The data has however also seen a significant reduction in 2020 for the same reasons already discussed above.

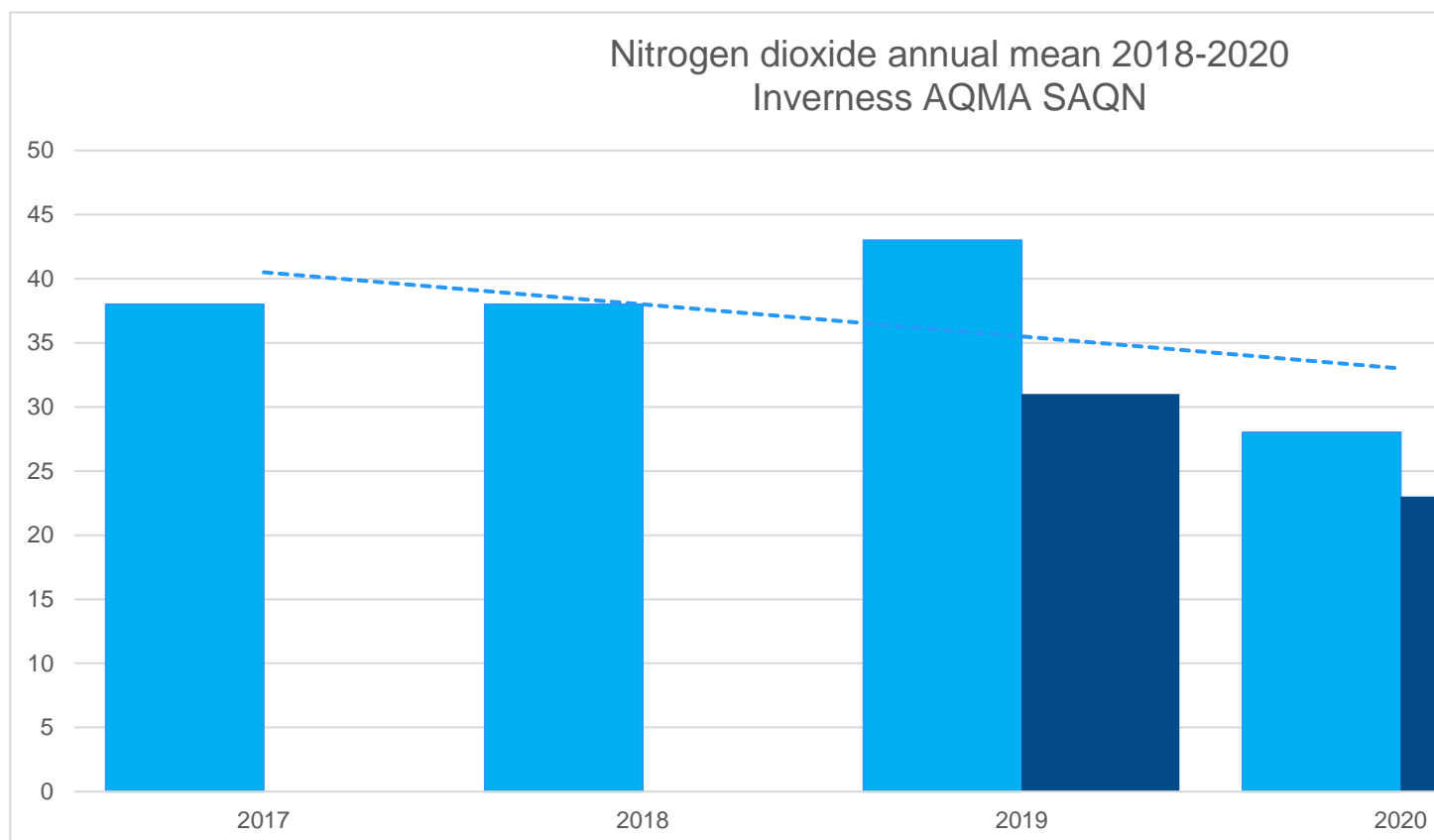
The data collected so far has shown nitrogen dioxide annual mean concentration at the first floor (relevant exposure) monitor to be between 20 and 30% lower than at street level.

3.2.2 Particulate Matter (PM₁₀)

Figure 3 Trend in nitrogen dioxide monitoring at AURN sites



Both of the AURN sites have been showing a steady decreasing trend over the previous five years. This decrease was accelerated in 2020 by the impact of COVID19 restrictions on traffic volumes at certain times of the year.

Figure 4 Trend in nitrogen dioxide monitoring at Inverness AQMA

The automatic sites on Queensgate within the Inverness City Centre AQMA have been in place since 2017 and 2019 respectively. INV03 is at street level and INV04 is at the same location but at first floor level on the façade. Nitrogen dioxide annual mean concentrations at INV03 remained the same in 2017 and 2018. In 2019 there was a significant increase in annual mean concentration at INV03, followed by an even more significant reduction in 2020 due to COVID restrictions.

INV04 has not been operating for long enough to discuss trend however there was also a significant reduction in annual mean concentration at this site in 2020.

Table A.4 in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past five years with the air quality objective of 18µg/m³.

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

There were no exceedances of the air quality objectives for PM₁₀ at any site in Highland in 2020.

3.2.3 Particulate Matter (PM_{2.5})

Table A.6 in Appendix A compares the ratified and adjusted monitored PM_{2.5} annual mean concentrations for the past five years with the air quality objective of 10µg/m³.

There were no exceedances of the air quality objective for PM_{2.5} at any site in Highland in 2020.

3.2.4 Sulphur Dioxide (SO₂)

The Highland Council does not currently undertake any monitoring of sulphur dioxide

3.2.5 Carbon Monoxide, Benzene and 1,3-Butadiene

The Highland Council has not undertaken any monitoring for carbon monoxide, benzene or 1,3-butadiene in 2020

4 New Local Developments

4.1 Road Traffic Sources

No new Road traffic sources were identified in 2020.

4.2 Other Transport Sources

No new other transport sources were identified in 2020.

4.3 Industrial Sources

No new or significantly changed industrial sources were identified in 2020.

4.4 Commercial and Domestic Sources

Four biomass boiler developments were granted planning permission in 2020. Details of the developments are included in Appendix A. All were screened out of further assessment during the planning process.

4.5 New Developments with Fugitive or Uncontrolled Sources

One new Quarry development was identified in 2020. Air quality assessment was not required as there was no associated relevant exposure.

5 Planning Applications

The following developments under consideration, with the capacity to affect air quality, have been identified:

- Construction of an Aluminium recycling and billet casting facility, Lochaber Smelter, North Road, Fort William. Emissions to air will be regulated by SEPA, however an environmental impact assessment submitted in support of the application suggests that the development will not have a significant impact upon LAQM.
- Demolition of building and erection of hotel, Academy Street, Inverness. The development is in close proximity to the AQMA.

6 Impact of COVID-19 upon LAQM

The Highland Council maintained diffusion tube monitoring as normal throughout the COVID-19 response. One month of data was lost.

The Highland Council maintained automatic monitoring sites as normal throughout the COVID-19 response.

The Highland Council received 7 low-cost monitors in April 2020. Initially intended to support an education in schools programme, the monitors were instead deployed at various locations in the district. The automatic monitors collected information about nitrogen dioxide and Fine particles concentrations as the COVID-19 response progressed through the year.

7 Conclusions and Proposed Actions

7.1 Conclusions from New Monitoring Data

No exceedances have been identified within or outwith existing AQMAs in Highland in 2020. The reduction in road traffic at times of lockdown during the pandemic has meant a significant reduction in traffic related air pollutants. Therefore although 2020 monitoring data suggests that the air quality objectives are being met it would not be appropriate to use the 2020 monitoring data as evidence to support revocation of the AQMA.

7.2 Conclusions relating to New Local Developments

No new development in 2020, was considered likely to significantly impact local air quality.

7.3 Proposed Actions

New monitoring data has not identified any new exceedances of the objectives for any pollutant.

New monitoring data has not identified any need for additional monitoring, or changes to the existing monitoring programme.

Although the monitoring data for 2020 suggests that the objectives for nitrogen dioxide are being comfortably met, the unusual circumstances resulting from the COVID-19 response mean that it would not be appropriate to consider the 2020 monitoring data as evidence for the revocation of the AQMA. The Highland Council will continue to monitor within and around the AQMA.

The Highland Council's air quality action plan for the Inverness City Centre AQMA has remained in final draft format since 2016. The Council will review the content of the final draft action plan early in 2022 and amend and publish the document in consultation with stakeholder partners.

The Council will also continue to work with stakeholder partners to pursue measures to improve air quality within the Inverness City Centre AQMA.

The Highland Council will submit an LAQM Annual Progress Report in 2022.

Appendix A: Monitoring Results

Table A. 1 – Detail 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)
INV02	Inverness	Roadside	265709	845670	NO ₂ ; PM ₁₀ ; PM _{2.5}	N	Chemiluminescent (2018 onwards) Daily Gravimetric (until 2017)	2.5	4	3
FW	Fort William	Suburban	210857	774431	NO ₂ ; Ozone	N	Chemiluminescent	77	47	2.5
SV	Strath Vaich	Rural	234831	875029	Ozone	N	Chemiluminescent	717	n/a	3
INV03	Inverness Academy Street	Roadside	266650	845446	NO ₂	Y	Chemiluminescent	0	4	1.3
INV04	Inverness Academy Street First Floor	Roadside	266650	845446	NO ₂	Y	Chemiluminescent	0	4	5
INV05	Inverness Telford Roundabout	Roadside	265945	845573	NO ₂ , PM ₁₀ , PM _{2.5}	N	Low cost sensor	0	2	3
INV06	Inverness Castle Street	Roadside	266711	845144	NO ₂ , PM ₁₀ , PM _{2.5}	N	Low cost sensor	n/a	2	3
INV07	Inverness Raigmore	Roadside	268605	844554	NO ₂ , PM ₁₀ , PM _{2.5}	N	Low cost sensor	20	2	3
CUL01	Culloden Academy	Roadside	272349	846611	NO ₂ , PM ₁₀ , PM _{2.5}	N	Low cost sensor	50	2	3
N01	Nairn A96	Roadside	288120	856436	NO ₂ , PM ₁₀ , PM _{2.5}	N	Low cost sensor	0	3	2.5

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)
INV08	Inverness Kenneth Street	Roadside	266285	845117	NO2, PM10, PM2.5	N	Low cost sensor	10	2	2.5
UL01	Ullapool Shore Street	Roadside	212802	893949	NO2, PM10, PM2.5	N	Low cost sensor	0	1	2.5

(3) 0 if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(4) N/A if not applicable.

Table A.1 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube co-located with a Continuous Analyser?	Tube Height (m)
IV1	Union Street	Roadside	266681	845361	NO2	N	0	4	N	3
IV2E	Academy Street E	Kerbside	266610	845487	NO2	N	1.5	1.5	N	2
IV2F	Academy Street F	Roadside	266629	845473	NO2	N	N/A	2	N	2
IV2G	Academy Street G	Roadside	266704	845413	NO2	N	N/A	2	N	2.5
IV3A	Queensgate A	Roadside	266650	845428	NO2	Y	0	4	N	2.5
IV3C	Queensgate C	Roadside	266609	845404	NO2	N	0	4	N	2.5
IV3H	Queensgate H	Roadside	266650	845446	NO2	Y	0	4	Y	1.5
IV3K	Queensgate K	Roadside	266650	845446	NO2	Y	0	4	Y	1.5
IV3L	Queensgate L	Roadside	266650	845446	NO2	Y	0	4	Y	1.5
IV4A	Telford Street A	Roadside	265710	845672	NO2	N	2.5	4	Y	3
IV4B	Telford Street B	Roadside	265710	845672	NO2	N	2.5	4	Y	3
IV4C	Telford Street C	Roadside	265710	845672	NO2	N	2.5	4	Y	3
IV6A	Church Street A	Roadside	266586	845337	NO2	N	0	2	N	3
IV6B	Church Street B	Roadside	266513	845476	NO2	N	2.5	2.5	N	3

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube co-located with a Continuous Analyser?	Tube Height (m)
IV8	Margaret Street	Roadside	266654	845532	NO2	N	0	3	N	2.5
IV9A	Academy St /Queensgate A	Kerbside	266666	845441	NO2	Y	N/A	0.5	N	2
IV9B	Academy St /Queensgate B	Kerbside	266657	845447	NO2	Y	3.5	0.5	N	2
IV9C	Academy St /Queensgate C	Roadside	266677	845451	NO2	Y	N/A	2	N	2.5
IV9D	Academy St /Queensgate	Kerbside	266659	845467	NO2	Y	2.5	0.5	N	2
RC1	Wyvis Terrace, Dingwall	Roadside	254430	858968	NO2	N	7.5	1	N	2
RC2	Station Road, Dingwall	Roadside	255200	858185	NO2	N	0	1	N	2
RC3	Kintail Place, Dingwall	Urban Background	255112	859866	NO2	N	4	1	N	2
RC4	Burns Crescent, Dingwall	Urban Background	254420	859288	NO2	N	4	1	N	2
FW1A	McAndie Court, Fort William	Roadside	211342	774369	NO2	N	3	2.5	N	2

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube co-located with a Continuous Analyser?	Tube Height (m)
FW1B	McAndie Court, Fort William	Roadside	211355	774386	NO2	N	0	5	N	2.5
FW1C	Belford Road, Fort William	Roadside	211148	774294	NO2	N	6.8	2	N	2.5
FW1D	Belford Road, Fort William	Roadside	210818	774188	NO2	N	10	2	N	2.5
IV11	George Street, Inverness	Roadside	266567	845743	NO2	N	10	1	N	2.5
IV12	Innes Street, Inverness	Roadside	266639	845759	NO2	N	2	1	N	2
N1A	Bridge Street, Nairn	Roadside	288660	85663	NO2	N	N/A	2	N	2
N1B	Boath Terrace, Nairn	Roadside	288698	856538	NO2	N	3	2	N	3
N2A	Asher's Court, Nairn	Roadside	288561	856628	NO2	N	0	2	N	2.5
N2B	St Ninian Road, Nairn	Roadside	288510	856654	NO2	N	2	2	N	3

Notes:

(1) 0m 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.2 – Annual Mean NO₂ Monitoring Results (µg/m³)

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
INV02	Roadside	Automatic	93	93	24	20	18	16	12.7
FW	Suburban	Automatic	99	99	10	10	9	8	5.3
INV03	Roadside	Automatic	88	88		38	38	43	28.2
INV04	Roadside	Automatic	86	86				31	22.6
IV1	Roadside	Diffusion	93.7	93.7	27.0	20.0	19.0	25.0	14.9
IV2E	Roadside	Diffusion	93.7	93.7	37.0	35.0	35.0	34.0	21.3
IV2F	Roadside	Diffusion	93.7	93.7	42.0	40.0	36.0	38.0	22
IV2G	Roadside	Diffusion	93.7	93.7	46.0	42.0	35.0	37.0	22.1
IV3A	Roadside	Diffusion	93.7	93.7	38.0	36.0	35.0	38.0	22.2
IV3C	Roadside	Diffusion	93.7	93.7	37.0	30.0	31.0	33.0	18.8
IV3L	Roadside	Diffusion	93.7	93.7	33.0	39.0	38.0	41.0	28.4
IV4C	Roadside	Diffusion	93.7	93.7	25.0	21.0	17.0	17.0	13.3
IV6A	Roadside	Diffusion	93.7	93.7	32.0	25.0	23.0	27.0	15.9
IV6B	Roadside	Diffusion	93.7	93.7	18.0	19.0	21.0	18.0	11.2
IV8	Roadside	Diffusion	93.7	93.7	24.0	23.0	21.0	22.0	13.3
IV9A	Kerbside	Diffusion	93.7	93.7	50.0	47.0	42.0	45.0	27.1
IV9B	Kerbside	Diffusion	93.7	93.7	29.0	30.0	34.0	38.0	21.5
IV9C	Roadside	Diffusion	93.7	93.7	38.0	43.0	39.0	40.0	22.9
IV9D	Kerbside	Diffusion	93.7	93.7	27.0	28.0	33.0	34.0	18.9
RC1	Roadside	Diffusion	93.7	93.7	14.0	14.0	21.0	20.0	14.6
RC2	Roadside	Diffusion	93.7	93.7	32.0	34.0	30.0	30.0	20.9
RC3	Urban Background	Diffusion	93.7	93.7	8.0	7.0	8.0	8.0	5.9
RC4	Urban Background	Diffusion	84.3	84.3	8.0	8.0	11.0	9.0	7
FW1A	Roadside	Diffusion	91.8	91.8		17.0	21.0	21.0	13.9
FW1B	Roadside	Diffusion	91.8	91.8		16.0	19.0	18.0	12.4
FW1C	Roadside	Diffusion	91.8	91.8		13.0	21.0	19.0	14.1
FW1D	Roadside	Diffusion	91.8	91.8		12.0	24.0	22.0	13.9
IV11	Roadside	Diffusion	93.7	93.7				18.0	11.6

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
IV12	Roadside	Diffusion	85.7	50.8				19.0	12.7
N1A	Roadside	Diffusion	93.7	93.7				18.0	11.8
N1B	Roadside	Diffusion	93.7	93.7				19.0	15.6
N2A	Roadside	Diffusion	93.7	93.7				25.0	20.4
N2B	Roadside	Diffusion	93.7	93.7				33.0	28.1

Notes:

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

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

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.

(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%).

Table A.3 – 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means > 200µg/m³

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
INV02	Roadside	Automatic	93	93	0	0	0	0	0
FW2	Suburban	Automatic	99	99		0	0	0	0
INV03	Roadside	Automatic	88	88	0(115)	0	0	0(143.7)	0
INV04	Roadside	Automatic	86	86				0(95.1)	0

Notes:

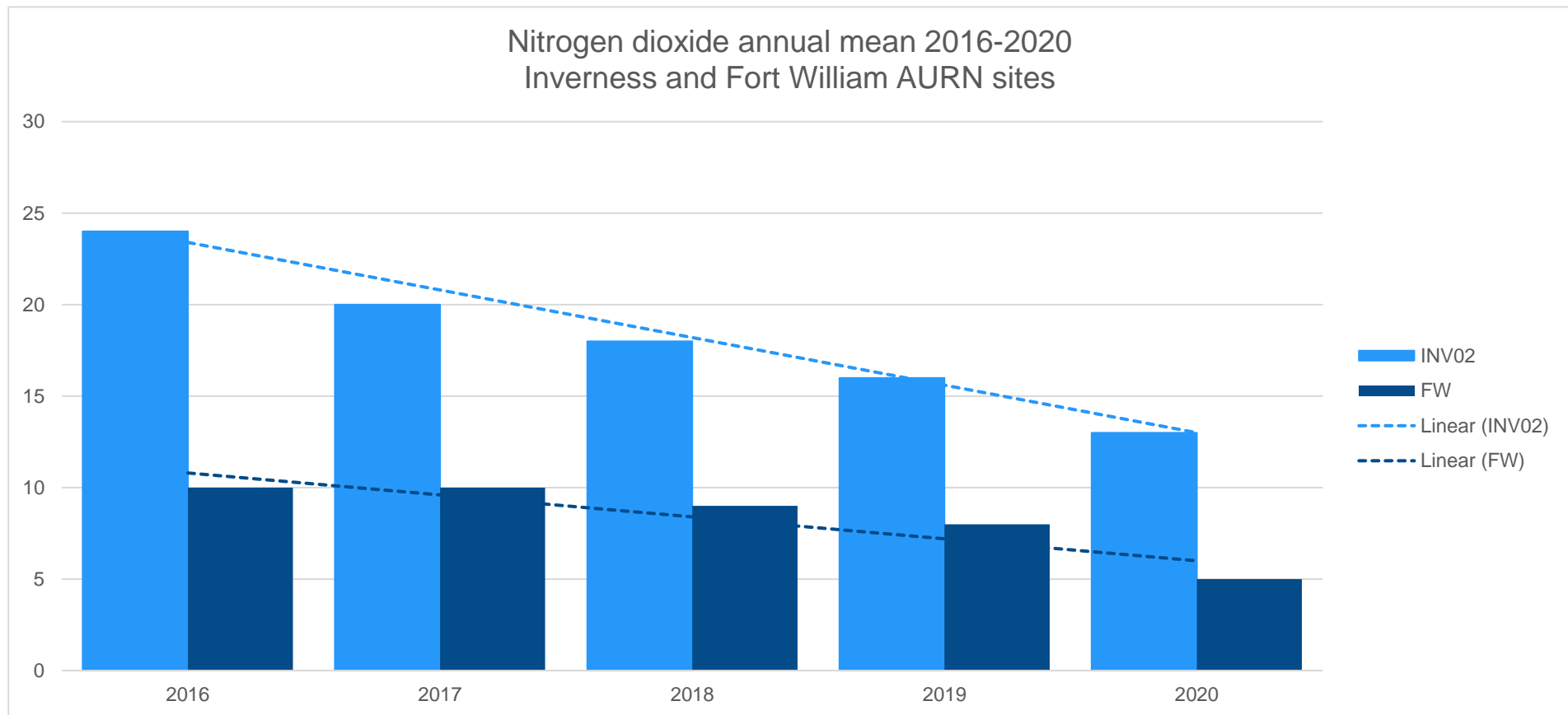
Exceedances of the NO₂ 1-hour mean objective (200 µg/m³ not to be exceeded more than 18 times/year) are shown in bold.

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

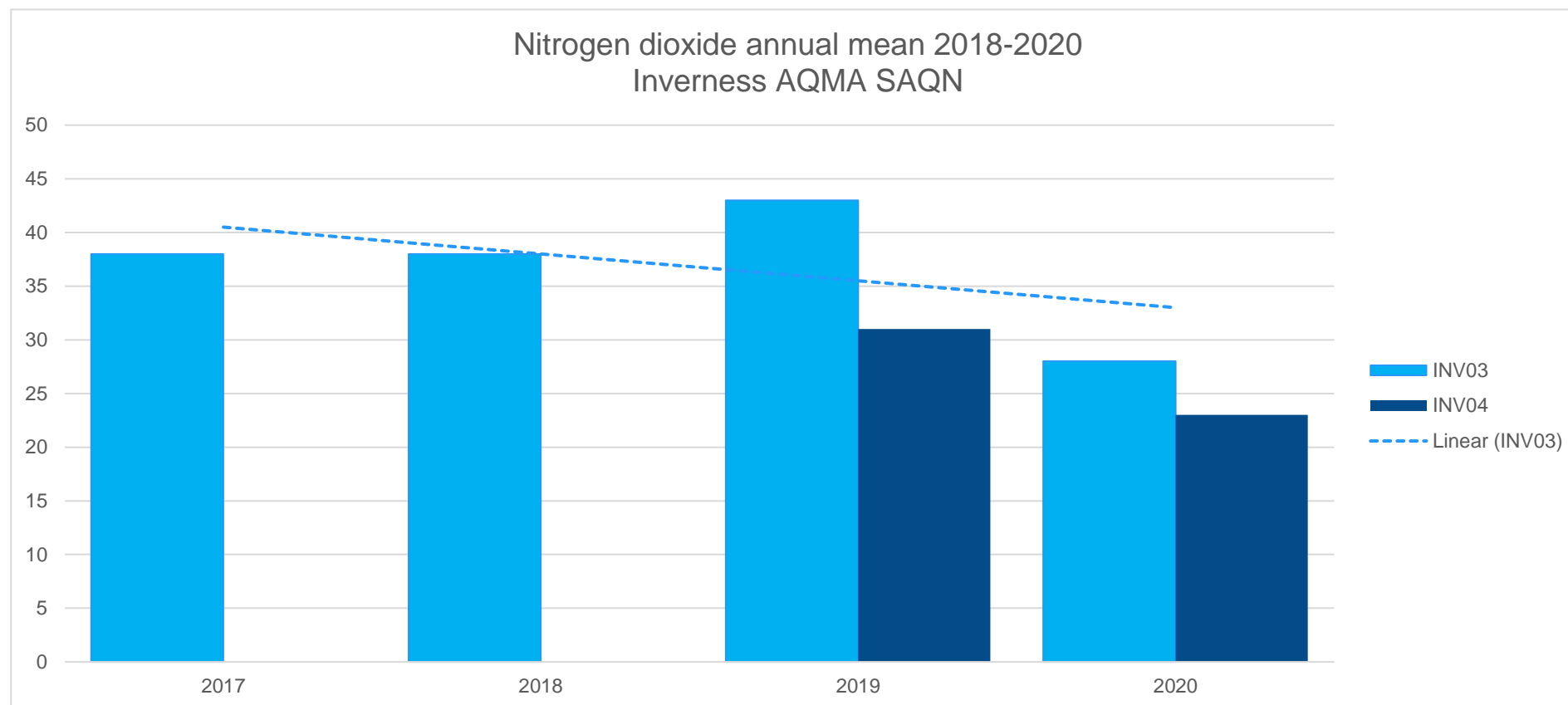
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(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%).

Figure 3 Trend in nitrogen dioxide monitoring at AURN sites



Both of the AURN sites have been showing a steady decreasing trend over the previous five years. This decrease was accelerated in 2020 by the impact of COVID19 restrictions on traffic volumes at certain times of the year.

Figure 4 Trend in nitrogen dioxide monitoring at Inverness AQMA

The automatic sites on Queensgate within the Inverness City Centre AQMA have been in place since 2017 and 2019 respectively. INV03 is at street level and INV04 is at the same location but at first floor level on the façade. Nitrogen dioxide annual mean concentrations at INV03 remained the same in 2017 and 2018. In 2019 there was a significant increase in annual mean concentration at INV03, followed by an even more significant reduction in 2020 due to COVID restrictions.

INV04 has not been operating for long enough to discuss trend however there was also a significant reduction in annual mean concentration at this site in 2020.

Table A.4 – Annual Mean PM₁₀ Monitoring Results (µg/m³)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
INV02	Roadside	96	96	9	10	9	9	8

Notes:

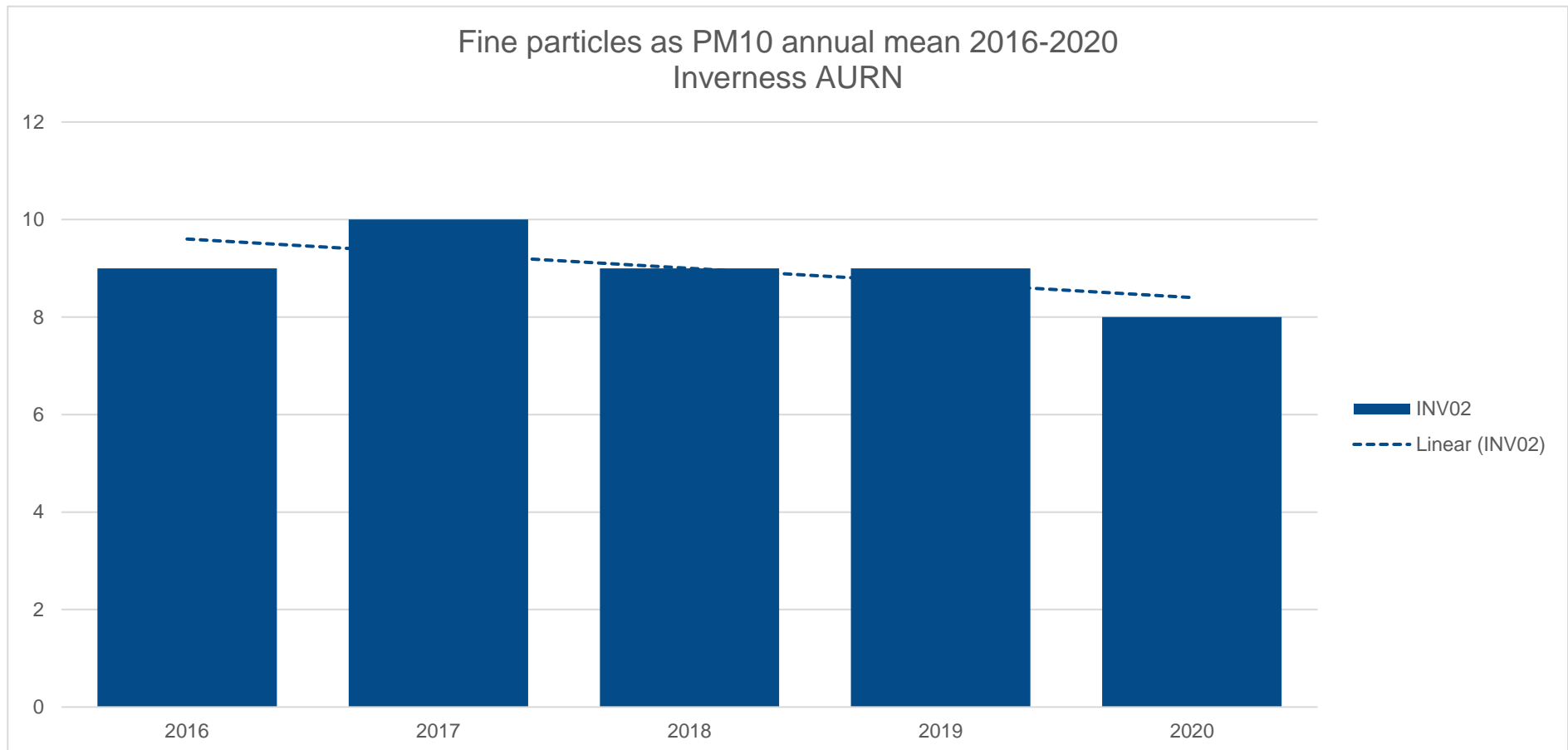
Exceedances of the PM₁₀ annual mean objective of 18 µg/m³ are shown in bold.

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.

(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%).

Figure 5 Trend in PM10 annual mean monitoring



There has been a slight reducing trend in PM10 annual mean concentrations at site INV02 over the last five years.

Table A.5 – 24-Hour Mean PM₁₀ Monitoring Results, Number of PM₁₀ 24-Hour Means > 50µg/m³

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
INV02	Roadside	96	96	0	0	0	0	0

Notes:

Exceedances of the PM₁₀ 24-hour mean objective (50 µg/m³ not to be exceeded more than seven times/year) are shown in bold.

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

(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%).

Table A.6 – Annual Mean PM_{2.5} Monitoring Results (µg/m³)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
INV02	Roadside	96	96	5	4	6	5	4

Notes:

Exceedances of the PM_{2.5} annual mean objective of 10 µg/m³ are shown in bold.

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.

(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%).

Maps of Monitoring locations

Figure 6 Map of Automatic Monitoring Sites in Highland

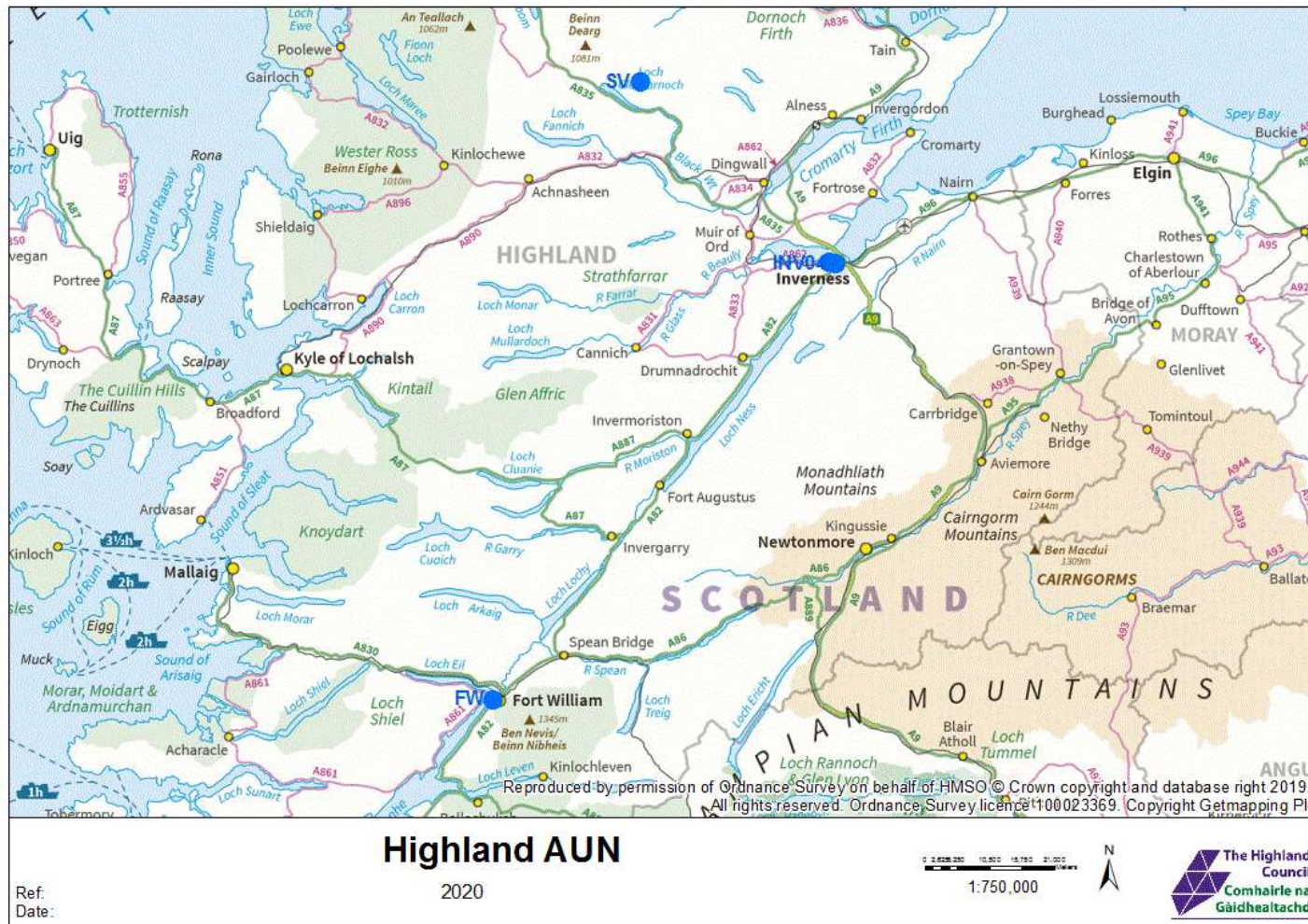


Figure 7 Map of Automatic Monitoring Sites in Inverness

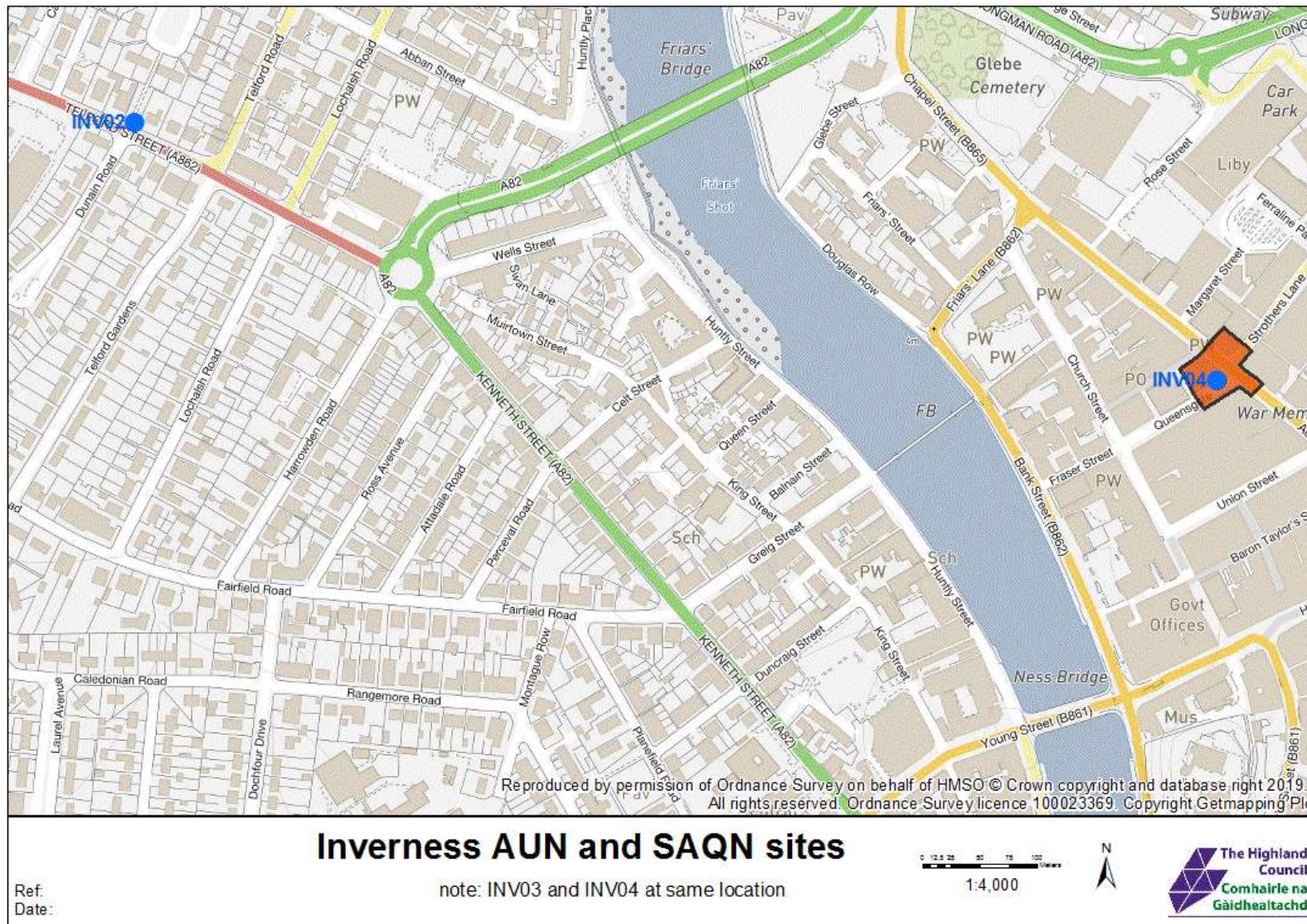


Figure 8 Map of non-automatic Monitoring Sites in Inverness

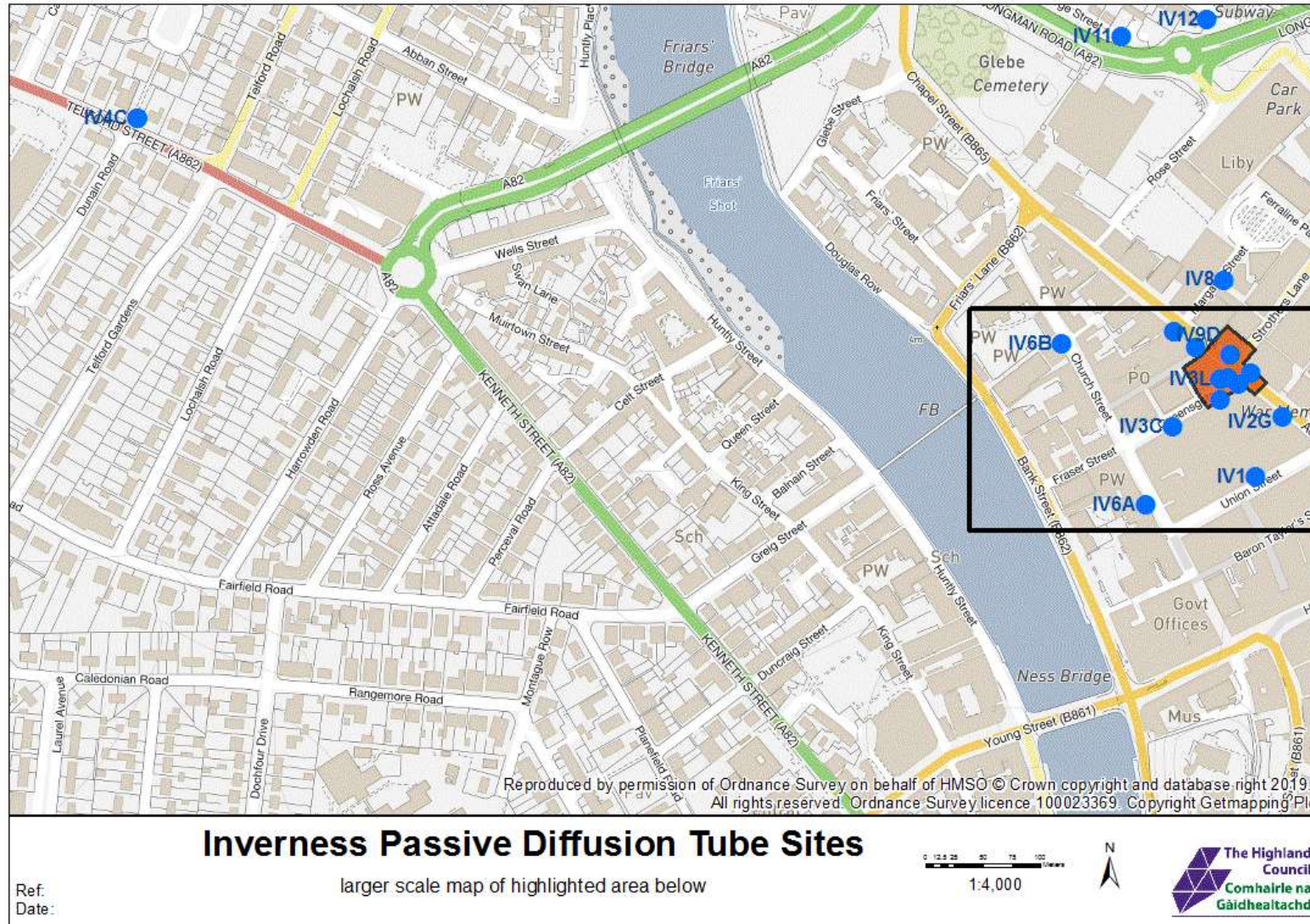


Figure 9 Map of non-automatic Monitoring Sites in Inverness AQMA

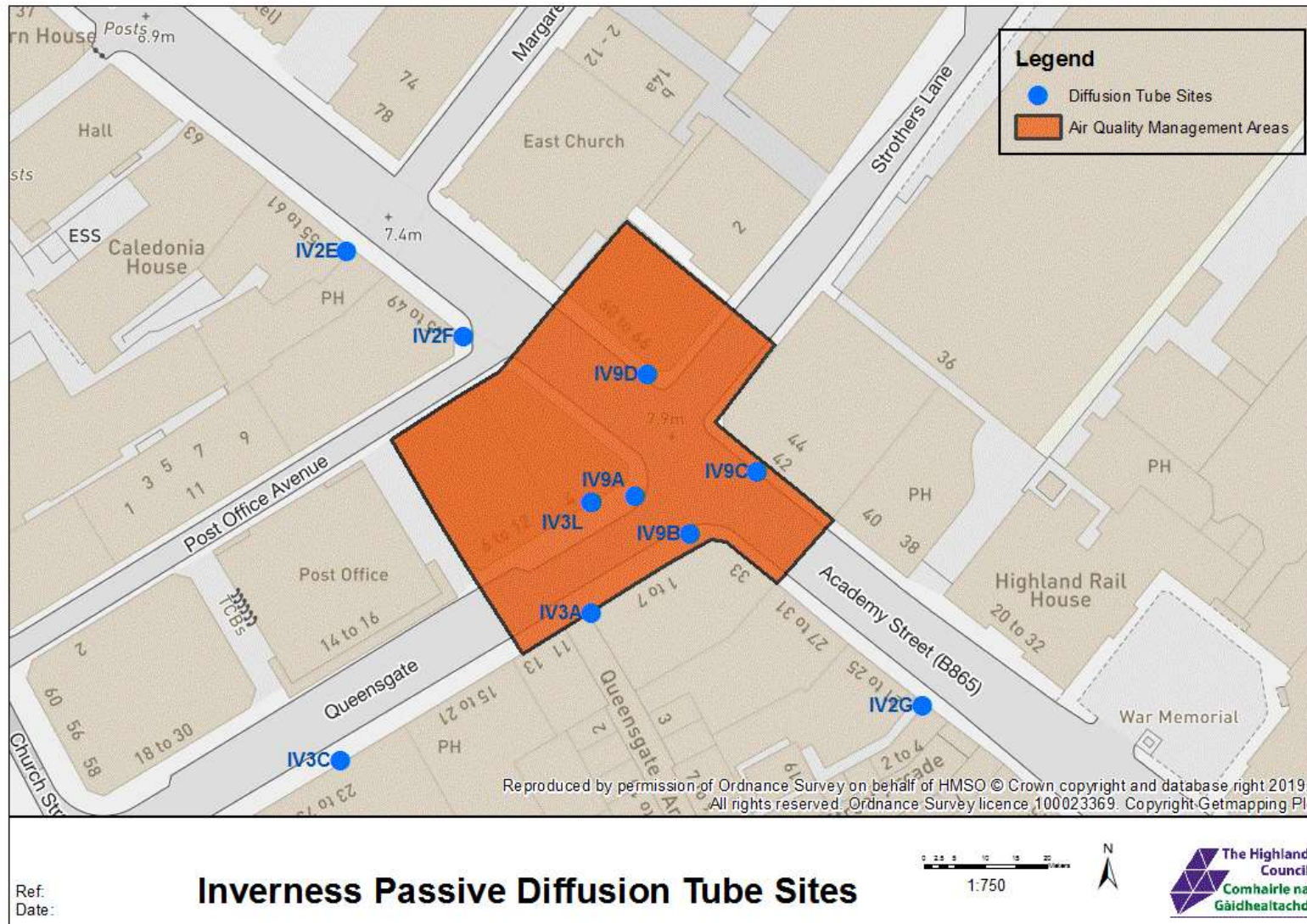


Figure 10 Map of non-automatic Monitoring Sites in Dingwall

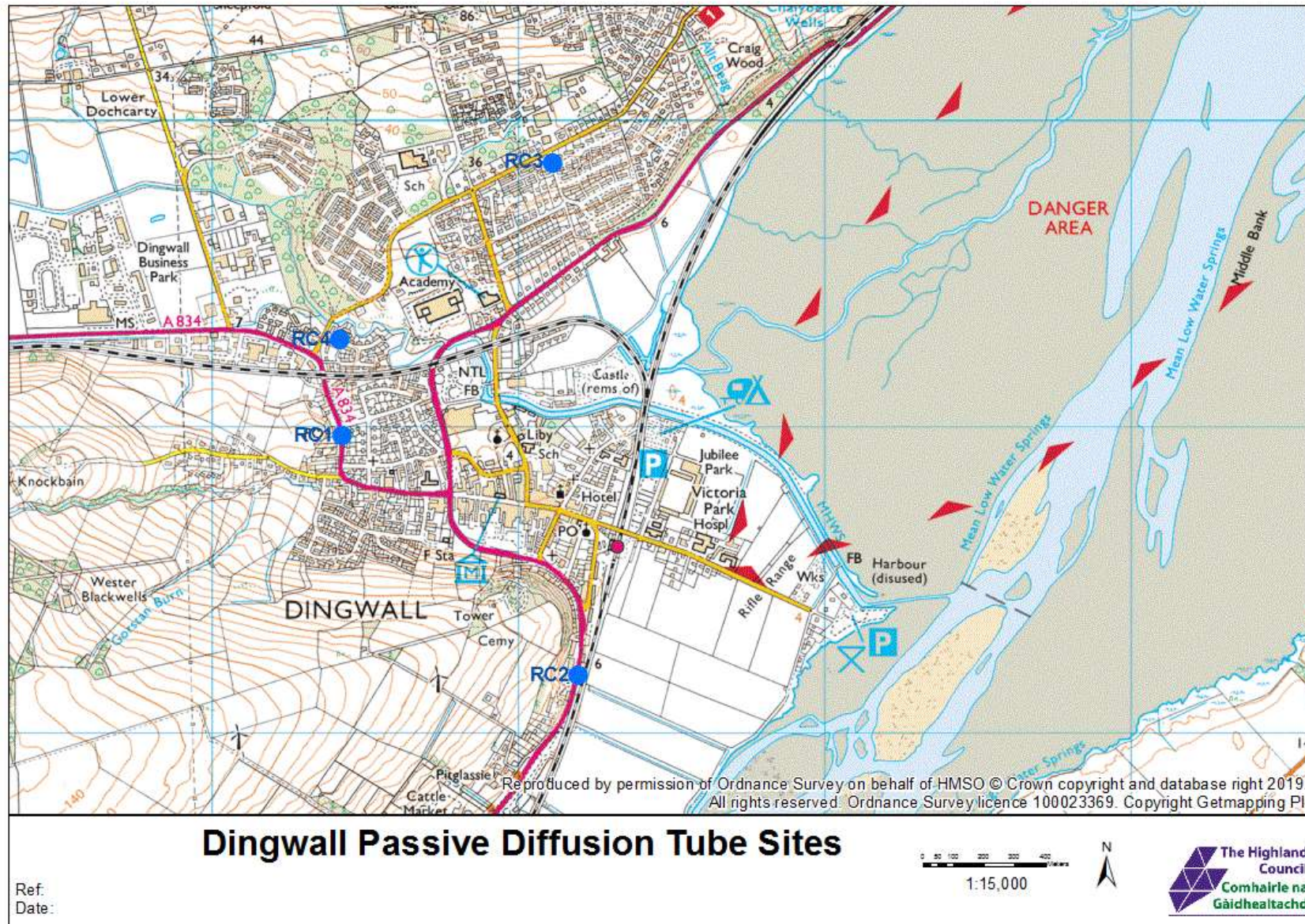


Figure 11 Map of non-automatic Monitoring Sites in Nairn

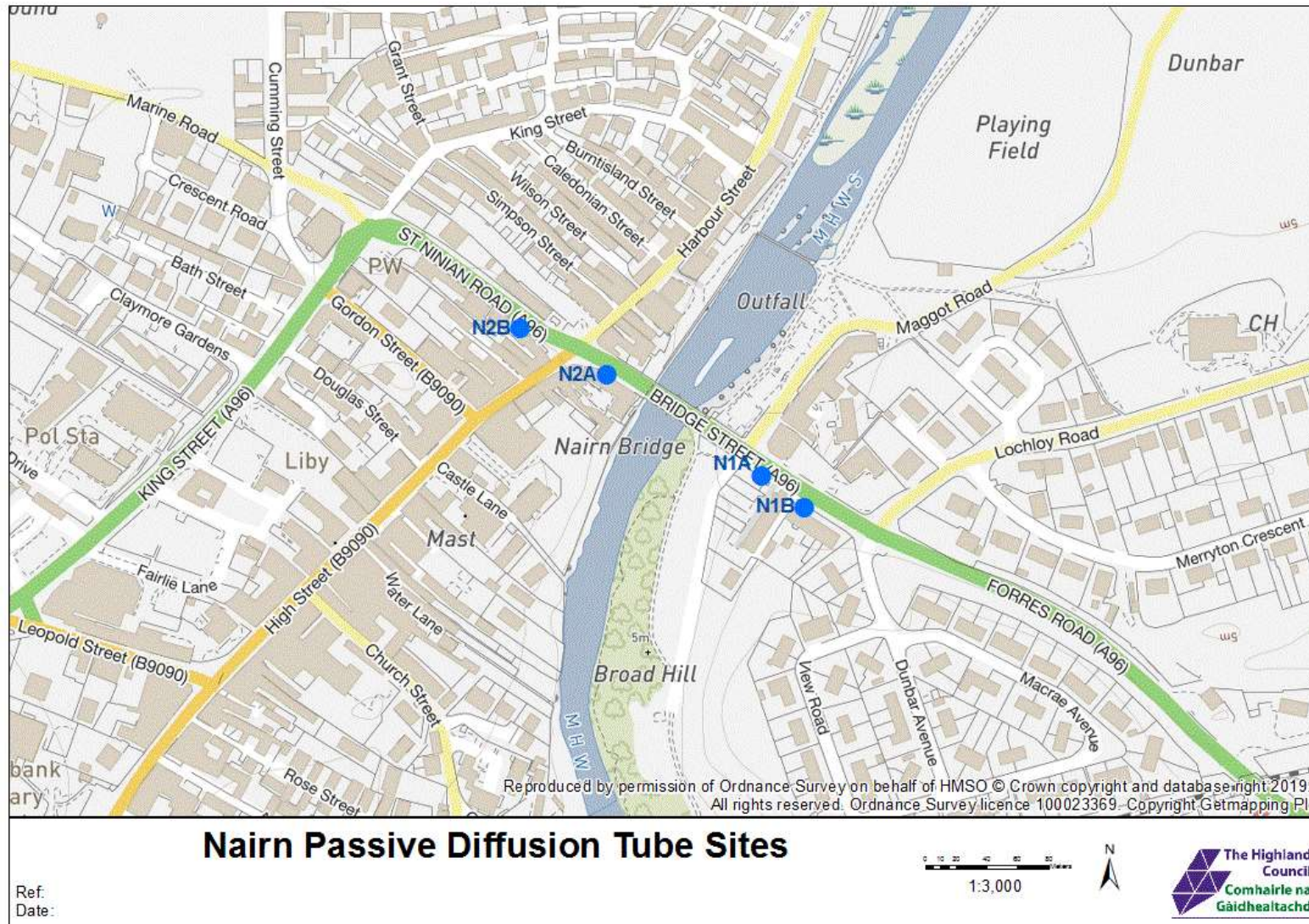
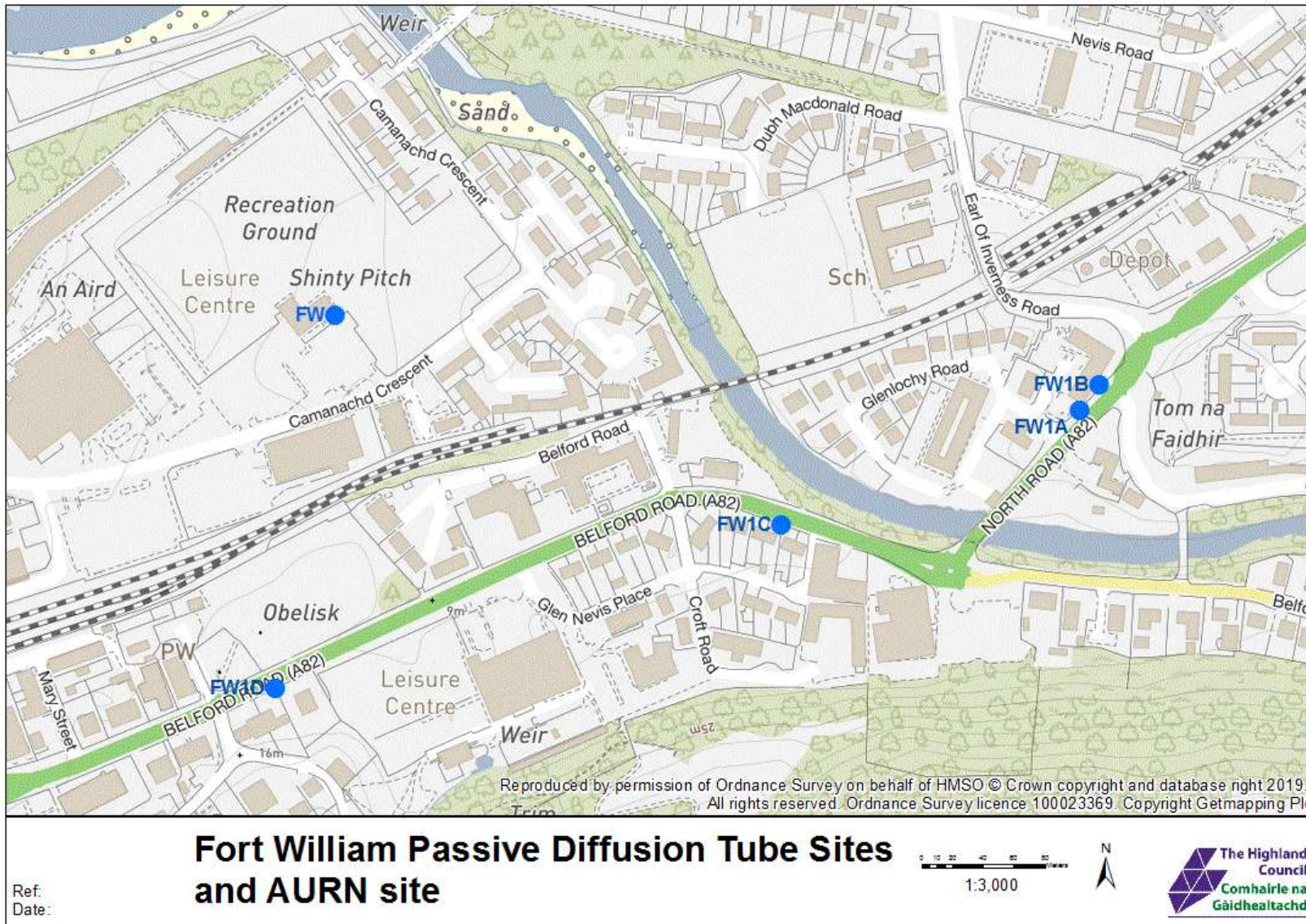


Figure 12 Map of non-automatic monitoring sites and AURN site in Fort William



Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO₂ 2020 Monthly Diffusion Tube Results (µg/m³)

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Bias Adjusted ⁽¹⁾
IV1	19.18	20.85	19.36	19.61	12.39	23.19	17.69		23.35	30.35	21.31	27.19	21.3	14.9
IV2E	38.33	42.17	30.74	18.39	14.81	24.90	25.79		30.80	40.83	33.23	34.68	30.4	21.3
IV2F	40.88	42.66	30.86	18.49	16.54	24.21	24.76		32.83	39.16	38.05	37.76	31.5	22
IV2G	35.00	39.91	31.48	22.45	15.86	26.77	26.29		33.44	41.01	37.42	37.28	31.5	22.1
IV3a	38.64	41.11	30.31	20.38	14.77	28.35	23.20		34.92	40.44	38.16	37.96	31.7	22.2
IV3c	32.79	32.13	26.23	18.16	12.80	24.75	22.26		26.39	34.31	32.41	32.69	26.8	18.8
IV3h	35.73	31.23	27.19	19.40	14.81	25.73	24.63		31.06	38.02	31.39	33.25	28.4	27.5
IV3k	34.81	35.84	25.80	19.31	14.27	24.95	23.82		30.45	33.42	33.64	35.36	28.3	27.5
IV3l	34.34	36.25	26.40	19.11	15.65	25.95	24.41		28.64	36.82	32.83	41.85	29.3	28.4
IV4a	24.15	24.57	20.56	9.65	9.45	11.41	14.01		18.90	25.03	26.52	26.85	19.2	13.4
IV4b	22.94	24.76	19.68	9.65	9.05	11.37	12.77		19.28	24.44	27.18	27.87	19	13.3
IV4c	22.94	23.61	19.98	9.16	9.54	11.89	13.29		17.71	26.65	26.14	28.93	19.1	13.3
IV6a	24.82	26.69	22.12	17.69	11.58	21.39	18.06		22.02	31.70	23.24	30.25	22.7	18.3
IV6b	18.12	18.46	14.16	10.08	7.18	13.05	11.75		15.66	22.02	21.69	24.05	16.0	12.9
IV8	19.67	22.47	19.33	12.45	9.13	14.94	15.43		19.51	24.66	25.47	26.51	19	15.3
IV9a	52.29	48.75	38.11	23.70	17.61	30.89	32.35		41.69	49.30	47.13	43.43	38.7	30.9
IV9b	32.74	37.78	29.89	18.91	16.64	25.27	26.07		31.19	39.55	39.07	40.94	30.7	24.7
IV9c	36.90	38.39	30.27	22.86	15.31	33.20	26.91		34.76	43.54	38.84	39.58	32.8	26.4
IV9d	29.57	30.78	25.05	20.84	13.45	25.49	22.53		28.11	35.70	30.32	34.65	26.9	21.8
IV11	17.54	20.08	16.23	9.60	8.24	11.67	12.04		16.34	21.63	25.77	23.00	16.6	11.6
IV12	22.97	22.60	18.85	10.78	9.12		13.44						16.3	11.4
RC1	20.42	23.37	19.40	10.79	9.33	10.47	10.75		17.37	22.46	25.43	28.63	18	5.8
RC2	33.98	34.73	25.38	14.63	13.13	20.79	17.52		27.19	31.07	31.98	34.11	25.9	6.9

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Bias Adjusted ⁽¹⁾
RC3	9.22	10.10	7.63	4.54	3.68	4.26	4.45		5.29	7.43	12.18	11.08	7.3	13.8
RC4	11.69	10.35	7.17	4.92	4.21	5.02			6.37	8.41	13.75	14.26	8.6	12.2
FW1A	15.71	19.73		9.62	8.64	13.73	11.64	18.72	25.56	20.11	22.08	23.86	17.2	13.9
FW1B	14.78	14.50		8.71	8.97	12.96	11.41	17.22	21.04	20.18	19.29	19.00	15.3	12.4
FW1C	16.71	17.85		11.21	11.50	15.60	13.92	19.35	18.95	22.44	20.92	22.56	17.4	14.1
FW1D	19.17	18.49		10.22	10.69	13.76	15.08	18.75	21.07	20.60	20.10	20.67	17.1	13.9
N1A	15.39	15.38	14.20	8.73	8.61	13.75	13.24		15.41	19.62	18.42	18.10	14.6	11.8
N1B	26.85	24.82	20.26	9.72	8.02	13.21	15.00		21.01	24.88	23.90	24.39	19.3	15.6
N2A	32.57	35.16	28.50	11.32	12.26	15.66	22.77		27.16	29.56	29.53	32.17	25.1	20.4
N2B	46.60	46.60	33.44	17.07	18.15	27.24	30.10		38.70	43.51	42.09	38.80	34.7	28.1

Notes:

(1) See Appendix C for details on bias adjustment

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

New or Changed Sources Identified Within The Highland Council During 2020

The following new biomass boiler installations were identified in 2020:

- Baillaird House, Newtonmore
- Unit D, Achnagonalin, Grantown-on-Spey
- Speyside Hotel, Grantown-on-Spey
- Easter Urray Cattery, Muir of Ord

All four were screen out of further investigation during the planning process.

A new sand and gravel quarry was identified at Pitgrudy, Dornoch, Sutherland. Air quality was not considered further as there was no relevant exposure present.

Additional Air Quality Works Undertaken by The Highland Council During 2020

The Highland Council has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

Diffusion tubes used in the surveys reported in this document were supplied by Gradko International Ltd. The method of preparation is 20% TEA in water. 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. Rounds 36 to 40 cover the 2020 monitoring details of which can be found at:

<https://laqm.defra.gov.uk/assets/laqmno2performancedatauptoOctober2020v1.pdf>

75% of submissions by Gradko to the proficiency scheme were satisfactory over the monitoring period. Rounds 37 and 39 were cancelled due to pandemic.

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. Tubes are exposed to the DEFRA calendar <https://laqm.defra.gov.uk/assets/2020laqmcalendar1.pdf> . However due to changes to

working as a result of the pandemic tubes exposed in May, June and July were exposed over periods that did not meet the DEFRA calendar requirements.

Diffusion Tube Annualisation

Annualisation was required at one non-automatic site in The Highland Council area. Details of this site and the data used to annualise are provided in Table C.2

Diffusion Tube Bias Adjustment Factors

The Highland Council have applied bias adjustment factors as follows:

Sites in Dingwall, Fort William and Nairn used the national bias adjustment factor of 0.81 as these sites are geographically remote from the local colocation study sites. A summary of bias adjustment factors used by over the past five years is presented in Table C.1.

Two local colocation studies were undertaken in The Highland Council area in 2020. The Inverness Queensgate INV03 study was discounted on this occasion as there was poor overall data capture from the automatic monitor. The Local bias adjustment factor was therefore taken to be 0.7 as derived from the Inverness INV02 colocation study.

The National bias adjustment factor for Gradko 20%TEA in water was 0.81. this was obtained from the 09/2021 bias adjustment factors spreadsheet and was derived from 27 colocation studies.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	Local and National	09/21	0.7 local and 0.81 national
2019	Local and National		0.86 local and 0.93 national
2018	Local and National		0.89 local and 0.93 national
2017	Local and National		0.96 local and 0.89 national
2016	Local	-	0.99 and 0.96

NO₂ Fall-off with Distance from the Road

No diffusion tube NO₂ monitoring locations within The Highland Council required distance correction during 2020.

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. Local site operator is The Highland Council for sites other than FW1.

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

Sites are subject to six monthly audit and service visits. LSO calibration visits are carried out fortnightly for all sites other than Strath Vaich, which is quarterly.

All data reported in this document is ratified.

Live and historical data is available at <http://www.scottishairquality.scot/data/> .

PM₁₀ and PM_{2.5} Monitoring Adjustment

The type of PM₁₀/PM_{2.5} monitor utilised within The Highland Council does not require the application of a correction factor.

Automatic Monitoring Annualisation

All automatic monitoring locations within The Highland Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 33% do not require annualisation.

NO₂ Fall-off with Distance from the Road

No automatic NO₂ monitoring locations within The Highland Council required distance correction during 2020.

Table C.2 – Annualisation Summary (concentrations presented in $\mu\text{g}/\text{m}^3$)

Site ID	Annualisation Factor Dundee Mains Loan	Annualisation Factor Edinburgh St Leonards	Annualisation Factor Glasgow Anderston	Annualisation Factor Site 4 Name	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
IV12	0.9744	1.2234	1.1399		1.1126	15.8	17.6	

Table C.3 – Local Bias Adjustment Calculations

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	9	11			
Bias Factor A	0.97 (0.92 - 1.03)	0.7 (0.66 - 0.74)			
Bias Factor B	3% (-3% - 9%)	44% (36% - 52%)			
Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$)	29.5	19.1			
Mean CV (Precision)	5.0%	3.2%			
Automatic Mean ($\mu\text{g}/\text{m}^3$)	28.7	13.3			
Data Capture	98%	98%			
Adjusted Tube Mean ($\mu\text{g}/\text{m}^3$)	29 (27-30)	13 (13-14)			

Notes:

A single local bias adjustment factor has been used to bias adjust the 2020 diffusion tube results.

Glossary of Terms

Please add a description of any abbreviation included in the APR – An example is provided below.

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

Please provide a list of all documents referred to in the report.

Delete this box when the document is finished

Start writing here...