

Annual Progress Report (APR)



2022 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, 2022

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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.

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.

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. Although a final draft of the action plan was completed in 2016, the plan was not formally published. The Highland Council is again working with partners to review and update the draft plan with a view to publishing by the end of 2022.

Figure 1 Rose Street Bus Gateway



Since 2016 there has been a general trend of reduction in nitrogen dioxide levels within the AQMA. However the abnormal traffic conditions experienced throughout 2020 and 2021 as a result of the COVID19 response have meant that it has not been possible to properly quantify what improvement may have resulted from some of the initiatives that have completed in the

last two years. For example: the completion of the Rose Street Bus Gateway.

It is hoped that 2022 and 2023 will begin to demonstrate further improvements especially as projects such as the electrification of the bus fleet operating within the AQMA, expected in late 2022, come online.

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

Figure 2 Schools Project



The Highland Council is currently working with a number of primary schools to promote air quality issues, through the use of portable air quality monitors alongside the educational work. 6 schools are currently part of this project and if successful may extend to more of the schools in the area.

The Highland Council is planning a redesign of the streetscape of Academy Street looking at improving the access for sustainable transport.

How to Get Involved

Information on air quality within the Highlands can be obtained at [The Highland Council Pollution web pages](#)

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1 Local Air Quality Management

This report provides an overview of air quality in The Highland Council during 2021. 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 a summary of 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?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 AQMA	NO ₂ annual mean	Inverness	An area encompassing a number of properties at the junction of Queensgate, Academy Street and Strothers Lane	Action Plan for Inverness City Centre AQMA (Draft)

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.

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:

[Local Transport Planning in The Highland Council](#)

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: [Climate Change in The Highland Council](#)

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 2021 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. Key completed measures are:

- The Highland Council is developing plans for permanent development of the Spaces for People initiative on Academy Street. Public consultation is underway.
- The Rose Street Bus Gateway was completed allowing departure for certain buses from the bus station avoiding Academy Street and the AQMA.
- The Highland Council continues to develop and extend the EV charging network within the Highlands encouraging the uptake of EVs.

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

- 25 vehicle EV bus fleet expected for delivery in late 2022. Allowing complete replacement of the current diesel fleet working on the local bus routes within the AQMA with ULEV. This action should have a significant positive impact upon the pollutant concentrations within the AQMA.

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>Transport Scotland 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>
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		<p>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.</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
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 (officially opened March 2022), Milburn Road; Riverside Way (technical designs near completion and funding in place) and route between Cradlehall Business Park and the campus.</p> <p>Funding has been secured for a signalised crossing for non-motorised users at Raigmore Interchange. Detailed plans are in preparation.</p> <p>Active Travel map for Inverness.</p> <p>HC revised Travel and Subsistence Policy promotes active travel through new travel hierarchy. NHS Active Travel Policy in place.</p> <p>e-bike hire scheme within Inverness City Centre to continue and expand. Docking points at the train station, UHI campus 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		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. Consultation on new scheme underway: https://academystreetproposals.commonplace.is/
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 2. Public consultation closed June 2022. Active Travel Masterplans including Inverness Active Travel Masterplan issued October 2021 Highland Council & Sustrans published Inverness Walking & Cycling Index 2021

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>The Highland Council has secure Scottish Government funding for a project engaging with Primary Schools via educational packages and the use of low cost monitoring techniques. A first tranche of 6 schools have been identified and the project will progress throughout 2022</p> <p>A School Street Zone pilot is underway at an Inverness Primary, with a further three locations commencing in 2023.</p> <p>The Council has a School Transport Transformation Project with recommendations to update School Transport Policies to encourage active travel alternatives.</p> <p>The Council runs Go For It incentive project with rewards for active travel.</p> <p>All Highland Council takes part in the Eco Schools award scheme which include a focus on sustainable travel to/from school</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
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		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	Ongoing					Stagecoach new fleet of 25 electric buses to be introduced in Inverness city centre routes from December 2022 replacing diesel fleet. A driverless EV bus operates between UHI campus and a nearby retail park. https://hitrans.org.uk/News/Story/1278
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	Completion of Electric A9 & LAIP		Ongoing		<p>The Highland Council currently host over 80 EV charge points, with 23 new charger installation in progress, and more planned for the future. https://chargeplacescotland.org/</p> <p>Additional charge points for the west coast region are due to be installed by Autumn 2023 via FASTER programme.</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>The Council have made progress on their fleet decarbonisation, with changes implemented through various Council policies such as, New Ways of Working (NWOW), the use of the Council Car Club and introduction of LEV within the LCV fleet. Currently the Council operates 55 electric vehicles and 48 hybrid vehicles, which represents 14% of the light commercial fleet. There are 26 EV charge points scheduled for installation at Council depots which are dedicated for fleet use.</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		All Highland Council takes part in the Eco Schools award scheme which include a focus on sustainable travel to/from school
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		<p>Ties in with measure 10 and 11.</p> <p>New Pathfinder project identifies new opportunities to develop a sustainable EV infrastructure model across the region.</p> <p>The Highland Council has published Planning Guidance for EV Infrastructure to be incorporated into new residential developments.</p>
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	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	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, including a bus gate at Raigmore hospital, bus priority lane on Barn Church Road, and traffic light prioritisation for buses. These projects are ongoing, planning to be complete by Summer 2024.</p> <p>In the longer term, three STAG appraisals have been commissioned for Inverness – they are for Milburn Road Corridor, B9006 Bus Priority and Bus Priority from Rose St – Shore St. Public consultations are planned. Once STAG are agreed, TS will provide funding for detailed design work.</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.
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						

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
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.
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		Various campaigns held throughout 2022 including Sustainable Travel Day . Highland Council has a Bikeability Coordinator who supports delivery of cycle training in schools . NHS Highland have an Active Travel facebook page. Local active travel pressure group, Kidical Mass North, have a monthly cycle campaign ride through Inverness.

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
30	Signposting to Car parks and other destinations	Transport Planning and Infrastructure	Review signposting around city centre to encourage traffic away from AQMA	Community Services	In progress	2019/20	Delivery of scheme		ongoing	2020	Development of Network Mesh ongoing which will provide capacity for smart signposting
31	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 2021. The sites are operated as part of the Scottish Air Quality Network (SAQN). There are, in addition, 3 air quality monitoring sites that are operated on behalf of DEFRA as part of the Automatic Urban and Rural Network (AURN). Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at <https://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.

3.1.2 Non-Automatic Monitoring Sites

The Highland Council undertook non- automatic (passive) monitoring of NO₂ at 29 sites during 2021. 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 (NO₂)

Table A.3 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.4 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 strategy objectives at any sites within The Highland Council area during 2021.

Figure 3 Trend in nitrogen dioxide monitoring at AURN sites

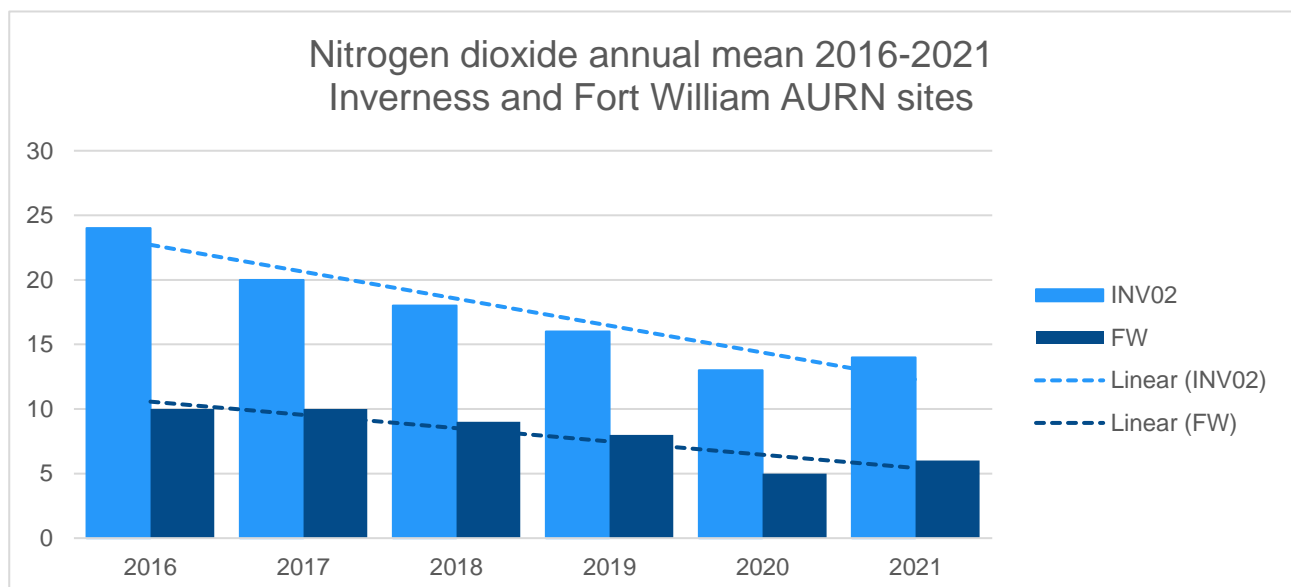
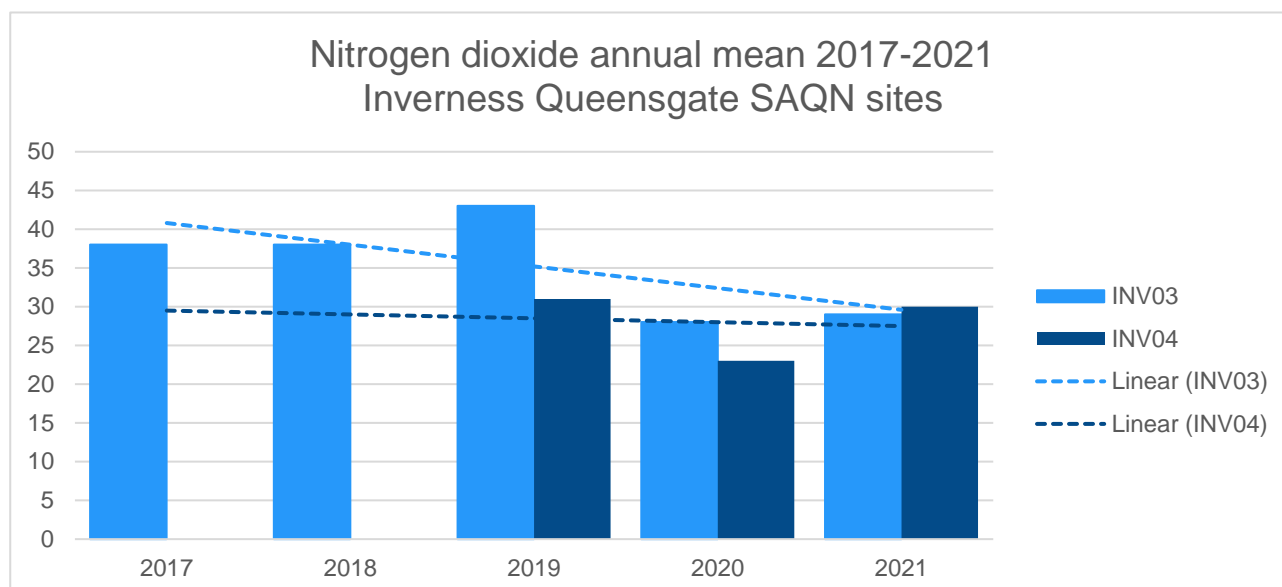


Figure 4 Trend in nitrogen dioxide monitoring at SAQN site in AQMA

Both the AURN sites have been showing a decreasing trend over the previous five years. The decrease was accelerated in 2020 by the impact of COVID19 restrictions. 2021 saw a continuation of the reduced levels although to a lesser extent than was witnessed in 2020.

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 concentrations at INV03 remained the same in 2017 and 2018. In 2019 there was a significant increase in annual mean concentration (13%) at INV03, followed by an even more significant reduction (in 2020 due to COVID restrictions). 2021 has seen an increase in nitrogen dioxide annual mean compared to 2020. Concentrations at all sites remain however significantly lower than before COVID.

It is difficult to determine a trend at the AQMA monitoring site given the unusual influences on the majority of the data set. Firstly in 2019 the temporary movement of a bus stop at the west end of Academy Street onto Queensgate, while construction work was undergone at the former location, meant increased bus movements within the AQMA. Secondly and more significantly COVID in 2020 and 2021. It is hoped that the 2023 APR when considering the 2022 dataset will give a better understanding of the current levels of nitrogen dioxide pollution within the AQMA and whether actions like the completion of the Rose Street Bus Gateway, that allows buses to depart the bus station avoiding Academy Street and the AQMA, have had a positive impact. Should the trend of lower nitrogen

dioxide concentrations continue through 2022 The Highland Highland Council will expect to begin the process of working towards revoking the AQMA.

3.2.2 Particulate Matter (PM₁₀)

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

Table A.6 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 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 any of the PM₁₀ objectives at any site in Highland in 2021.

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 five years with the air quality objective of 10µg/m³.

There were no exceedances of the PM_{2.5} objective at any site in Highland in 2021.

3.2.4 Sulphur Dioxide (SO₂)

No monitoring for sulphur dioxide was undertaken in Highland in 2021.

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

No monitoring for carbon monoxide, lead or 1,3-butadiene was undertaken in Highland in 2021

4 New Local Developments

4.1 Road Traffic Sources

There are no new road traffic sources identified in Highland in 2021.

4.2 Other Transport Sources

There are no new other transport sources identified in Highland in 2021.

4.3 Industrial Sources

There are no new Industrial installations, or significantly changed existing installations, major fuel storage depots storing petrol, petrol stations or poultry farms identified in Highland in 2021.

4.4 Commercial and Domestic Sources

Two new biomass installations were considered. Details of the developments are in the appendix. Both were screened for air quality impact and neither was found to be significant.

4.5 New Developments with Fugitive or Uncontrolled Sources

There were no new potential sources of fugitive or uncontrolled particulate matter identified in 2021.

5 Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

No exceedances of air quality objectives were identified in 2021, either within or out with the existing AQMA. There is still an obvious influence upon 2021 monitoring data of the ongoing COVID19 response. Pollutant concentrations remain well below the objectives and whilst it would not be appropriate to revoke the AQMA on the basis of this data, should, however, that trend continue and levels remain well within the objectives in 2022 it will be the intention of The Highland Council to progress with revoking the AQMA in 2023.

5.2 Conclusions relating to New Local Developments

No local developments with the potential to significantly affect local air quality were identified in this round of review.

5.3 Proposed Actions

The new monitoring data has not identified any new exceedances of the objectives. Although 2020 and 2021 monitoring data within the AQMA is below the objective level it would not be appropriate to use data from this unusual circumstance as the basis for changing or revoking the AQMA. The Highland Council will continue to monitor air quality within and around the AQMA through 2022 and 2023 as we move into a more normal post COVID19 situation.

The Highland Council is reviewing the content of the 2016 final draft AQAP for Inverness City Centre AQMA with an expectation that a new draft, compliant with the most recent DEFRA structure for action plans, will be presented to council for approval to publish by the end of 2022.

The Highland Council will submit a 2023 APR.

The Highland Council will continue to work, including with partner organisations, on the implementation of action plan measures.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which 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

Notes:

(1) 0m 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? 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
RC5	Burn Place, Dingwall	Roadside	254538	858790	NO2	N	2.7	2.5	N	2.5
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
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.3 – Annual Mean NO₂ Monitoring Results (µg/m³)

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2021 (%) ⁽²⁾	2017	2018	2019	2020	2021
INV02	Roadside	Automatic	93	93	20	18	16	12.7	14
FW	Suburban	Automatic	96	96	10	9	8	5.3	6
INV03	Roadside	Automatic	93	93	38	38	43	28.2	29
INV04	Roadside	Automatic	69	69	-	-	31	22.6	29.6
IV1	Roadside	Diffusion	0	0	20.0	19.0	25.0	14.9	-
IV2E	Roadside	Diffusion	91.7	91.7	35.0	35.0	34.0	21.3	30.1
IV2F	Roadside	Diffusion	100	100	40.0	36.0	38.0	22	26.5
IV2G	Roadside	Diffusion	100	100	42.0	35.0	37.0	22.1	29.6
IV3A	Roadside	Diffusion	100	100	36.0	35.0	38.0	22.2	28.7
IV3C	Roadside	Diffusion	91.7	91.7	30.0	31.0	33.0	18.8	24.3
IV3L	Roadside	Diffusion	100	100	39.0	38.0	41.0	28.4	25.1
IV4C	Roadside	Diffusion	100	100	21.0	17.0	17.0	13.3	14.7
IV6A	Roadside	Diffusion	91.7	91.7	25.0	23.0	27.0	15.9	19.6
IV6B	Roadside	Diffusion	100	100	19.0	21.0	18.0	11.2	14.3
IV8	Roadside	Diffusion	100	100	23.0	21.0	22.0	13.3	17.6
IV9A	Kerbside	Diffusion	100	100	47.0	42.0	45.0	27.1	33.7
IV9B	Kerbside	Diffusion	100	100	30.0	34.0	38.0	21.5	27.8
IV9C	Roadside	Diffusion	100	100	43.0	39.0	40.0	22.9	33.7
IV9D	Kerbside	Diffusion	100	100	28.0	33.0	34.0	18.9	25.7
RC1	Roadside	Diffusion	100	100	14.0	21.0	20.0	14.6	14
RC2	Roadside	Diffusion	100	100	34.0	30.0	30.0	20.9	19.2
RC3	Urban Background	Diffusion	100	100	7.0	8.0	8.0	5.9	5.3
RC4	Urban Background	Diffusion	100	100	8.0	11.0	9.0	7	6.6
RC5	Roadside	Diffusion	100	41.7	-	-	-	-	11.2
FW1A	Roadside	Diffusion	100	100	17.0	21.0	21.0	13.9	16.4
FW1B	Roadside	Diffusion	100	100	16.0	19.0	18.0	12.4	14.5
FW1C	Roadside	Diffusion	100	100	13.0	21.0	19.0	14.1	16.1
FW1D	Roadside	Diffusion	100	100	12.0	24.0	22.0	13.9	16.6
IV11	Roadside	Diffusion	100	100	-	-	18.0	11.6	14.2

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2021 (%) ⁽²⁾	2017	2018	2019	2020	2021
N1A	Roadside	Diffusion	100	100	-	-	18.0	11.8	14
N1B	Roadside	Diffusion	100	100	-	-	19.0	15.6	17.2
N2A	Roadside	Diffusion	100	100	-	-	25.0	20.4	20.1
N2B	Roadside	Diffusion	100	100	-	-	33.0	28.1	27.9

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%).

Trend Data

Trends into the 2021 monitoring year continued to be skewed to an extent by the unusual air quality conditions resulting from the ongoing COVID19 response.

Table A.4 – 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 2021 (%) ⁽²⁾	2017	2018	2019	2020	2021
INV02	Roadside	Automatic	93	93	0	0	0	0	0
FW2	Suburban	Automatic	96	96	0	0	0	0	0
INV03	Roadside	Automatic	93	93	0	0	0(143.7)	0	0
INV04	Roadside	Automatic	69	69	-	-	0(95.1)	0	0(95.9)

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%).

Table A.5 – Annual Mean PM₁₀ Monitoring Results (µg/m³)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020 (%) ⁽²⁾	2017	2018	2019	2020	2021
INV02	Roadside	100	100	10	9	9	8	9

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%).

Table A.6 – 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⁾	2017	2018	2019	2020	2021
INV02	Roadside	100	100	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.7 – 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⁾	2017	2018	2019	2020	2021
INV02	Roadside	100	100	4	6	5	4	5

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 5 Map of Automatic Monitoring Sites in Highland

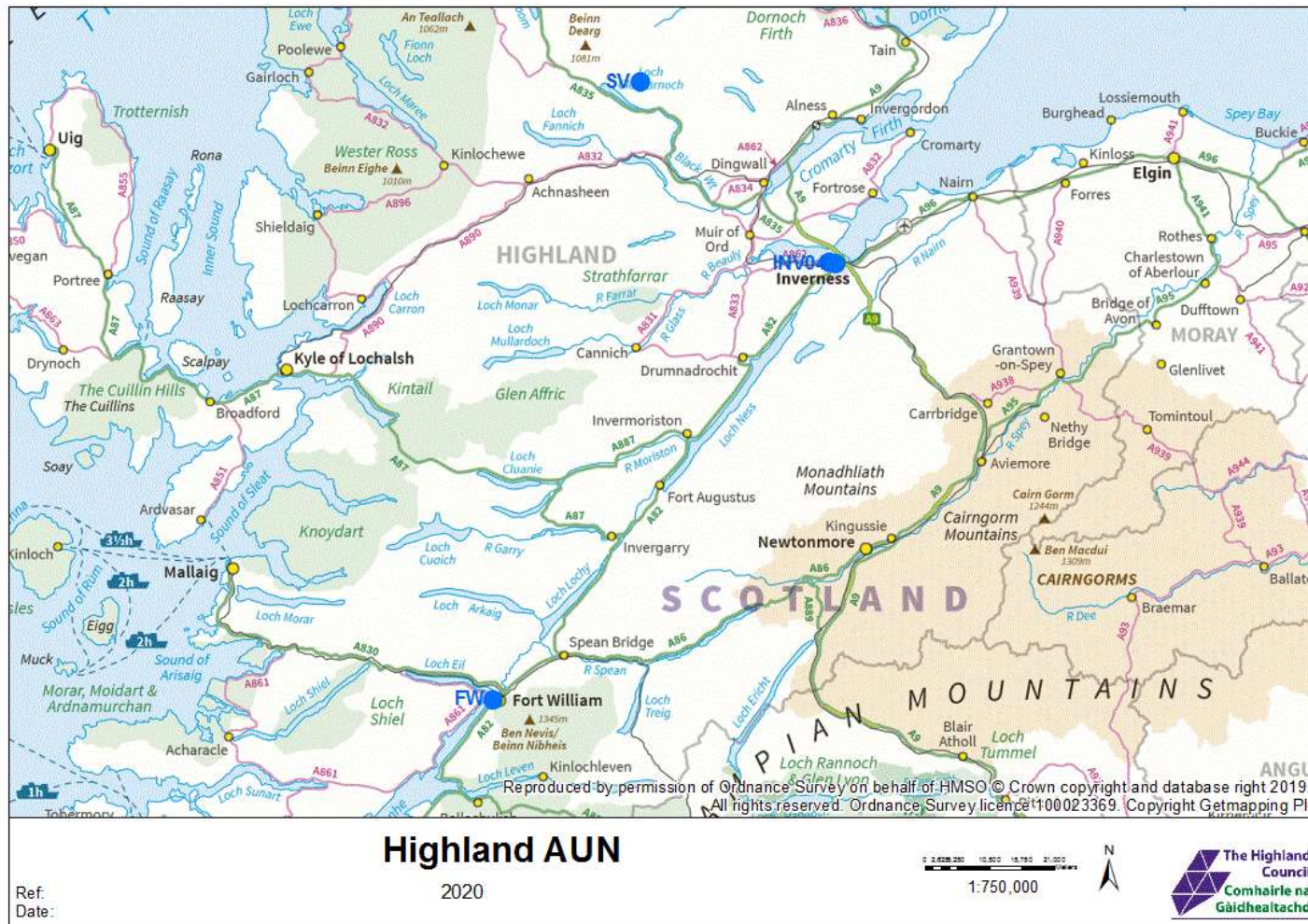


Figure 6 Map of Automatic Monitoring Sites in Inverness

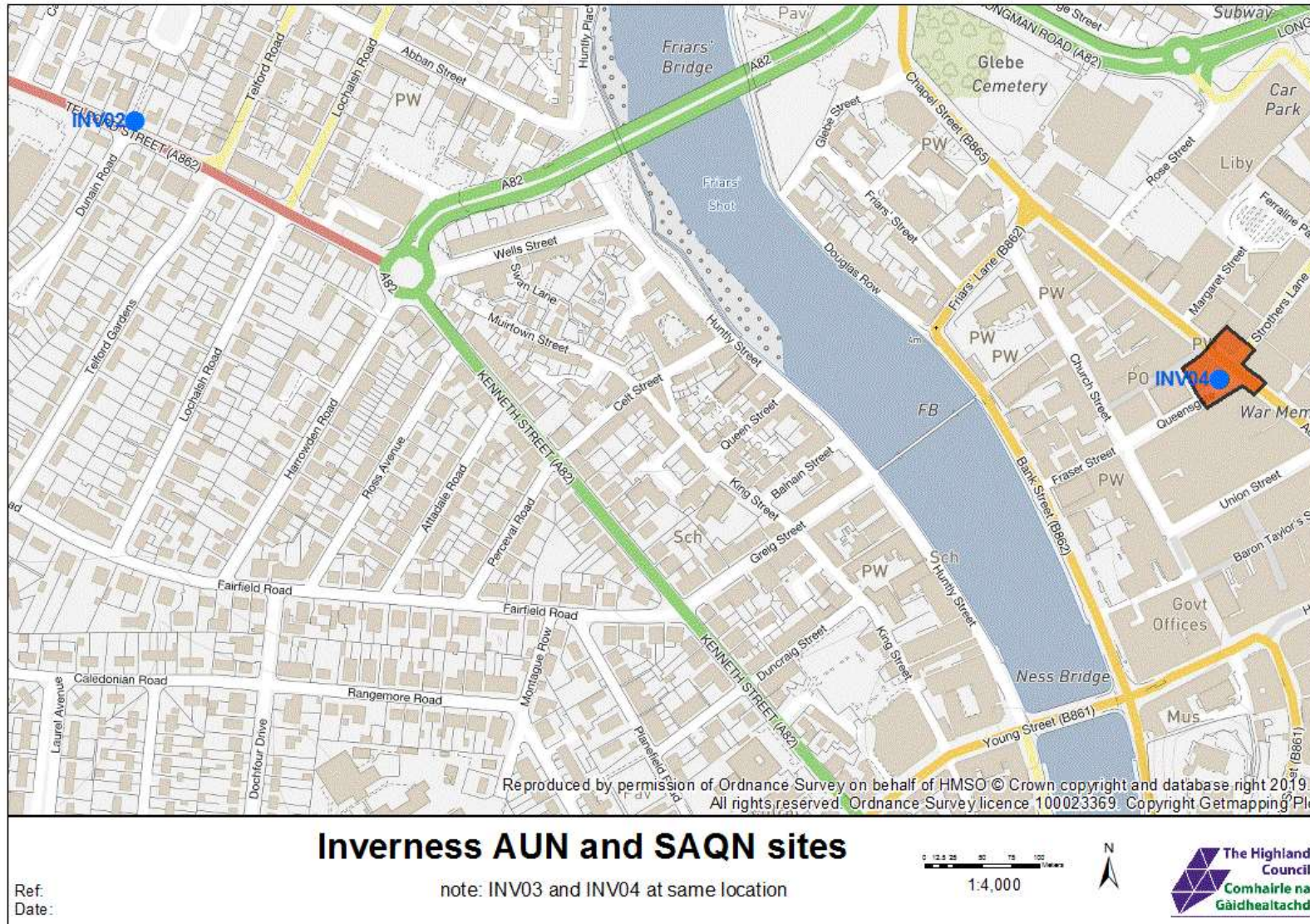


Figure 7 Map of non-automatic Monitoring Sites in Inverness

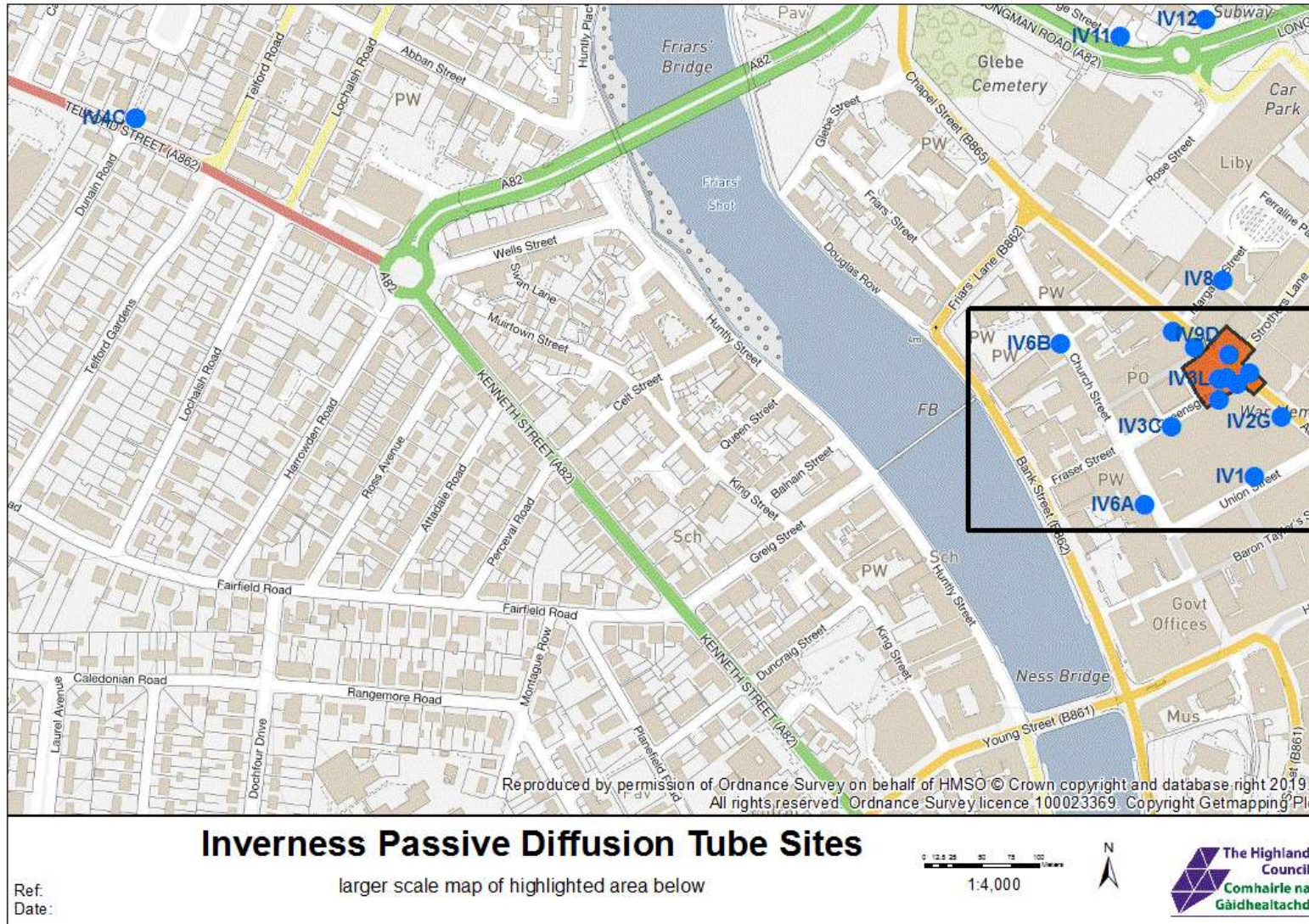


Figure 8 Map of non-automatic Monitoring Sites in Inverness AQMA

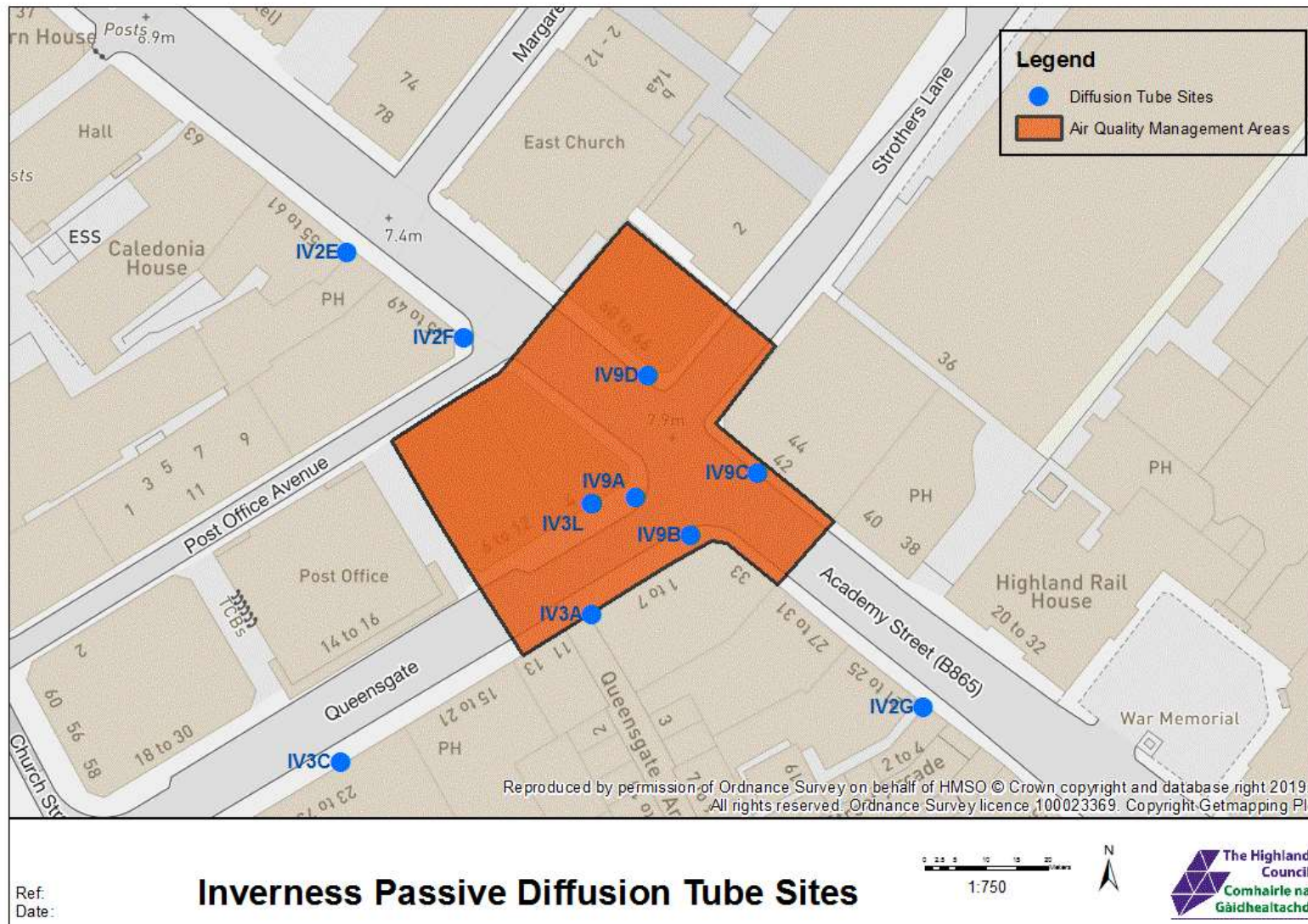


Figure 9 Map of non-automatic Monitoring Sites in Dingwall

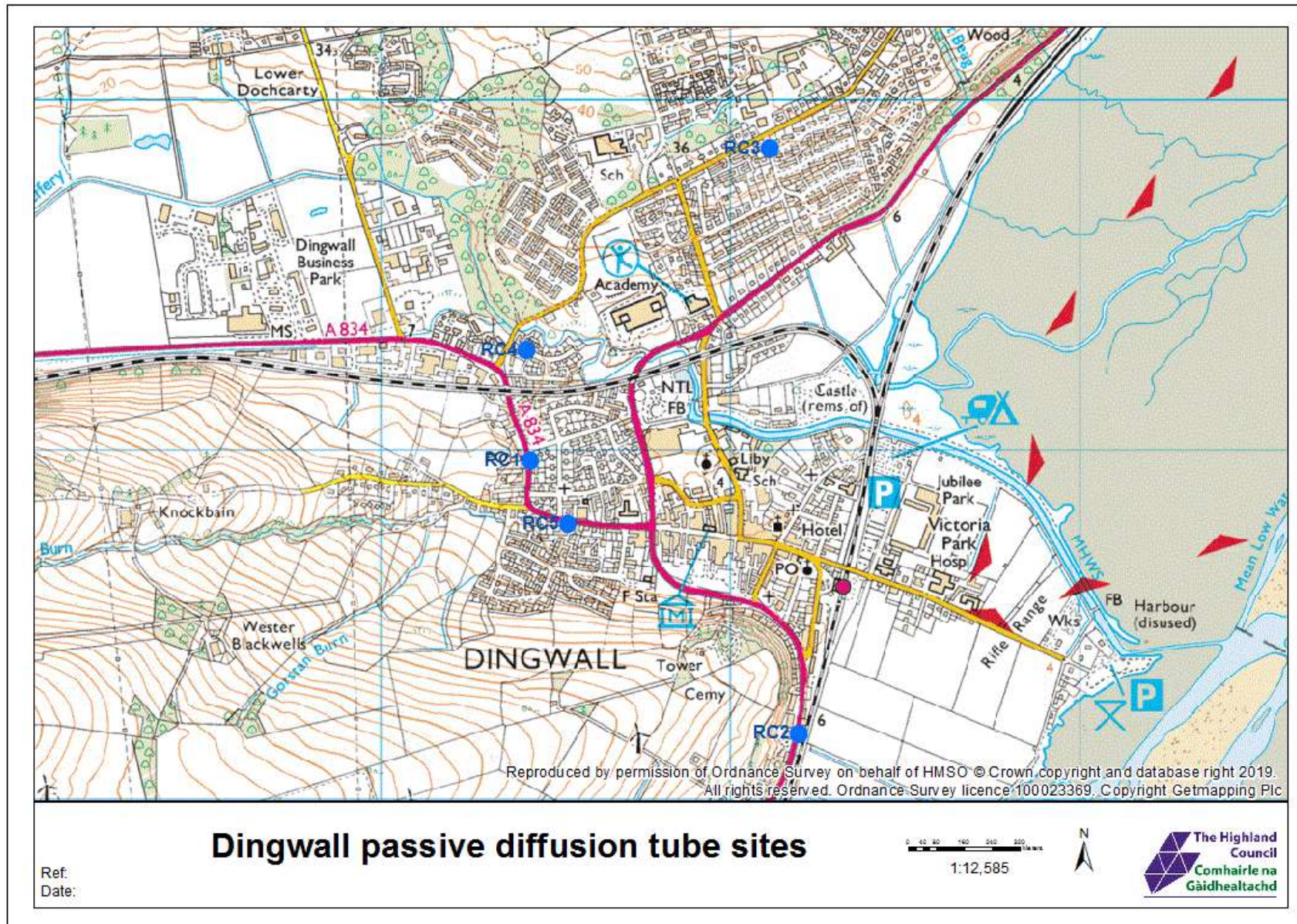


Figure 10 Map of non-automatic Monitoring Sites in Nairn

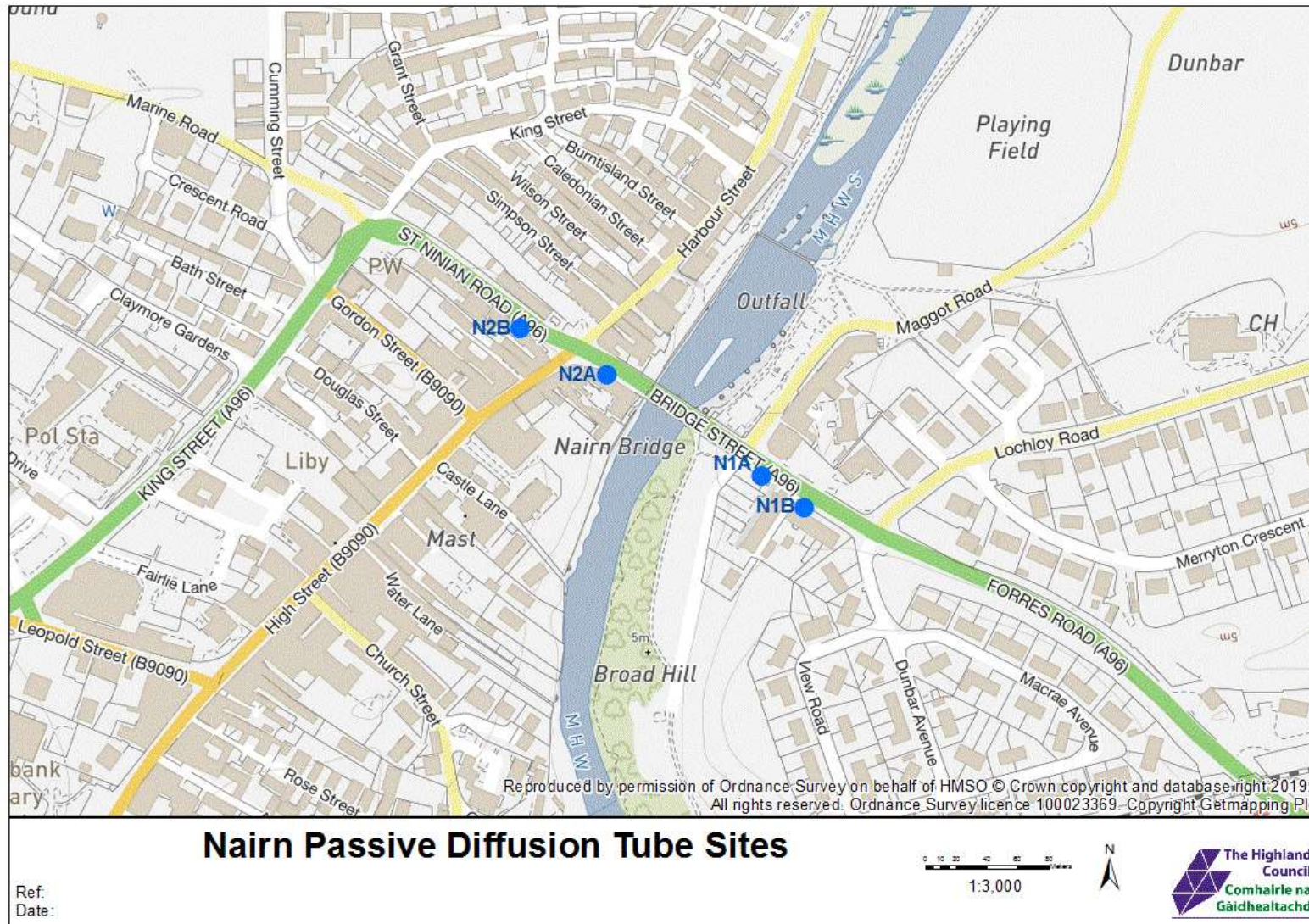
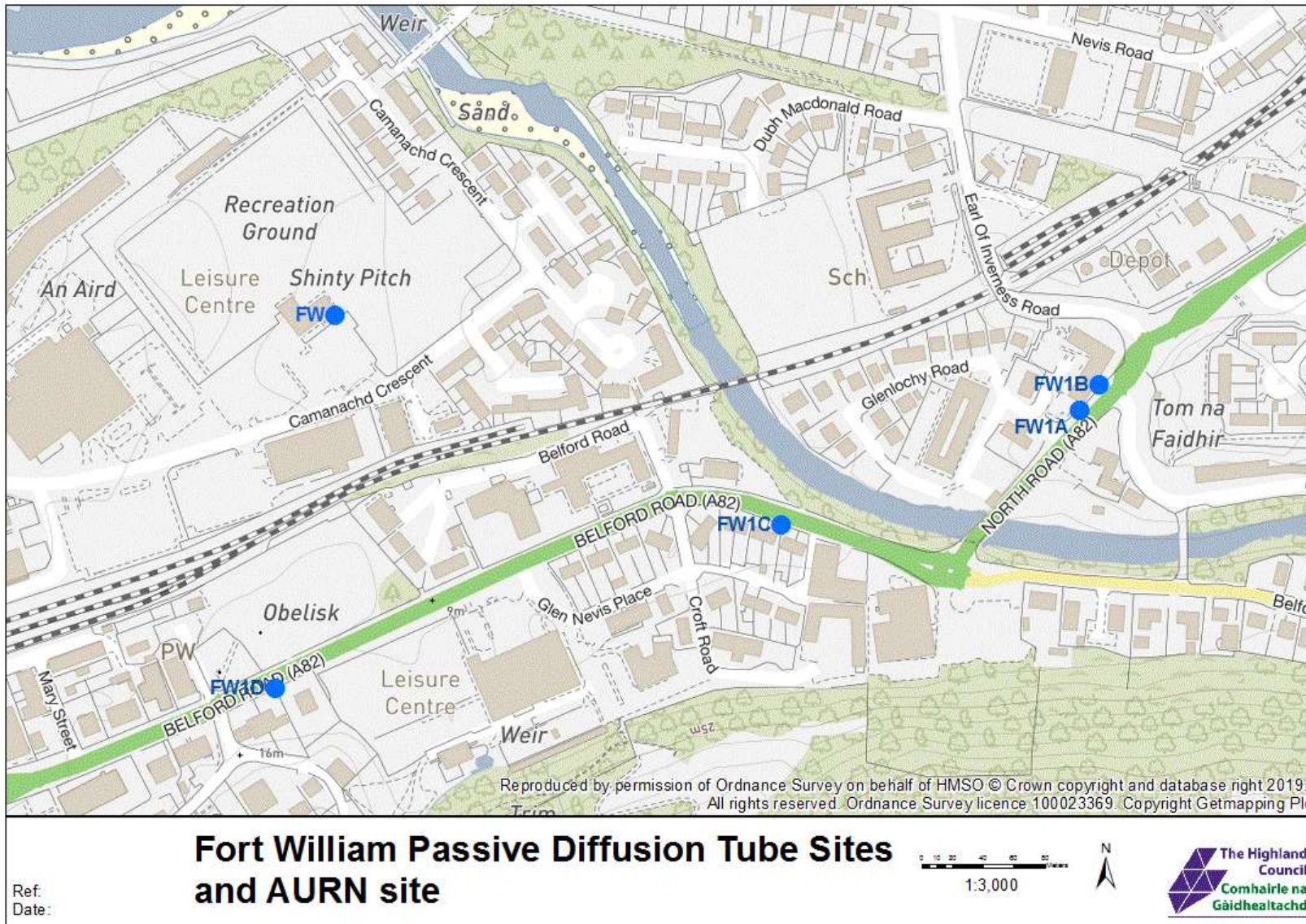


Figure 11 Map of non-automatic monitoring sites and AURN site in Fort William



Appendix B: Full Monthly Diffusion Tube Results for 2021

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														
IV2E	40.4	35.2	32.5	57.2	39.7		28.8	35.0	34.2	30.4	33.0	36.7	36.6	30.1
IV2F	38.5	31.7	29.4	29.5	34.6	28.8	27.9	34.6	32.3	31.9	32.3	33.2	32.2	26.5
IV2G	44.0	35.5	29.3	29.5	43.3	29.8	33.1	39.5	36.3	35.0	35.7	36.4	36.0	29.6
IV3A	45.8	42.5	29.4	30.0	39.3	29.9	34.4	34.5	31.4	33.1	31.0	34.8	34.8	28.7
IV3C	40.1	32.6	23.6	27.3	37.9	25.8	29.8	32.0		25.8	22.8	24.6	29.6	24.3
IV3H	37.4	30.4	26.8	29.0	32.7	26.6	27.8	32.3	29.4	28.8	28.9	31.7	30.4	25.0
IV3K	36.2	33.8	26.5	29.2	34.6	26.5	25.9	32.3	29.9	28.8	28.8	30.9	30.3	25.0
IV3L	39.2	34.1	27.7	29.1	34.6	27.0	29.2	32.3	29.1	28.7	28.1	28.7	30.8	25.3
IV4A	21.4	34.6	16.9	17.6	12.6	12.5	10.8	12.8	17.0	19.0	21.5	23.5	17.8	14.6
IV4B	20.6	33.0	16.8	16.8	13.3	12.4	10.6	14.0	17.3	18.9	21.5	22.6	17.6	14.5
IV4C	24.6	34.1	18.0	16.8	12.9	12.5	10.6	14.9	16.9	19.9	20.9	24.0	18.4	15.1
IV6A	35.0	24.1	19.1	22.8	30.4	17.6	23.0	24.9	21.8	19.4	18.8		23.8	19.6
IV6B	24.0	19.1	14.5	15.7	20.1	12.6	17.8	18.7	16.0	16.5	13.6	17.7	17.4	14.3
IV8	30.3	22.4	17.2	18.7	21.4	17.2	20.7	23.9	21.3	21.5	17.9	21.2	21.4	17.6
IV9A	48.5	41.8	34.9	35.4	46.4	35.0	35.4	41.3	41.4	42.4	40.3	43.8	40.9	33.7
IV9B	42.7	36.5	32.4	32.8	36.9	28.8	28.8	33.3	34.6	32.8	32.5	32.4	33.8	27.8
IV9C	74.5	35.3	32.1	35.5	49.6	33.1	38.7	40.5	36.4	32.0	31.7	37.8	41.0	33.7
IV9D	39.2	30.6	22.9	29.2	44.3	27.7	32.0	35.0	29.0	25.8	24.4	29.4	31.2	25.7
RC1	25.7	19.4	16.3	17.0	13.1	10.5	9.6	12.0	15.7	18.5	22.7	21.7	17.0	14.0
RC2	30.5	22.1	23.5	24.3	21.5	19.4	19.8	21.7	25.7	24.0	33.5	15.8	23.3	19.2
RC3	10.5	7.5	5.2	6.1	4.7	3.4	3.9	4.2	5.0	6.8	9.1	9.8	6.4	5.3
RC4	16.1	8.9	7.4	7.0	5.2	3.8	4.5	4.7	5.4	8.3	11.3	11.6	8.0	6.6
RC5								11.6	12.9	14.0	16.5	17.9	14.7	11.2
FW1A	25.2	18.7	13.5	18.6	19.6	14.1	15.4	25.0	17.3	24.0	22.9	21.7	19.9	16.4

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Bias Adjusted ⁽¹⁾
FW1B	21.8	16.3	13.0	16.7	17.4	14.8	17.0	22.1	14.2	20.3	17.8	17.0	17.6	14.5
FW1C	23.8	17.7	14.3	19.1	21.7	16.1	17.5	25.4	17.9	21.4	19.0	18.0	19.6	16.1
FW1D	19.9	17.7	19.3	18.3	20.7	16.6	20.4	23.2	21.1	22.3	19.7	20.1	20.1	16.6
IV11	24.8	20.6	15.1	16.5	16.5	11.9	13.0	17.3	17.3	18.3	17.1	17.5	17.2	14.2
N1A	21.0	12.7	11.4	15.5	21.9	13.4	18.8	20.3	17.8	15.4	14.4	17.4	17.1	14.0
N1B	26.5	23.1	18.9	19.5	19.3	15.8	16.1	19.5	22.5	20.1	24.6	24.1	20.8	17.2
N2A	27.8	31.2	27.7	20.3	17.2	21.9	18.8	22.2	26.6	25.7	30.3	27.9	24.4	20.1
N2B	35.5	39.5	34.3	29.1	30.2	29.8	25.7	29.8	37.3	36.1	40.5	40.9	33.9	27.9

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 2021

The following new sources were identified in 2021:

Scottish Fire and Rescue Service, Fort William, Containerised 80kW biomass

Grantown Grammar School, Grantown-on-Spey, Biomass Energy Centre

Both developments were screened using the methods described in LAQM.TG(16) and found to be not significant in terms of impacts upon air quality

Additional Air Quality Works Undertaken by The Highland Council During 2021

The Highland Council has not completed any additional works within the reporting year of 2021.

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 42 to 46 cover the 2021 monitoring details of which can be found at:

https://laqm.defra.gov.uk/wp-content/uploads/2022/07/LAQM-NO2-Performance-data_Upto-June-2022_V2.1.pdf

25% of submissions by Gradko in round 42 were satisfactory. In all other rounds 100% of submissions were satisfactory.

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/air-quality/air-quality-assessment/diffusion-tube-monitoring-calendar/>

Diffusion Tube Annualisation

Site RC5 required annualization. Details of the calculation method undertaken are provided in Table C.2.

Diffusion Tube Bias Adjustment Factors

The Highland Council have applied a combined local bias adjustment factor of 0.82 to the 2021 monitoring data. A summary of bias adjustment factors used by The Highland Council over the past five years is presented in Table C.1.

A combined local bias adjustment factor has been used based upon local co-location studies at automatic sites INV02 and INV03. Good overall tube precision and good overall continuous monitor data capture was recorded for both co-location studies. Local bias was calculated using the diffusion tube data processing tool version 2.0. The output from the tool is included in table C.3.

The 2021 national bias adjustment factor for the laboratory and method used was 0.84.

In previous years the national bias adjustment factor has been used for sites out with Inverness. In 2021 however there was little difference between the combined local and national bias adjustment factor so the combined local has been used for all sites.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	-	0.82
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

NO₂ Fall-off with Distance from the Road

No diffusion tube NO₂ monitoring locations within The Highland Council required distance correction during 2021.

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 do not require the application of a correction factor.

Automatic Monitoring Annualisation

Annualisation was required for automatic monitoring site INV04, which had data capture in 2021 less than 75% but greater than 25%. Annualisation data is presented in Table C.2.

NO₂ Fall-off with Distance from the Road

No automatic NO₂ monitoring locations within The Highland Council required distance correction during 2021.

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

Site ID	Annualisation Factor Dundee Mains Loan	Annualisation Factor Grangemouth Moray	Annualisation Factor Townhead	Annualisation Factor Fort William	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
RC5	0.9058	1.0814	0.9263	0.8800	0.9484	14.7	13.9	
INV04	1.1075	0.9847	1.0716	1.0869	1.0627	28	29.7	

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	11	11			
Bias Factor A	0.71 (0.62 - 0.83)	0.97 (0.92 - 1.03)			
Bias Factor B	40% (20% - 61%)	3% (-3% - 9%)			
Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$)					
Mean CV (Precision)	18.1	29.7			
Automatic Mean ($\mu\text{g}/\text{m}^3$)	2.8%	2.5%			
Data Capture					
Adjusted Tube Mean ($\mu\text{g}/\text{m}^3$)	12.9	28.8			

Notes:

A combined local bias adjustment factor of 0.82 has been used to bias adjust the 2021 diffusion tube results.

Table C.4 – NO₂ Fall off With Distance Calculations (concentrations presented in µg/m³)

no corrections made to 2021 dataset

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
SAQN	Scottish Air Quality Network
SO ₂	Sulphur Dioxide

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