



Inverness City Centre Air Quality Management Area
Draft Revocation Proposal Report
January 2025

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Executive Summary

This document lays out the evidence for revocation of the Inverness City Centre AQMA that was established in 2014.

The document follows the Scottish Government's statutory guidance on Local Air Quality Management (LAQM) LAQM PG(S) 24.

Key air quality action plan measures, such as the Rose Street Bus Gateway completed in 2018 and the introduction of the ULEV bus fleet in 2023 have reduced pollutant emissions in the AQMA.

Ongoing monitoring within and around the AQMA confirms that annual mean nitrogen dioxide concentrations are well below the UK Air Quality Objective and have been so for three consecutive monitoring years¹. A maximum annual mean concentration of 25 µg/m³ was recorded in 2023.

The Highland Council therefore seeks to revoke the Inverness City Centre AQMA.

The Council will however continue to review and assess air quality and will continue to pursue action plan measures. The Highland Council will continue to publish its air quality data. A wider Air Quality Strategy for Highland will also be developed.

¹ <https://www.gov.scot/publications/local-air-quality-management-policy-guidance/pages/4/>

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1. BACKGROUND

This document provides the supporting evidence for the proposal by The Highland Council to revoke the Inverness City Centre AQMA.

Part IV of the Environment Act 1995 requires the UK Government and devolved administrations to publish an air quality strategy and establishes the system of Local Air Quality Management (LAQM).

The air quality objectives set out in the Air Quality (Scotland) Amendment Regulations 2002 and the Air Quality (Scotland) Amendment Regulations 2016 provide the statutory basis for LAQM.

Local authorities must regularly review and assess air quality in their areas against these objectives.

Local authorities have a duty under Section 83(1) of the Environment Act 1995 to designate air quality management areas (AQMAs) where the air quality objectives are unlikely to be met by the prescribed date.

Local authorities must establish an air quality action plan for the AQMA that identifies the actions that the local authority and other organisations will undertake to achieve compliance with the objectives within the AQMA.

Where there is sufficient evidence to support current and future compliance with the objectives within the AQMA the local authority may seek revocation of the AQMA.

Ongoing monitoring within and around the AQMA confirms that annual mean nitrogen dioxide concentrations are well below the UK Air Quality Objective and have been so for three consecutive monitoring years. A maximum annual mean concentration of 25 µg/m³ was recorded in 2023.

The Highland Council therefore seeks to revoke the Inverness City Centre AQMA.

2. DESCRIPTION OF AQMA

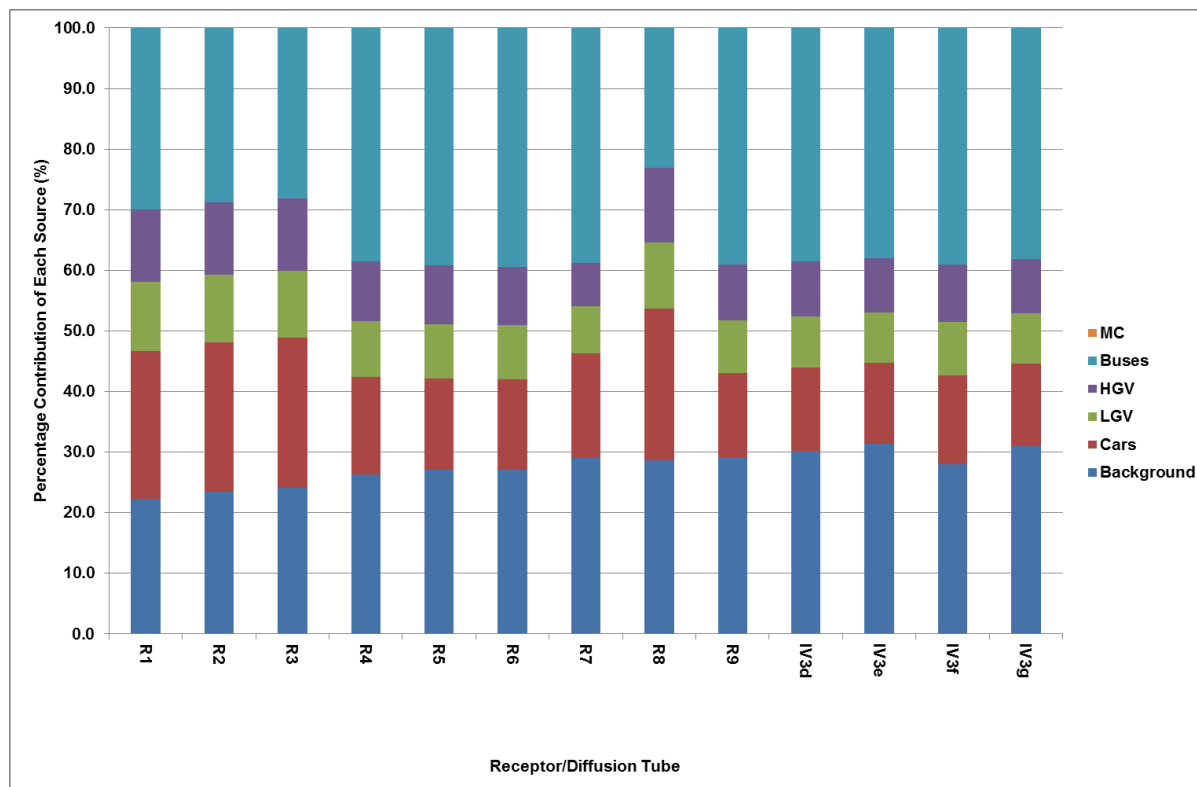
The Inverness City Centre AQMA was declared in 2014 following LAQM review and assessment that demonstrated the nitrogen dioxide annual mean objective was being exceeded. The exceedance was limited to a small area of the city centre around a junction between Academy Street, Queensgate and Strothers Lane, where there is relevant exposure as domestic residences in the upper stories (first floor and above). This area of the city centre is characterised by narrow street canyons with poor dispersion. A map of the location and extent of the AQMA is provided in Annex 1.

3. DESCRIPTION OF LOCAL SOURCES

Academy Street is a busy through route of the city. Queensgate and Strothers Lane are smaller one-way streets that respectively feed into and out of Academy Street. Transport emissions are

the principal source of nitrogen dioxide. At the time of declaration of the AQMA buses were identified as the most significant individual component of the NO₂ annual mean. The street layout of the city centre requires buses on some routes to pass through the AQMA several times on a single route.

Figure 1 Source Apportionment in and around AQMA (2014)



The following action plan measures have been completed:

- West link completed – new river and canal crossings completing the city bypass to the south and west (A9/A96 to A82) (2020) reducing the need cross city traffic.
- Bus network real time displays improving ease of access to public transport (2020).
- Rose street bus gateway – new exit from city centre bus station removing need for some bus routes to cross the AQMA. (2021)
- 20mph speed limit programme (2022-2024) implementation of city wide 20mph speed limit.
- Raigmore estate active travel link (2022).
- City centre traffic light priority measures (2023) improvements to traffic lights in city centre prioritising buses.
- Bus fleet electrification (2023) 25 new EV buses replacing existing ICE buses on most of the city centre routes.
- Riverside Way active travel route (2024) encouraging active travel in the city centre.

3.1. Change to local circumstances for Emission Sources

As illustrated in Figure 1, transport was the principal source of nitrogen dioxide within the AQMA at the time of declaration. Table 1 provides a comparison of the annual average daily traffic flow (AADT) derived from automatic counts for 2022, 2023 and 2024 (to date). Table 2 shows the change in traffic flows within the AQMA since 2016. Data was initially obtained from a manual traffic count on a set day in the year (usually the third Thursday in August). The count is broken down into vehicle classes. In 2021 traffic cameras using shape recognition technology to provide real time counts were installed in the AQMA. The data in table 2 for 2022 onwards, although derived from the real-time dataset, continues the “third Thursday in August” rationale for comparability with the earlier data.

Academy Street has seen a reduction in traffic volume from 2016 to 2024. However, this is not a simple downward trend. From 2016 to 2018 traffic flows increased. There is no count data for the COVID19 period, however, it can be assumed that there would have been a significant reduction in traffic during 2020 and 2021 while COVID movement restrictions were in place. The count data in 2022 shows that traffic flow was still significantly below pre-COVID levels. The AADT on Academy Street has seen only slight change year on year since 2022.

Conversely, traffic flow on Queensgate has been steadily increasing both in the years before and in the years after COVID. This may be partly because of domestic housing development on Union Street and Church Street during that time period.

The driver for most change to vehicle emissions within the AQMA will, however, have been the replacement of most of the bus fleet with EV in January 2023.

Table 1 Change in AADT for Academy Street and Queensgate within the AQMA 2022-2024

	Academy Street			Queensgate		
Year	2022	2023	2024	2022	2023	2024
Total	9091	9127	9081	3224	3451	3387
Car	7494	7501	7392	2604	2770	2709
LGV	957	933	1013	344	371	381
Bus	380	448	434	178	226	219
OGV1	98	71	71	38	33	31
OGV2	18	15	12	4	5	4
Motorbike	59	62	64	17	18	20
Pedal Cycle	83	97	96	39	27	23

Table 2 Change in traffic volume for Academy Street and Queensgate 2016-2024

Year	2016	2018	2022	2023	2024
	Academy Street				
Total	11381	11783	9399	9326	10645
Car	8995	9361	7512	7395	8491
LGV	1114	1274	1083	1052	1261
Bus	702	690	450	550	542
OGV1	266	234	135	85	99
OGV2	27	26	18	21	21
Motorbike	103	80	86	79	87
Pedal Cycle	174	118	115	144	144
	Queensgate				
Total	2543	2825	3217	3606	3523
Car	1730	2023	2448	2755	2725
LGV	319	389	410	440	412
Bus	317	282	226	281	279
OGV1	86	74	44	39	40
OGV2	8	6	1	5	7
Motorbike	39	23	21	28	19
Pedal Cycle	44	28	67	58	41

NOTE: Count data derived from a manual count exercise undertaken on 18/08/2016 and 23/08/2018. 18/08/2022 data derived from automatic traffic counting

4. LOCAL MONITORING EQUIPMENT

There are two automatic monitors for nitrogen dioxide located within the AQMA. Both are at the same location, however INV03 samples at street level and INV04 samples at the façade of the first floor. There are 8 passive diffusion tubes sampling nitrogen dioxide within the AQMA. 3 are co-located with the automatic monitor INV03.

In addition, there are a further 6 passive diffusion tubes sampling nitrogen dioxide in the streets in the vicinity but outside the AQMA.

Details of all the monitoring sites are included in Table 3, Table 4 and table 5 below.

A map showing the boundary of the AQMA and the location of monitoring is included in Annex 1.

Table 3 Automatic monitoring equipment within the AQMA

Site ID and Name	INV03 Inverness Academy Street	INV04 Inverness Academy Street First Floor
Designation	Roadside	Roadside
Address	6 Queensgate, Inverness	6 Queensgate, Inverness
NGR	266650, 845446	266650, 845446
Dates of Operation	2016 -	2018-
Pollutants	Nitrogen dioxide	Nitrogen dioxide
Types of Equipment	Automatic	Automatic
Monitoring Techniques used	Chemiluminescent	Chemiluminescent
Distance to relevant exposure (m)	0	0
Distance to kerb of nearest road (m)	4	4
Height above ground level (m)	1.3	5

Table 4 non-automatic monitoring equipment within AQMA

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Dates of operation	Pollutants Monitored	Distance to Relevant Exposure (m)	Distance to kerb of nearest road (m)	Location within AQMA	Tube Height (m)
IV3A	Inverness Queensgate A	Roadside	266650	845428	May 2002 - present	NO ₂	0.0	3.0	Attached to façade on Queensgate approximately 20m from junction with Academy Street	2.5
IV9A	Inverness AQMA A	Kerbside	266657	845447	Nov 2014 -present	NO ₂	3.0	0.5	Attached to traffic light pole on Queensgate exiting onto Academy Street (right turn lane)	2.0
IV9B	Inverness AQMA B	Kerbside	266666	845441	Nov 2014 – present	NO ₂	5.0	0.5	Attached to traffic light pole on Queensgate exiting onto Academy Street (left turn lane)	2.0
IV9C	Inverness AQMA C	Roadside	266677	845451	Nov 2014 – present	NO ₂	0.0	2.0	Attached to facade on Academy Street opposite to Queensgate exit	2.0
IV9D	Inverness AQMA D	Kerbside	266659	845467	Nov 2014 – present	NO ₂	2.0	0.0	Attached to traffic light pole on Academy Street at junction with Strothers Lane	2.0
IV3H, IV3K, IV3L	Inverness Queensgate L	Roadside	266650	845446	Jul 2016 - present	NO ₂	0.0	5.0	Collocated with INV03	1.5

Table 5 non-automatic monitoring equipment within city centre near to AQMA

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Dates of operation	Pollutants Monitored	Distance to Relevant Exposure (m)	Distance to kerb of nearest road (m)	Tube co-located with a Continuous Analyser?	Tube Height (m)
IV1	Inverness Union Street	Roadside	266681	845361	May 2002 – present	NO ₂	0.0	3.0	3.0	3.5
IV2E	Inverness Academy Street E	Roadside	266610	845487	Feb 2013 – present	NO ₂	0.0	1.0	1.0	2.0
IV2G	Inverness Academy Street G	Roadside	266704	845413	Feb 2013 – present	NO ₂	0.0	2.0	2.0	2.5
IV3C	Inverness Queensgate C	Roadside	266609	845404	Apr 2004 - present	NO ₂	0.0	3.0	3.0	2.5
IV6B	Inverness Church Street B	Roadside	266513	845476	Feb 2013 – present	NO ₂	3.0	2.0	2.0	3.0
IV8	Inverness Margaret Street	Roadside	266654	845532	Feb 2013 – present	NO ₂	0.0	1.0	1.0	2.5

5. LOCAL MONITORING DATA

5.1. Automatic Monitoring Results and interpretation

Monitoring within the AQMA at site INV03 began in 2016. The annual mean nitrogen dioxide concentration at INV03 in the first monitoring year was $37\mu\text{gm}^{-3}$. For the next two years there was either no change in concentration, or a small increase (less than 3%). It was noted in the Table 2 above that traffic volume on Academy Street and Queensgate was increasing from 2016 to 2019.

In 2019 there was a more significant increase in nitrogen dioxide concentration. A 13% year-on-year increase in the annual mean was recorded. Monitoring at other locations in the city suggested that this was a change very local to the city centre. The change may have been due to the construction of a new hotel development on Academy Street, which resulted in the temporary relocation of a bus stop from Academy Street to Queensgate for a portion of 2019, with a corresponding increase in bus movements through the AQMA.

A second automatic monitor was installed at the site on Queensgate in 2019. INV04 sampled air from the façade of residential buildings at first floor level alongside the street level sample collected by INV03. This monitoring confirms that nitrogen dioxide concentration at the first floor, where there is relevant exposure for the annual mean objective, is generally around 10-20% lower than at street level, where there is no relevant exposure for the annual mean objective.

2020 saw a large reduction in annual mean traffic pollution concentration across the whole country as COVID19 movement restrictions were imposed. This reduction was also evident within the AQMA. A 34% reduction in year-on-year annual mean nitrogen dioxide concentration was measured.

Once COVID19 restrictions were lifted, however, pollutant concentrations did not return to a level similar to what was seen before the pandemic. In 2022 annual mean nitrogen dioxide concentration remained around 25% lower than was generally measured from 2016 – 2018. It is likely a number of different factors contributed to this reduction such as: a proportion of the working population continuing to engage in alternative work patterns beyond the pandemic; the completion within this timeframe of some key air quality action plan measures, for example, Rose Street Bus Gateway and the West Link completing the Inverness Southern Distributor; and also the general reduction in pollution from the vehicle fleet as a result of improving emissions technology and a higher proportion of LEV and ULEV.

Another significant step change reduction in annual mean nitrogen dioxide concentration occurred at the start of 2023 with the introduction of ULEV into the Stagecoach bus fleet operating on routes in and around the AQMA. This resulted in a further 30% reduction in NO₂ concentration.

Provisional data for 2024 suggests that the concentration of nitrogen dioxide at street level within the AQMA may be below $20\mu\text{gm}^{-3}$ and may be as low as $15\mu\text{gm}^{-3}$ at first floor level on Queensgate.

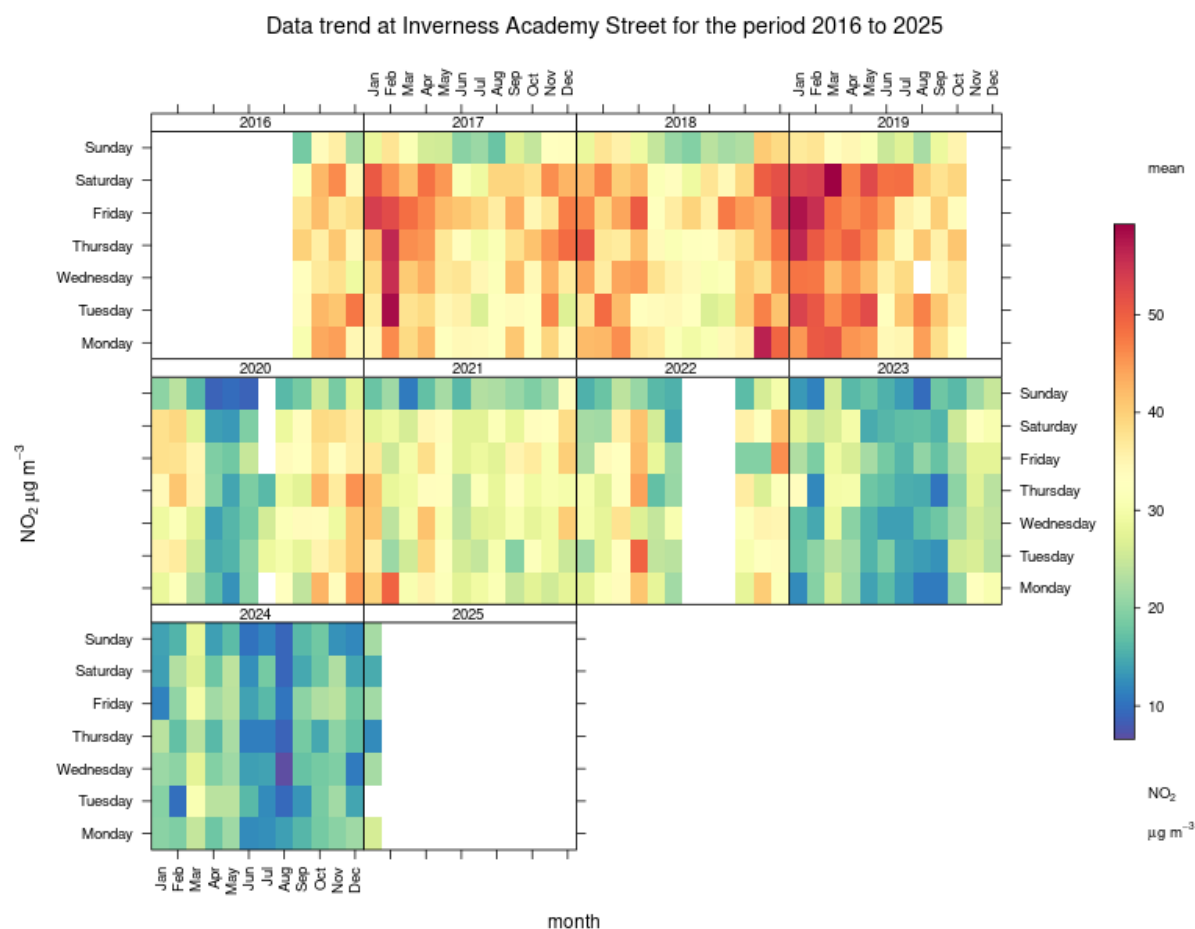
Table 6 Automatic Monitoring Result – annual mean μgm^{-3}

Site ID	2016 ⁽¹⁾	2017	2018	2019	2020	2021	2022	2023	2024 ⁽²⁾
INV03	37	38	38	43	28.2	29	29	20	18
INV04	No data	No data	No data	31	22.6	29.6	23	18.8	15

Note (1) first year of installation - monitoring for part of the year.

Note (2) provisional data – at the time of writing although complete the 2024 dataset has yet to be ratified.

Figure 2 Trend graphic for INV03



This graphic illustrates the change in nitrogen dioxide concentration over time at the ground floor automatic monitoring site within the AQMA. The step change that resulted from COVID19 in April 2020 is clear. As is the step change in January 2023 when the ULEV bus fleet came into use. It is also obvious that the concentrations were elevated over the winter of 2018/19 when bus stop was temporarily moved from Academy Street to Queensgate.

5.2. Non-Automatic Monitoring Results and Interpretation

There are 8 passive diffusion tubes monitoring nitrogen dioxide within the AQMA. 3 of these are co-located with the automatic monitor INV03. IV3A is the only monitoring data within the AQMA that predates its declaration. The other four sites were started in 2014 after the AQMA was declared.

Data from IV3A shows that prior to AQMA declaration annual mean nitrogen dioxide concentration was higher than $40 \mu\text{g m}^{-3}$. From 2014 until 2019 concentration was in the high thirties. As discussed in the previous section there was a significant reduction in annual mean concentration in 2020. As the automatic monitoring demonstrated, since 2021 the concentration has reduced year on year with a notable increased reduction in 2023, coinciding with the introduction of EV buses.

The highest annual mean nitrogen dioxide concentration recorded by monitoring is $50 \mu\text{g m}^{-3}$ from the tube IV9A in 2016. This is a kerbside location affixed to the traffic light pole on the right side of the street exiting Queensgate. Tube IV9C also recorded $50 \mu\text{g m}^{-3}$ in 2016 however in most monitoring years the result from IV9C is less than IV9A. It is worth noting however that IV9C is a roadside location (1m from kerb) so would normally be expected to record a lower concentration than at the kerb. Tubes IV9B and IV9D consistently record significantly lower than IV9A and IV9C. This may be because IV9B and IV9D are upwind of the junction in prevailing wind conditions whereas IV9A and IV9C are downwind.

Both IV9A and IV9C recorded $25 \mu\text{g m}^{-3}$ in 2023.

Table 7 also records the results of monitoring from other diffusion tubes in the vicinity of the AQMA. What follows is a discussion of the results from these tubes organised into the locality that they are in.

Queensgate (IV3C) - located towards the west end of Queensgate on the façade of a commercial/residential building. Monitored concentrations are generally around 10% lower than at IV3A within the AQMA. In 2023 $19 \mu\text{g m}^{-3}$ was recorded.

Church Street (IV6B) - located towards the north end of Church Street on a quieter and more open one-way street which feeds Queensgate from the North. Monitored concentrations are generally 40-50% lower than in the AQMA. In 2023 $12 \mu\text{g m}^{-3}$ was recorded.

Union Street (IV1) - located in a narrow street canyon one-way street which feeds Queensgate from the south and east. Also, the only diffusion tube location outside Queensgate that predates the AQMA. Monitored concentrations are generally around 30% lower than on Queensgate. In 2023 $16 \mu\text{g m}^{-3}$ was recorded.

Margaret street (IV8) - located in a narrow one-way street canyon which is the exit from the bus station to the north of Academy Street onto Academy Street. It is closed to traffic except buses and taxis. Since the completion of the Rose Street Bus Gateway in 2018 fewer buses are required to use this street to exit the bus station. Monitored concentrations are generally around 30% lower than in the AQMA. In 2023 $14 \mu\text{g m}^{-3}$ was recorded.

Academy Street (IV2E, IV2G) – these two monitoring locations are on Academy Street out with the AQMA. Monitored concentrations are generally similar to those found within the AQMA. In 2023 $23\mu\text{g}\text{m}^{-3}$ and $25\mu\text{g}\text{m}^{-3}$ were recorded respectively.

Table 7 Non-automatic monitoring results – annual mean ratified and bias adjusted μgm^{-3}

Site ID	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
IV3A	46	42	48	48	38	37	32	38	36	35	38	22	28	26	21	
IV3L	-	-	-	-	-	-	-	34	39	38	42	28	25	24	18	
IV9A	-	-	-	-	-	49	45	50	48	42	45	27	33	31	25	
IV9B	-	-	-	-	-	38	36	41	43	34	38	22	28	26	21	
IV9C	-	-	-	-	-	43	39	50	43	39	44	23	33	28	25	
IV9D	-	-	-	-	-	38	32	35	37	33	36	19	25	23	22	
IV1	26	27	28	41	27	26	20	27	23	19	25	15	-	19	16	
IV2E	-	-	-	-	42	39	37	42	40	35	34	21	30	27	23	
IV2G	-	-	-	-	41	39	39	46	42	35	35	22	29	27	25	
IV3C	-	-	-	46	34	33	29	37	31	30	33	19	24	22	19	
IV6B	-	-	-	-	19	19	17	20	21	21	18	11	14	13	12	
IV8	-	-	-	-	25	23	22	24	23	21	22	13	17	16	14	

Note: 2024 data incomplete at time of writing

6. FUTURE ACTIONS TO BE RETAINED FOR THE AQMA

The Highland Council reviewed and updated its 2016 Draft AQMA Action Plan in 2024. A number of action measures were identified in the 2024 AQMA Action Plan. The council will continue to work, along with external stakeholders, to progress the actions identified by the review, and will continue the periodic review of actions going forward.

The Highland Council will develop an air quality strategy that will encompass the objectives and functions of the AQMA action plan beyond AQMA revocation.

7. CONCLUSIONS AND RECOMMENDATIONS

Monitoring within and around the AQMA confirms that nitrogen dioxide annual mean concentration in Inverness City Centre has indicated a downward trend over the last four years and is now well below the UK air quality objective value at all monitoring locations.

The Highland Council believe that it would therefore be appropriate to revoke the Inverness City Centre Air Quality Management Area.

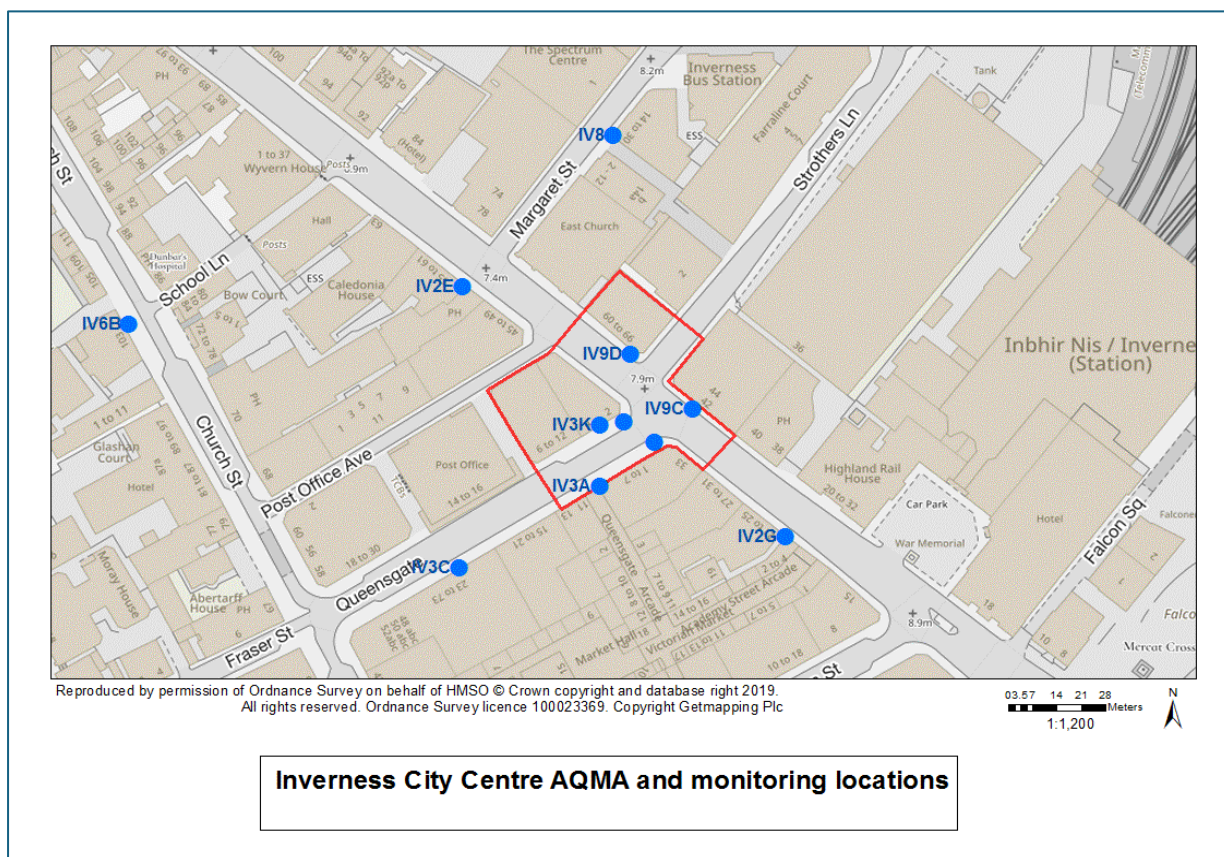
It is recommended that the Highland Council continue to monitor air quality to ensure that the reduction in pollutant concentrations is maintained or further improved.

The Highland Council will continue to undertake our statutory duties in terms of the Local Air Quality Management framework.

The Highland Council will work with colleagues and stakeholders to develop an air quality strategy that will continue to progress actions to maintain and improve air quality within Inverness City Centre and the broader Highland Council area.

ANNEX 1

Figure 3 map of Inverness City Centre showing boundary of AQMA and location of monitoring



ANNEX 2

Photographs

Image 1 AQMA looking across Academy Street from Queensgate



Image 2 AQMA looking across Academy Street



Image 3 Academy Street looking north towards AQMA



Image 4 Academy Street looking across the AQMA to the North

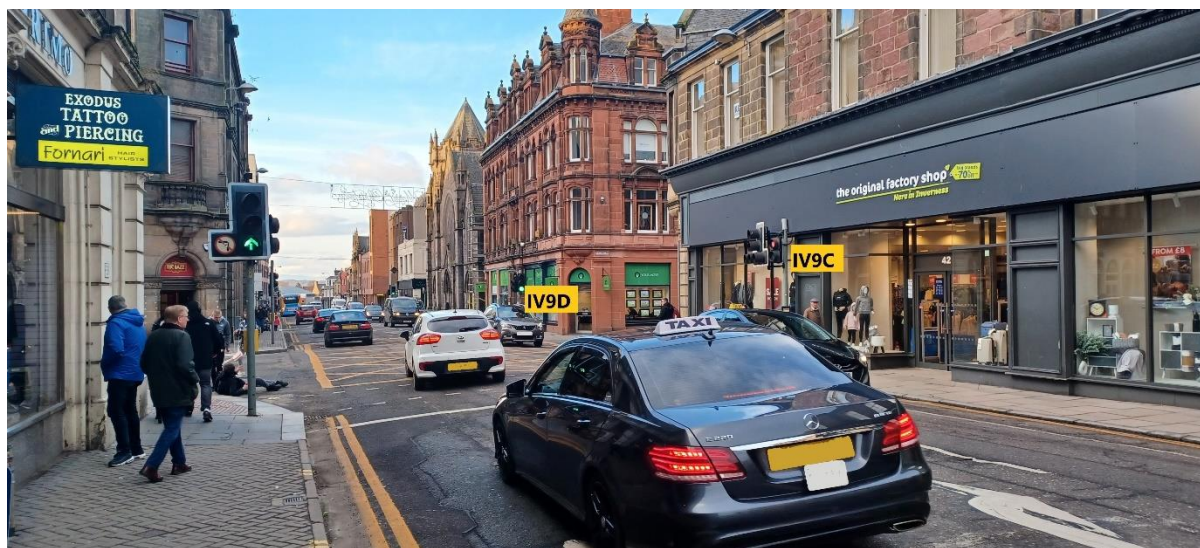


Image 5 Queensgate looking east towards the AQMA



Image 6 Automatic monitoring station on Queensgate in the AQMA



Image 7 Church Street looking south towards Queensgate



Image 8 Academy Street looking north from junction with Margaret Street



Image 9 Union Street looking west towards Church Street



Image 10 Margaret Street looking east towards bus station



Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority 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
AQS	Air Quality Strategy
APR	Air quality Annual Progress Report – A statutory report from the local authority to Scottish Government and SEPA
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
EV	Electric Vehicle
LAQM	Local Air Quality Management
LEV	Low Emission Vehicle
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
SEPA	Scottish Environment Protection Agency – regulatory authority with statutory powers over the activity of the local authority regarding LAQM
µg/m ³	Micrograms per cubic meter – a unit for the measurement of the concentration of pollutants in air

References

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16. The Highland Council, **Annual Progress Report 2024**
17. The Highland Council, **Air Quality Action Plan 2024**
18. **Environment Act 1995**
19. **Clean Air Act 1993**

20. Environment Act 2021

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22. <http://www.scottishairquality.scot/laqm>