Annual Progress Report (APR)

2024 Air Quality Annual Progress Report (APR) for The Highland Council

In fulfilment of Part IV of the Environment Act 1995, as amended by the Environment Act 2021

Local Air Quality Management

July 2024

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Executive Summary: Air Quality in Our Area

Air Quality in The Highland Council

Air quality in the Highlands is generally good. In 2014 an Air Quality Management Area (AQMA) was declared for a small area of Inverness city centre after monitoring revealed that UK Air Quality Strategy Objectives for nitrogen dioxide were not being met. Since then, the Highland Council has worked with partners to progress actions that would improve air quality in the AQMA. In recent years a significant reduction in nitrogen dioxide air pollution has been recorded throughout the Highlands, and especially within the AQMA, where measures such as the electrification of a large proportion of the bus fleet have taken place.

Actions to Improve Air Quality

The Highland Council drafted an action plan for the AQMA in 2016 and this document was reviewed in 2023. Revised action plan measures were identified, and the amended action plan will be published in 2024. The Council will continue to work with partners to progress actions in the following 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.

The most significant action plan measure progress in 2023 was the provision of 25 new LEV buses into the city centre fleet. There was a measured reduction of 30% in the nitrogen dioxide annual mean concentration within the AQMA from 2022 to 2023.

Local Priorities and Challenges

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

How to Get Involved

Information on air quality within the Highlands can be obtained at The Highland Council Pollution web pages.

Table of Contents

List of Tables

List of Figures

1 Local Air Quality Management

This report provides an overview of air quality in The Highland Council during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 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	31.12.2021
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 publish and implement an Air Quality Action Plan (AQAP) within the shortest possible time and no later than 12 months of the date of AQMA Designation Order. The AQAP must set out measures the local authority intends to put in place in pursuit of the objectives. Measures should be provided with milestones and a final date for completion. The action plan itself should have a timescale for completion and for revocation of the AQMA. Where measures to reduce air pollution may require a longer timescale an action plan shall be reviewed and republished within five years of initial publication and then five-yearly thereafter.

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://www.highland.gov.uk/info/1281/pollution/73/pollution/2

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	Inverness Air Quality Action Plan https://www.highland.gov.uk/downloads/file/16577/inverness_action_plan

2.2 Cleaner Air for Scotland 2

Cleaner Air for Scotland 2 – Towards a Better Place for Everyone (CAFS2) is Scotland's second air quality strategy. CAFS2 sets out how the Scottish Government and its partner organisations propose to further reduce air pollution to protect human health and fulfil Scotland's legal responsibilities over the period 2021 – 2026. CAFS2 was published in

July 2021 and replaces Cleaner Air for Scotland – The Road to a Healthier Future (CAFS), which was published in 2015. CAFS2 aims to achieve the ambitious vision for Scotland "to have the best air quality in Europe". 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 for which local authorities are the lead delivery bodies within this strategy is demonstrated below.

2.2.1 Placemaking – Plans and Policies

Local authorities with support from the Scottish Government will assess how effectively air quality is embedded in plans, policies, City Deals and other initiatives, and more generally in cross departmental working, identifying and addressing evidence, skills, awareness and operational gaps.

The Highland Council adopted the Inner Moray Firth Proposed Local Development Plan 2 in June 2024. This document includes the City Centre Development brief which has a stated vision, outcome and approach to development to "make it convenient and attractive to access city centre destinations on foot or by bicycle or public transport, improving air quality where required". It also supports delivery of the Council's Air Quality Management Plan. Further details, including a copy of the plan can be obtained from the Council's website:
https://www.highland.gov.uk/info/178/development_plans/202/inner_moray_firth_local_development_plan

2.2.2 Transport – Low Emission Zones

Local authorities working with Transport Scotland and SEPA will look at opportunities to promote zero-carbon city centres within the existing LEZs structure.

The Highland Council has no Low Emission Zones established within the Local Authority area. The Highland Council carried out a National Low Emission Framework Stage 1 Screening Appraisal and concluded that there was no need to proceed to a Stage 2 Assessment. The details of the screening are contained within the 2020 Annual Progress Report available here:
https://www.highland.gov.uk/downloads/file/24226/2020_air_quality_report

2.3 Implementation of Air Quality Action Plan(s) and/or measures to address air quality

In order to ensure that local authorities implement the measures within an action plan by the timescales stated within that plan, the Scottish Government expects authorities to submit updates on progress through the APR process. The Highland Council has taken forward a number of measures within the action plan during the current reporting year of 2023 in pursuit of improving local air quality and meeting the air quality objectives within the shortest possible time. The Highland Council recently reviewed the Inverness Air Quality Management Area Action Plan measures, as a formal review had not been undertaken since the draft was published in 2016. The draft Action Plan was approved with an updated Action Plan measures table in May 2024. Details of all measures completed, in progress or planned are set out in Table 2.2.

Key completed measures for this reporting year are:

- City Centre Traffic Light Priority upgrades at twenty key traffic light junctions in the city centre. This allows buses to have priority at traffic lights depending on real time bus tracker information to cut delays.
- Raigmore Bus Gate linking Raigmore Hospital to Raigmore hosing estate, cutting bus delays and congestion at the entrance to the hospital and onto the B9006.
- The replacement of a significant proportion of the internal combustion engine bus fleet operating within Inverness with electric vehicles coming into operation in January 2023.

Progress on the following measure has been slower than expected due to:

- Pedestrian Friendly Academy Street proposals have not been agreed for the redesign of Academy Street. This is due to ongoing discussions between key stakeholders and lack of agreement on way forward which will be acceptable to the stakeholders and the funder (Sustrans) design requirement for traffic reduction. It is hoped that this can be resolved in the near future in order to take this project forward.

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

- Highland Council Active Travel Strategy for the period to 2024 -2030. This will include details of projects which are submitted to Transport Scotland for Active Travel Infrastructure Funding.
- Inverness Riverside Way active travel route – construction works are ongoing to improve this key active travel artery from the southwest of the city to the centre of Inverness, expected to be complete summer/autumn of 2024.
- Inverness Raigmore Interchange – signalised crossing to make the junction safer for non-motorised users.

The Inverness City Committee of The Highland Council agreed in May 2024 to updates and finalisation of the Draft AQMA Air Quality Action Plan following consultation with key stakeholders. Table 2.2 incorporates these changes, such that completed or obsolete action measures from previous years APR have been removed. The AQMA Action Plan will be placed on The Highland Council's Air Quality webpage.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category and Classification	Expected/ Actual Completion Year	Measure Status	Funding Source	Funding Status	Estimated Cost of Measure	Target Reduction in Pollutant / Emission from Measure	Key Milestones	Comments
1	Promote Active Travel	Promoting Travel Alternatives; Classification Intensive active travel campaign	Ongoing	In progress	Not funded from Scottish Government Air Quality grant. Funding sourced from Council budget, and partners such as Sustrans			Reduction in emissions due to changeover to active travel modes	Number of schools undertaking bikeability increased.	Highland Council employs a Bikeability Coordinator to train staff & volunteers, and coordinate school bike fleet. Other Active Travel campaigns may be carried out if funding sources are identified.
2	Improvement of Active Travel Infrastructure	Transport Planning and Infrastructure; Classification Active Travel/Other	Various between 2024 and 2026	In progress and Planned	Not funded from Scottish Government Air Quality grant. There are various active travel infrastructure projects in progress or planned by Highland Council in Inverness, some of which are funded or part funded by Sustrans. Some are still to attract funding. Projects include: Riverside Way – Active travel improvements Raigmore Interchange – non-motorised traffic improvements Academy Street – pedestrian friendly West of the Ness – Active travel improvements			Estimated 5µg/m^3 reduction in NO_2 (on implementation of Academy Street redesign)	Agreement of design proposals Securing funding for project Appointing contractor for works Completion of works	Riverside way construction commenced November 2023, set to be complete in summer/autumn 2024. Contractor: Wills Bros Raigmore Interchange – Construction (led by TS/BEAR) due to start summer 2024. Academy Street – Plans still to be agreed. Provisional plans approved by Highland Council September 2023. West of the Ness – Options for improving road junctions, paths etc being considered and public consultations ongoing. Areas between River Ness and Canal being considered. Designs not yet drawn up.

Measure No.	Measure	Category and Classification	Expected/ Actual Completion Year	Measure Status	Funding Source	Funding Status	Estimated Cost of Measure	Target Reduction in Pollutant / Emission from Measure	Key Milestones	Comments
3	Active Travel Strategy	Promoting Travel Alternatives; Classification Promotion of cycling and walking	2024	In progress	Not funded from Scottish Government Air Quality grant.			Reduction in emissions due to changeover to active travel modes	Ongoing review of agreed Strategy workflow (linked to Measure 2 above)	The Strategy (agreed May 2024) allows identification of active travel improvement projects which can then be put forward for funding when application sources become available.
4	Promote Active Travel in Schools	Promoting Travel Alternatives; classification Other	2024 and ongoing	In progress	Not funded from Scottish Government Air Quality grant. This has been funded in the past by Sustrans - Safer Routes to School. The funding model will be changing in 2024, however this work shall continue.			Reduction in emissions due to changeover to active travel modes	Provision of large and small grant funding to schools	Schools can apply for large and small grant funding for improvements such as cycle and scooter storage; access improvements; pupil reward schemes (Go For It) and banners
5	School Street Zone	Promoting Travel Alternatives; classification Other	2024	In progress	Not funded from Scottish Government Air Quality grant. This trial has been funded by Sustrans - Safer Routes to School.			Reduction in emissions due to changeover to active travel modes	Completion of pilots at 4 schools.	Temporary school street zones pilot for Duncan Forbes Primary, Bishop Eden Primary, Kirkhill Primary and Pennyland Primary
6	Schools Education and Monitoring Project	Promoting Travel Alternatives; classification Other	2024	In progress	Scottish Government Air Quality grant scheme	Funded	<£10k	Reduction in emissions due to changeover to active travel modes	Completion of monitoring and presentations in 10 schools	Combination of NO_2 diffusion tubes monitoring and real-time low cost monitors for NO_2 and PM, followed by presentation to P6/P7 pupils.
7	Promotion and encouragement of online tool for car sharing	Alternatives to Private Vehicle Use, classification Car and Lift Sharing Schemes	Ongoing	Completed	Not funded from Scottish Government Air Quality grant. This project has been funded by Hitrans			Reduction in emissions due to vehicle sharing	n/a	HItravel liftshare scheme in operation: https://liftshare.com/uk/community/hitravel

Measure No.	Measure	Category and Classification	Expected/ Actual Completion Year	Measure Status	Funding Source	Funding Status	Estimated Cost of Measure	Target Reduction in Pollutant / Emission from Measure	Key Milestones	Comments
8	Low Emission Buses	Vehicle Fleet Efficiency, Classification Promoting Low Emission Public Transport	Ongoing	In progress	Not funded from Scottish Government Air Quality grant. This project was part funded by Scottish Government - Scottish Zero Emission Bus Scheme and private investment			Approximate 9µg/m^3 reduction in NO_2 complete. Estimated a further 2µg/m^3 if all buses were LEV	LEV Buses on Stagecoach Inverness City Routes LEV Buses on Highland Council school transport routes LEV Buses on long distance routes	25 LEV buses on Stagecoach city centre routes since December 2022. This has corresponded with an annual decline in the annual hourly mean NO_2 measured at an automatic roadside monitor in Queensgate from 29µg/m^3 in 2021 and 2022 to 20 µg/m^3 in 2023 – a 30% decrease. Further improvements anticipated if other buses passing through AQMA were LEV
9	EV Charge Point Infrastructure	Promoting Low Emission Transport, Classification Procuring Alternative Refuelling Infrastructure to Promote LEV	Ongoing	In progress	Not funded from Scottish Government Air Quality grant. This project is funded by Scottish Government EV Infrastructure Fund			Reduction in emissions due to change of vehicle type	Continued roll out of EV charge points	Highland Council currently host over 90 EV charge points
10	Low Emission Council Fleet	Vehicle Fleet Efficiency; Classification Fleet efficiency	2030 or beyond for some ULEV large vehicles	Planned	Not funded from Scottish Government Air Quality grant. Funding for this project is sourced from various Scottish Government projects and Highland Council budget			Reduction in emissions due to change of vehicle type	Continued changeover to LEV to fleet when renewing vehicles	The Highland Council, in collaboration with Enterprise Car Club, now operate a fleet of 80+shared asset car club vehicles, the majority being plug-in hybrids or EV. Currently the Council operates 55 electric vehicles and 48 hybrid vehicles, which represents 14% of the light commercial fleet.

Measure No.	Measure	Category and Classification	Expected/ Actual Completion Year	Measure Status	Funding Source	Funding Status	Estimated Cost of Measure	Target Reduction in Pollutant / Emission from Measure	Key Milestones	Comments
11	Bus Partnership Fund Projects	Transport Planning and Infrastructure, classification Bus Route Improvements	2028	In progress and Planned	Not funded from Scottish Government Air Quality grant. Projects has been funded by Transport Scotland; however, TS propose a pause in funding from 2024.			Reduction in emissions due to increased use of bus alternatives to private vehicles	Agreement of STAG appraisals Agreement of design proposals Securing funding for project Appointing contractor for works Completion of works	1. Raigmore Bus Gate linking hospital with Raigmore estate –Opened Spring 2024. 2. Rose Street enforcement camera to deter unauthorised use of Foundry Way bus link – complete. 3. City Centre Traffic Light Priority to allow bus priority dependent on real time info -upgrades ongoing. 4. Connecting Inverness STAG appraisal – submitted to TS for review (April 2023). 5. B9006 Bus Priority STAG appraisal to enhance bus journey time and reliability –public engagement complete, report under preparation. 6. Millburn Corridor Bus Priority and Active Travel STAG Appraisal which will tie into Academy St redesign - public engagement complete, report under preparation
12	Public Information about the AQMA	Public Information; Classification leaflet/internet/ other	Ongoing	In progress	Not funded from Scottish Government Air Quality grant. Public information published on Highland Council website.			Reduction in emissions due to changeover to active travel modes	Publication of Annual Progress Report on Council website	Each year the APR is published on the Council's website: https://www.highland.gov.uk/info/1281/pollution/73/pollution/2
13	Traffic Count Monitoring	Traffic Management; Classification Congestion management and Traffic Reduction	Ongoing	In progress	Not funded from Scottish Government Air Quality grant. Information on vehicle numbers and type collected as part of efficient vehicle movement monitoring in the city centre by Highland Council			Reduction in emissions due to efficient vehicle movements	Provision of vehicle number and speed data to DfT	Data viewed here https://roadtraffic.dft.gov.uk/local-authorities/35

Measure No.	Measure	Category and Classification	Expected/ Actual Completion Year	Measure Status	Funding Source	Funding Status	Estimated Cost of Measure	Target Reduction in Pollutant / Emission from Measure	Key Milestones	Comments
14	Planning Application Review and assessment	Policy Guidance and Development Control; Classification Air Quality Planning and Policy Guidance, and Promoting Place Based Approaches	Ongoing	In progress	Not funded from Scottish Government Air Quality grant. Effective control of air quality planning enforcement undertaken by Highland Council as part of its statutory duties, therefore funding from Highland Council general budget.			Ensuring emissions do not increase due to development	Identifying Planning Applications which may require EIA or have significant potential air quality impacts Applying conditions to Planning Consents Ensuring that conditions are complied with	Planning Applications/developments with significant potential air quality impacts and their mitigations are reported in the Annual Progress Report

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 2023. There are also 3 sites within the Highland Council area operated on behalf of DEFRA as part of the AURN. Table A. 1 in Appendix A: Monitoring Results 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: Monitoring Results. Further details on how the monitors are calibrated and how the data has been adjusted are included in QA/QC of Automatic Monitoring in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

The Highland Council undertook non- automatic (passive) monitoring of NO_2 at 34 sites during 2023. 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.

3.1.3 Other Monitoring Activities

The Highland Council undertook monitoring with low-cost sensors during 2023. Seven Earthsense Zephyr® units measured oxides of Nitrogen and fine particles. The sensors were deployed around primary schools to support an educational project within the schools. The data was used, alongside NO_2 diffusion tube monitoring at locations around the school to demonstrate monitoring methods to pupils. Details of the project and the monitoring undertaken are included in Appendix D.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for annualisation and bias. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A. 3 in Appendix A compares the ratified monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40 µg/m^3 at automatic monitoring sites.

Table A. 4 in Appendix A compares the adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40 µg/m^3 at non automatic monitoring sites.

For diffusion tubes, the full 2023 dataset of monthly mean values is provided in Appendix B.

Table A. 5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

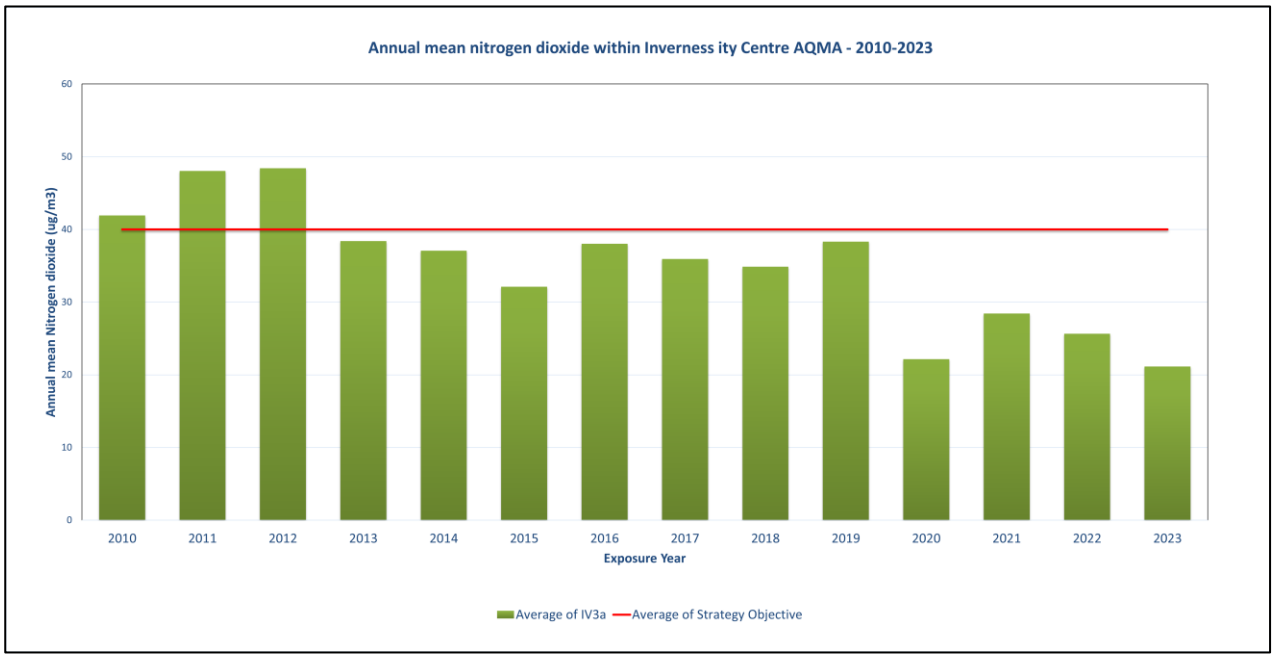
There were no exceedances of any of the air quality objectives at any of the sites where monitoring was undertaken in The Highland Council area within 2023.

Trend in the AQMA

Figure 1 below is a graphical representation of the time plot trend for NO_2 within the Inverness AQMA since 2010. The data source is the passive diffusion tube site IV3A. This site has been chosen as it has monitored nitrogen dioxide over the longer term without interruption and covers the period from 2010, when exceedances of the annual mean objective were first identified during the review and assessment process, to 2023.

During the pandemic year of 2020, a significant reduction of NO_2 was observed largely due to the impact of movement restrictions as a response to COVID 19. In 2021, after COVID restrictions lifted there was an increase in NO2. Since then, a reducing trend has been evident.

Figure 1 Annual mean trend within the AQMA (non-automatic)



The annual hourly mean concentration of NO_2 measured at the automatic monitor at ground floor level within the AQMA in 2021 and 2022 was 29 µg/m^3. In 2023 the annual hourly mean concentration of NO_2 measured at the same location was 20µg/m^3.

Figure 2 Monthly mean trend within the AQMA

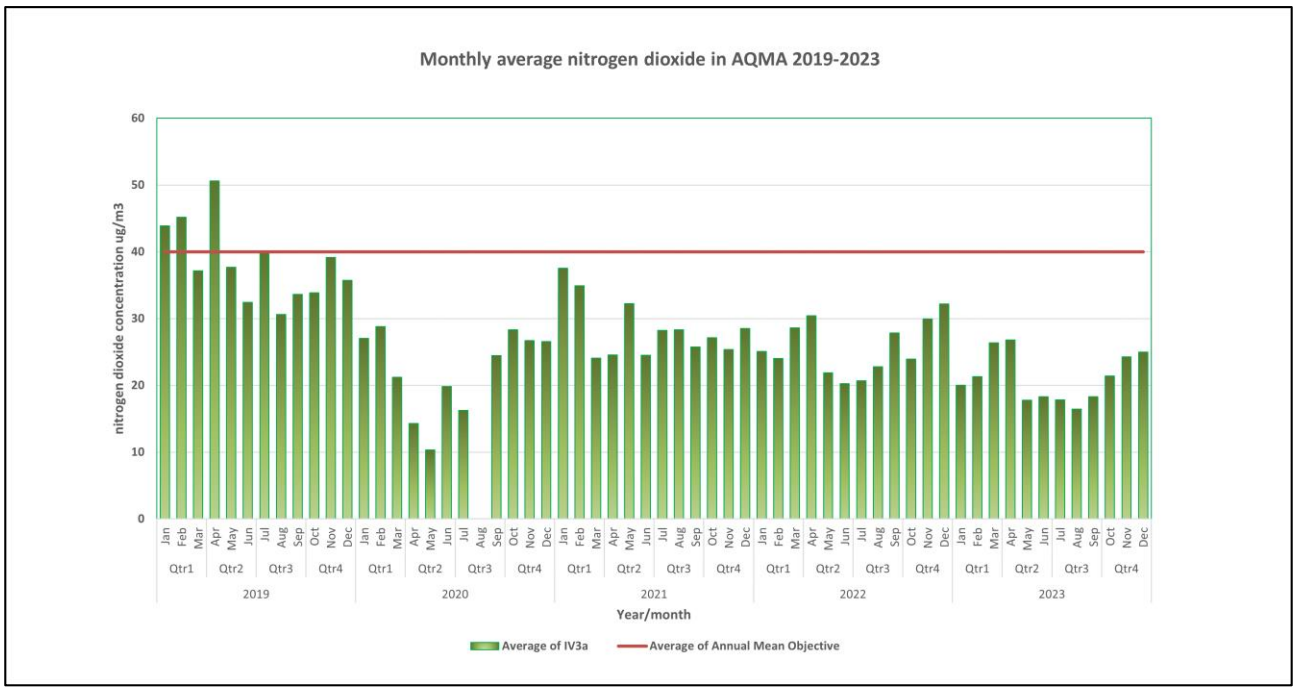


Figure 2 shows the period from 2019 in more detail as a series of monthly average pollutant concentrations. From 2020 onwards the mean concentration of NO_2 is less than

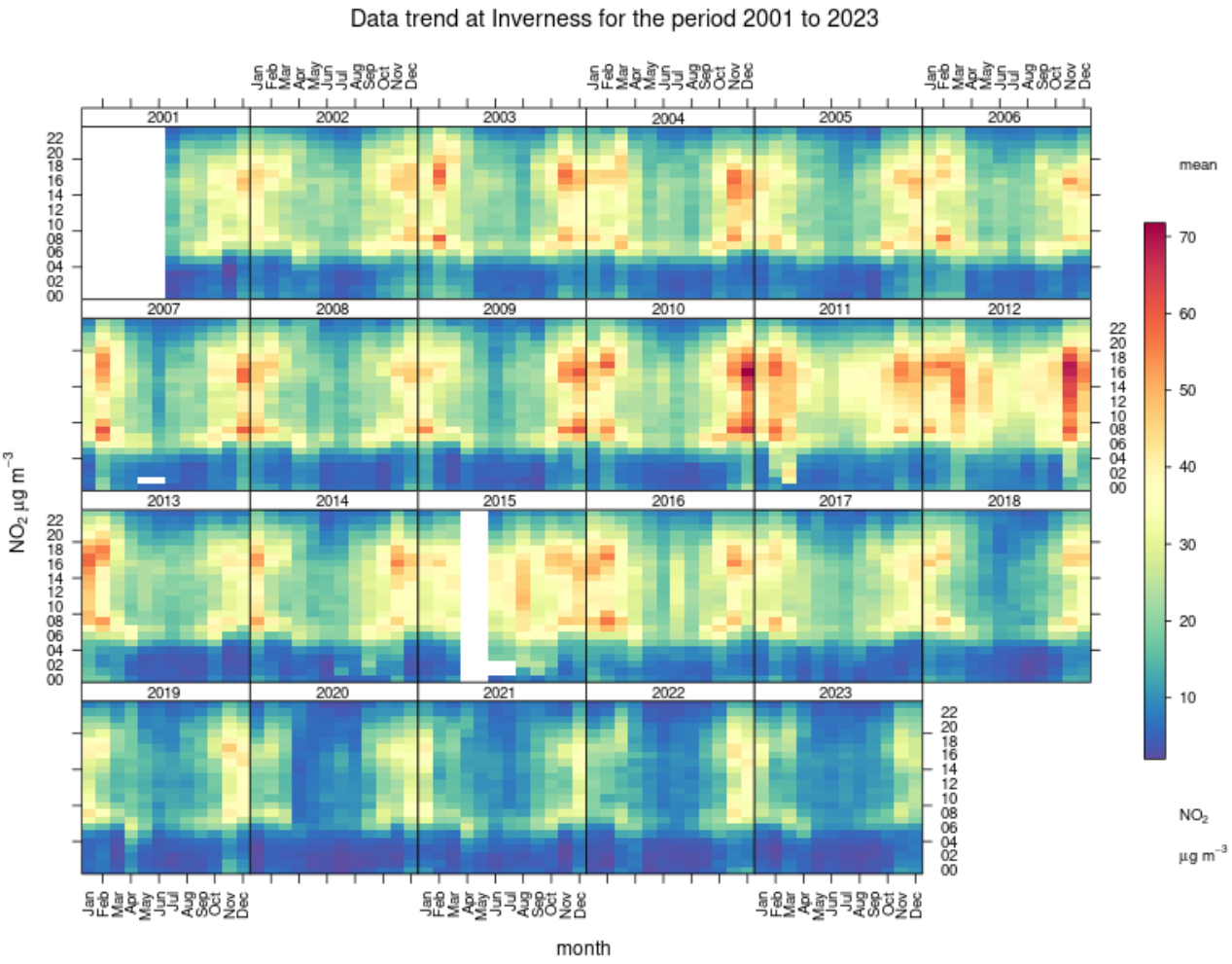
40 µg/m^3 in every month of every year. Furthermore, for 2023 the mean concentration of NO_2 is less than 30 µg/m^3 in every month.

The Inverness AQMA is located within an area where bus routes to and from the city centre typically start/finish. The significant drop off in annual mean NO_2 between 2022 and 2023 correlates with the replacement of the diesel bus fleet with 25 EV buses serving local Inverness City routes by bus operator Stagecoach in December 2022.

Trend outside the AQMA

Figure 3 below is a graphical representation of the long-term trend at Telford Street AURN since monitoring began in 2001. A steady increase in mean nitrogen dioxide concentration from 2001 until 2012 is observed. Between 2012 and 2016 there is little change year on year. From 2017 onward the trend is reducing.

Figure 3 Illustration of trend at Inverness AURN (Telford Street)



The annual hourly mean concentration of NO_2 measured at the Telford Street AURN in 2021 was 14µg/m^3; in 2022 it was 13µg/m^3; and in 2023 it was 12µg/m^3. This demonstrates a continuing downward trend in NO_2 concentration for three consecutive years following the 2020 pandemic. Sites within Nairn, Dingwall and Fort William are also demonstrating a downward trend.

3.2.2 Particulate Matter (PM_{10})

Table A. 6 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 18µg/m^3.

Table A. 7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than seven times per year.

There were no exceedances of any of the air quality objectives within The Highland Council area in 2023.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A. 8 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/m^3.

3.2.4 Sulphur Dioxide (SO_2)

No monitoring for SO_2 was undertaken in The Highland Council area in 2023.

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

No monitoring for Carbon Monoxide, Lead or 1,3-Butadiene was undertaken in The Highland Council area in 2023.

4 New Local Developments

4.1 Road Traffic Sources

There are no new road traffic sources identified in Highland in 2023.

4.2 Other Transport Sources

There are no new airports, ports or locations of stationary diesel/steam trains identified in Highland in 2023.

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 2023.

4.4 Commercial and Domestic Sources

Two new biomass combustion plants were granted planning consent in 2023. Details of the developments are in Appendix C. They were screened for air quality impact and were not 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 2023.

5 Planning Applications

There are no major planning applications recently granted consent which will have a significant impact on air quality within Highland. The following three major developments have been granted Planning Consent; further information concerning these Applications and the consideration of air quality impacts has been included:

Staffin harbour on Skye for upgrading to include development of a new quayside, storage facilities and access improvements (see Planning Consent reference 21/04521/FUL). Air quality impacts were not considered significant within the EIA. Approved work is planned for 2024.

A new distillery at Laggan including 3No. warehouses, access, parking, offices, boreholes. Approved by Cairngorm National Park Authority in November 2023 (see Planning Consent 2023/0267/DET). The EIA report submitted to support the application does not consider that there will be a significant reduction in air quality either during the construction or operational phases of the development.

At Nigg, a development comprising a High Voltage Cable Manufacturing Plant (see Planning Consent 23/04662/FUL). The EIA report submitted to support the application does not consider that there will be a significant reduction in air quality either during the construction or operational phases of the development. Minor adverse effects predicted from dust during the construction phase will have mitigations in place. Stack emissions to air are not considered significant and will be permitted and operated in accordance with Best Available Technologies.

The following two projects are currently obtaining pre-planning consents and investigations which will lead to further major Planning Applications which will be considered by The Highland Council in future, both of which have or will include EIA air impact assessments.

Corran Ferry development including infrastructure and accommodation improvements - the upgrade will involve the replacement of the existing ferry with two electric vessels requiring installation of infrastructure to support their use, including new slipways at Ardgour and Nether-Lochaber, marshalling areas and public facilities, also include the construction of a new berthing pier and new accommodation building(s) at Ardgour (see Planning reference 23/03630/SCRE).

Sutherland Spaceport development including construction and operation of a vertical launch spaceport with launch operations control centre, launch site integration facility, launch pad complex, antenna park, access road, fencing, services and associated infrastructure. The EIA report submitted to support the application does not consider that there will be a significant reduction in air quality should the application be approved. Mitigation measures to reduce dust during the construction phase are recommended (see Planning applications 23/05374/PAN and 24/01091/FUL).

6 Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

Monitoring undertaken in the Highland Council in 2023 suggests that the air quality objectives are being met in all areas within the authority. The highest nitrogen dioxide annual mean concentration recorded in 2023 was 26.3µg/m^3 at site N2B on the A96 in Nairn. Most sites have seen a significant reduction in annual mean concentration since 2019. Within the Inverness City Centre AQMA, the reduction has been in the range 36 to 55%. The highest annual mean concentration measured within the AQMA in 2023 was 25.2µg/m^3. Nitrogen dioxide concentration within the AQMA has been significantly lower than the objective for the last 3 years and The Highland Council consider that it would be appropriate to seek revocation of the AQMA.

6.2 Conclusions relating to New Local Developments

Two biomass developments and three major planning developments were considered for air quality impacts which were found to be insignificant.

6.3 Proposed Actions

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

A need for additional monitoring or changes to the current monitoring programme has not been identified.

The Highland Council believe that it would be appropriate to revoke the Inverness City Centre AQMA and will seek to progress this course of action in 2024.

A revised and finalised action plan for the Inverness City Centre AQMA has been approved by Highland Council members and will be submitted to DEFRA and subsequently published in July 2024

The Highland Council will continue to work with partners to progress action plan measures.

If the Inverness City Centre AQMA is revoked the Highland Council will work with partners to develop an Air Quality Strategy for Highland.

The Highland Council will continue to monitor air quality and to complete Air Quality Annual Progress Reports.

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? 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 PM (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	Inverness City Centre	Chemiluminescent	0	4	1.3
INV04	Inverness Academy Street First Floor	Roadside	266650	845446	NO_2	Inverness City Centre	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.

Figure 4 AUN locations

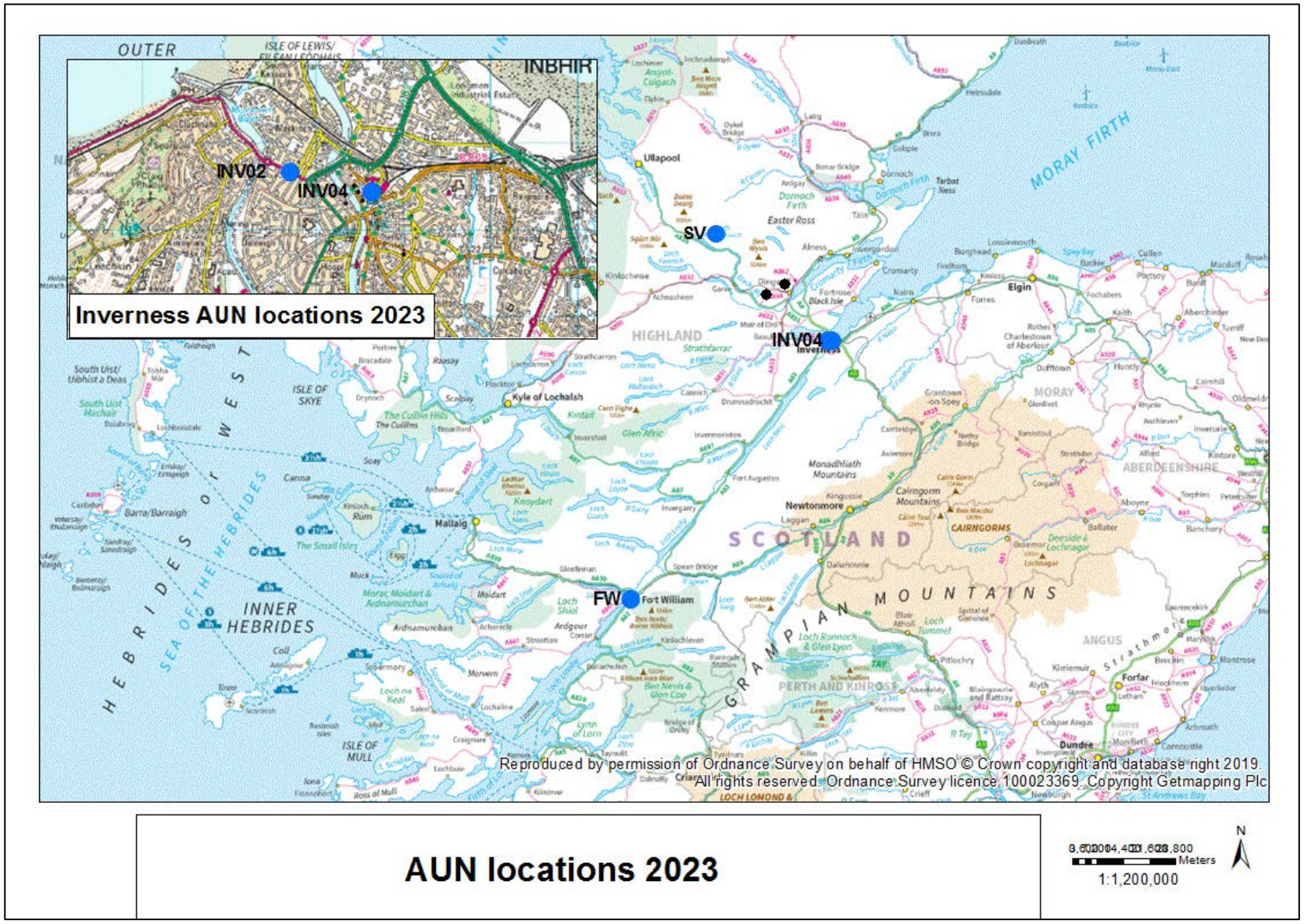


Table A. 2 Detail of non-automatic monitoring

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	Inverness Union Street	Roadside	266681	845361	NO2	No	0.0	3.0	No	3.5
IV2E	Inverness Academy Street E	Roadside	266610	845487	NO2	No	0.0	1.0	No	2.0
IV2G	Inverness Academy Street G	Roadside	266704	845413	NO2	No	0.0	2.0	No	2.5
IV3A	Inverness Queensgate A	Roadside	266650	845428	NO2	Inverness City Centre	0.0	3.0	No	2.5
IV3C	Inverness Queensgate C	Roadside	266609	845404	NO2	No	0.0	3.0	No	2.5
IV4A, IV4B, IV4C	Inverness Telford Street	Roadside	265710	845672	NO2	No	0.0	5.0	Yes	3.0
IV6B	Inverness Church Street B	Roadside	266513	845476	NO2	No	3.0	2.0	No	3.0

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	Inverness Margaret Street	Roadside	266654	845532	NO2	No	0.0	1.0	No	2.5
IV9A	Inverness AQMA A	Kerbside	266657	845447	NO2	Inverness City Centre	3.0	0.5	No	2.0
IV9B	Inverness AQMA B	Kerbside	266666	845441	NO2	Inverness City Centre	5.0	0.5	No	2.0
IV9C	Inverness AQMA C	Roadside	266677	845451	NO2	Inverness City Centre	0.0	2.0	No	2.0
IV9D	Inverness AQMA D	Roadside	266659	845467	NO2	Inverness City Centre	2.0	0.0	No	2.0
IV3H, IV3K, IV3L	Inverness Queensgate L	Roadside	266650	845446	NO2	Inverness City Centre	0.0	5.0	Yes	1.5
IV22A	Inverness Crown A	Roadside	267057	845167	NO2	No	10.0	1.0	No	3.0
IV22B	Inverness Crown B	Roadside	267137	845051	NO2	No	3.0	1.0	No	3.0

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)
IV22C	Inverness Crown C	Roadside	267120	845012	NO2	No	4.0	1.0	No	3.0
IV22D	Inverness Crown D	Roadside	267148	845018	NO2	No	5.0	1.0	No	3.0
IV23A	Inverness Culcabock A	Roadside	268146	844694	NO2	No	0.0	2.0	No	3.0
IV23B	Inverness Culcabock B	Roadside	268214	844695	NO2	No	4.0	1.0	No	3.0
IV23C	Inverness Culcabock C	Roadside	268285	844674	NO2	No	5.0	2.0	No	3.0
N1B	Nairn Boath Terrace	Roadside	288688	856543	NO2	No	4.0	3.0	No	2.5
N2A	Nairn Ashers Court	Roadside	288559	856629	NO2	No	0.0	2.6	No	2.5
N2B	Nairn St Ninian Road	Roadside	288503	856659	NO2	No	0.0	1.8	No	2.5

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)
N3A	Nairn Leopold Street	Roadside	282228	856458	NO2	No	0.0	1.0	No	2.5
RC1	Dingwall Wyvis Terrace	Roadside	254429	858970	NO2	No	10.0	1.0	No	1.8
RC2	Dingwall Station Road	Roadside	255199	858189	NO2	No	0.0	1.5	No	1.8
RC3	Dingwall Kintail Place	Urban Background	255113	859863	NO2	No	0.0	1.0	No	1.8
RC4	Dingwall Burns Crescent	Urban Background	254419	859287	NO2	No	0.0	2.0	No	1.8
AV1A	Aviemore Dalfaber Drive	Roadside	289674	813669	NO2	No	10.0	2.0	No	2.5
AV1B	Aviemore Grampian Road	Roadside	289650	813656	NO2	No	10.0	4.0	No	2.5
FW1A	Fort William 1A	Roadside	211342	774369	NO2	No	5.0	1.0	No	2.5

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	Fort William 1B	Roadside	211355	774386	NO2	No	0.0	6.0	No	2.5
FW1C	Fort William 1C	Roadside	211148	774294	NO2	No	6.0	2.0	No	2.5
FW1D	Fort William 1D	Roadside	210818	774188	NO2	No	10.0	2.0	No	2.5

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.

Figure 5 Map of Inverness Passive Diffusion Tube Locations

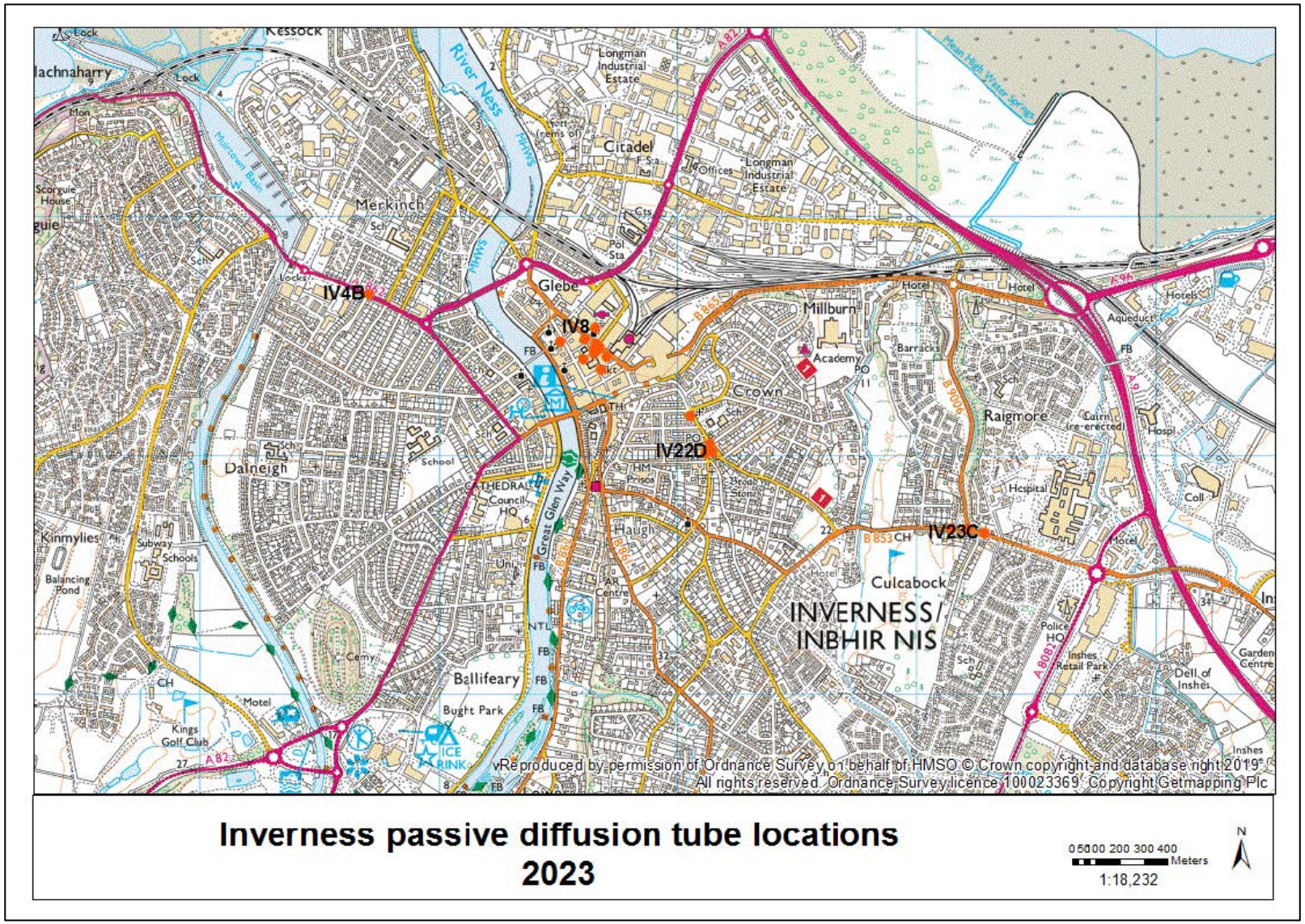


Figure 6 Map of Inverness City Centre Passive Diffusion Tube Locations

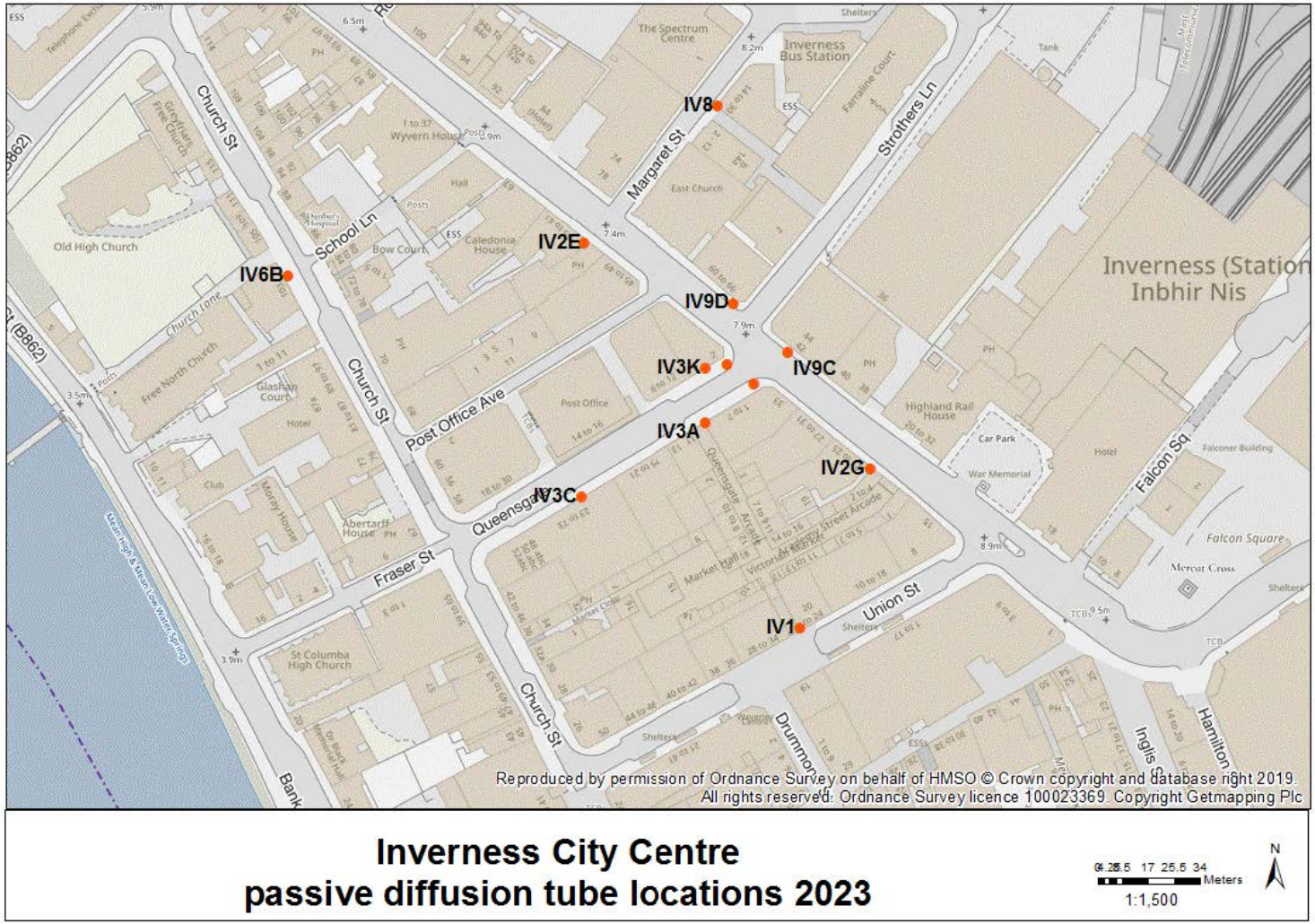


Figure 7 Map of Inverness (Crown) Passive Diffusion Tube Locations

Figure 8 Map of Inverness (Culcabock) Passive Diffusion Tube Locations

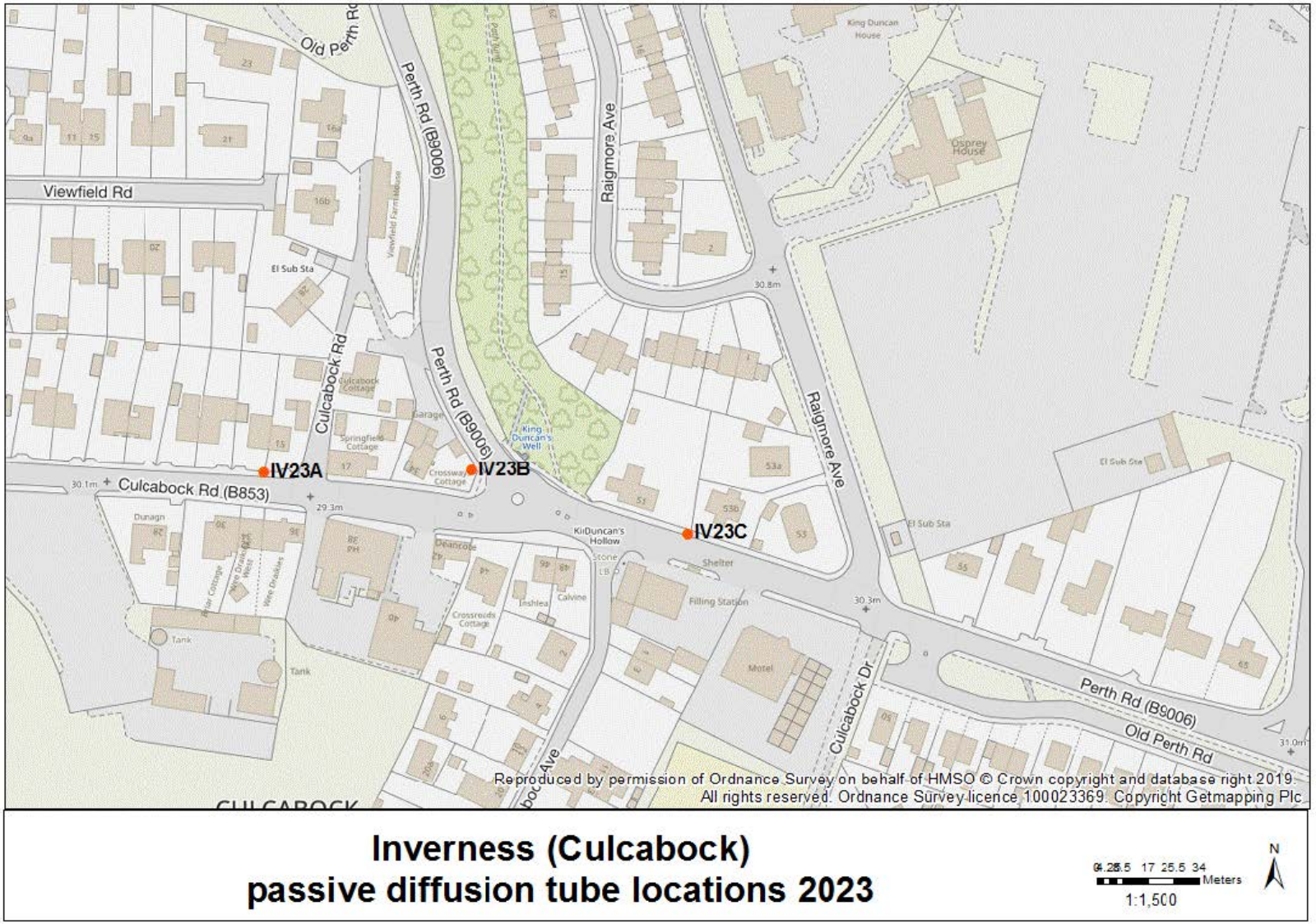


Figure 9 Map of Nairn Passive Diffusion Tube Locations

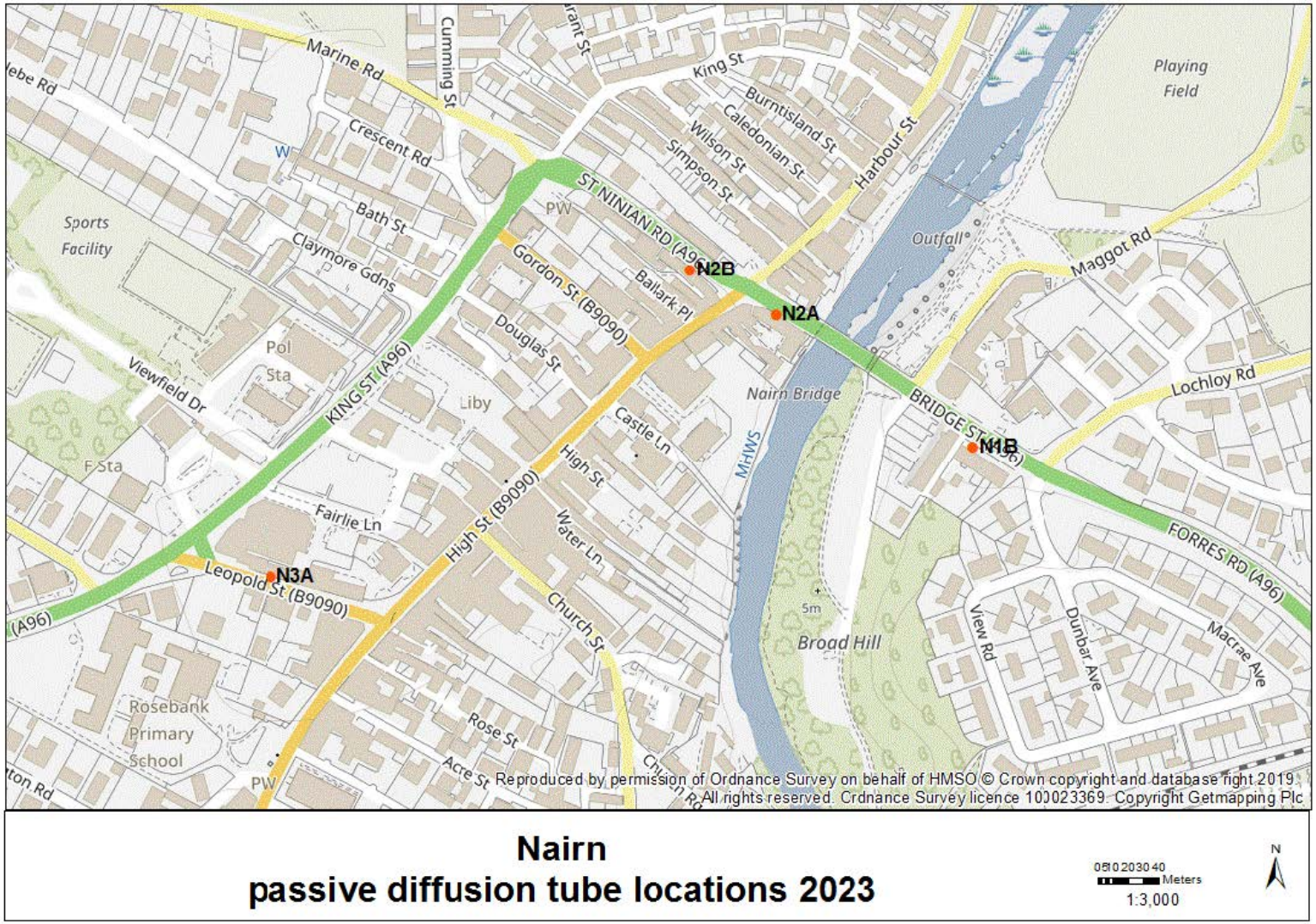


Figure 10 Map of Dingwall Passive Diffusion Tube Locations

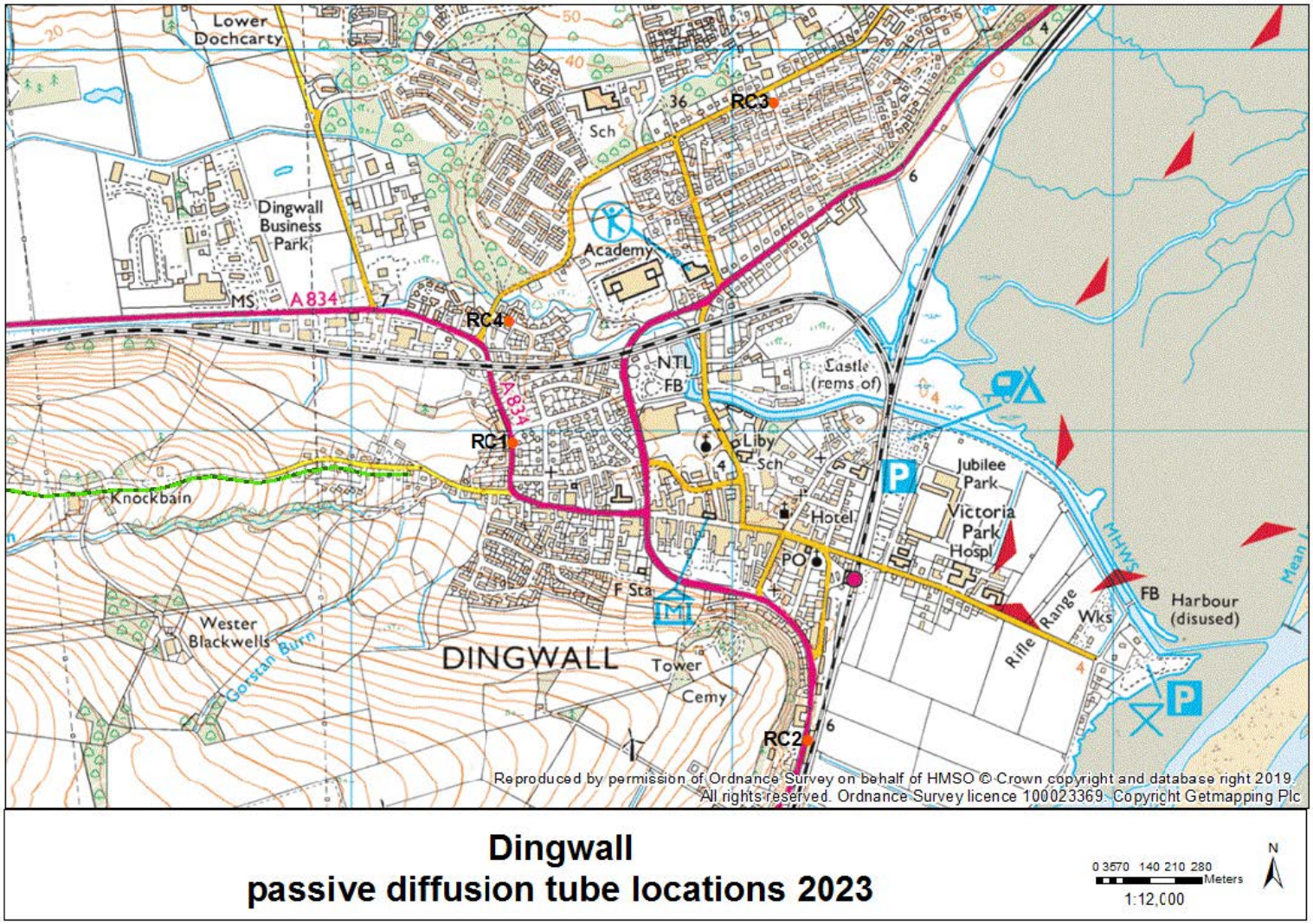


Figure 11 Map of Aviemore Passive Diffusion Tube Locations

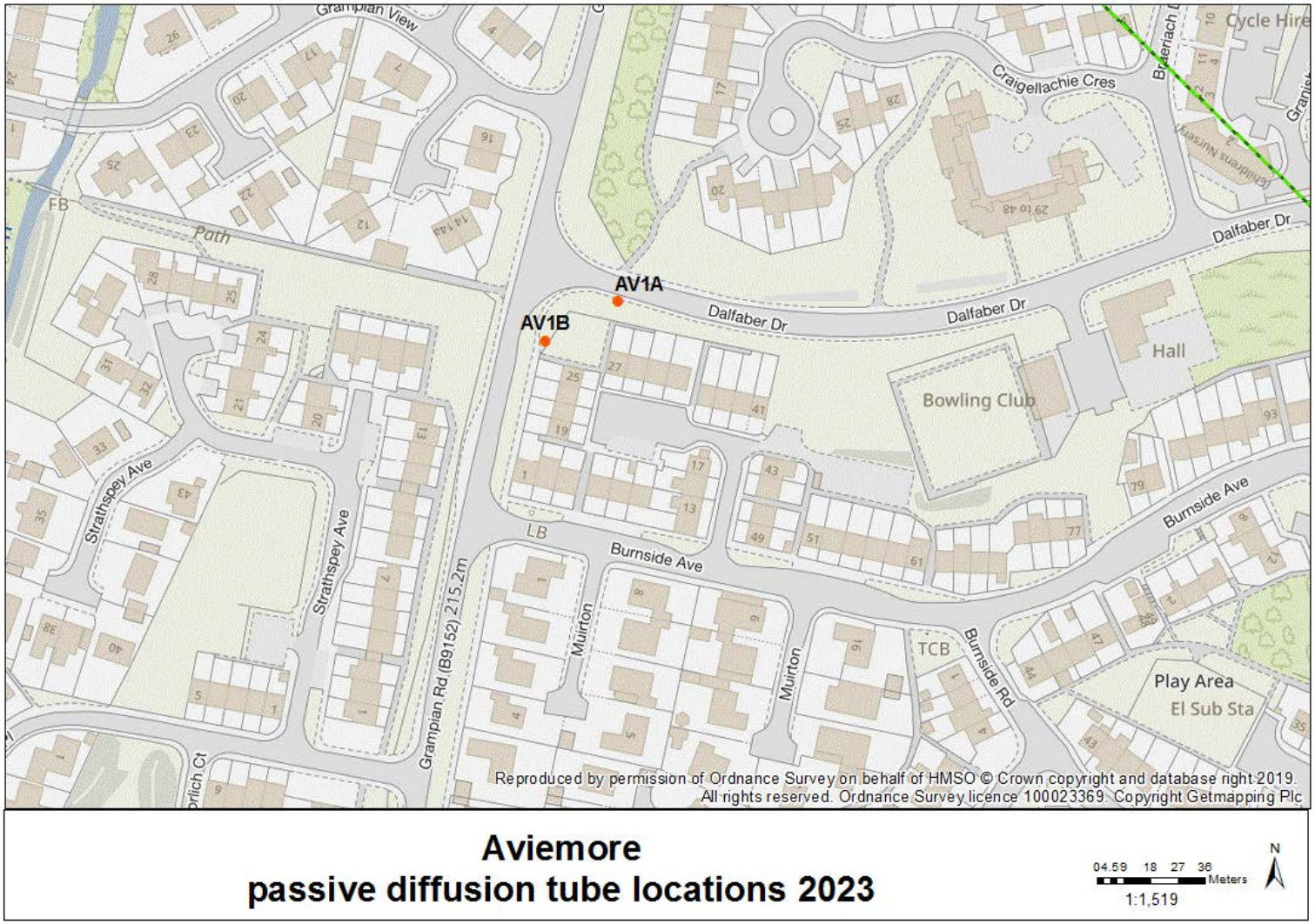


Figure 12 Map of Fort William Passive Diffusion Tube Locations

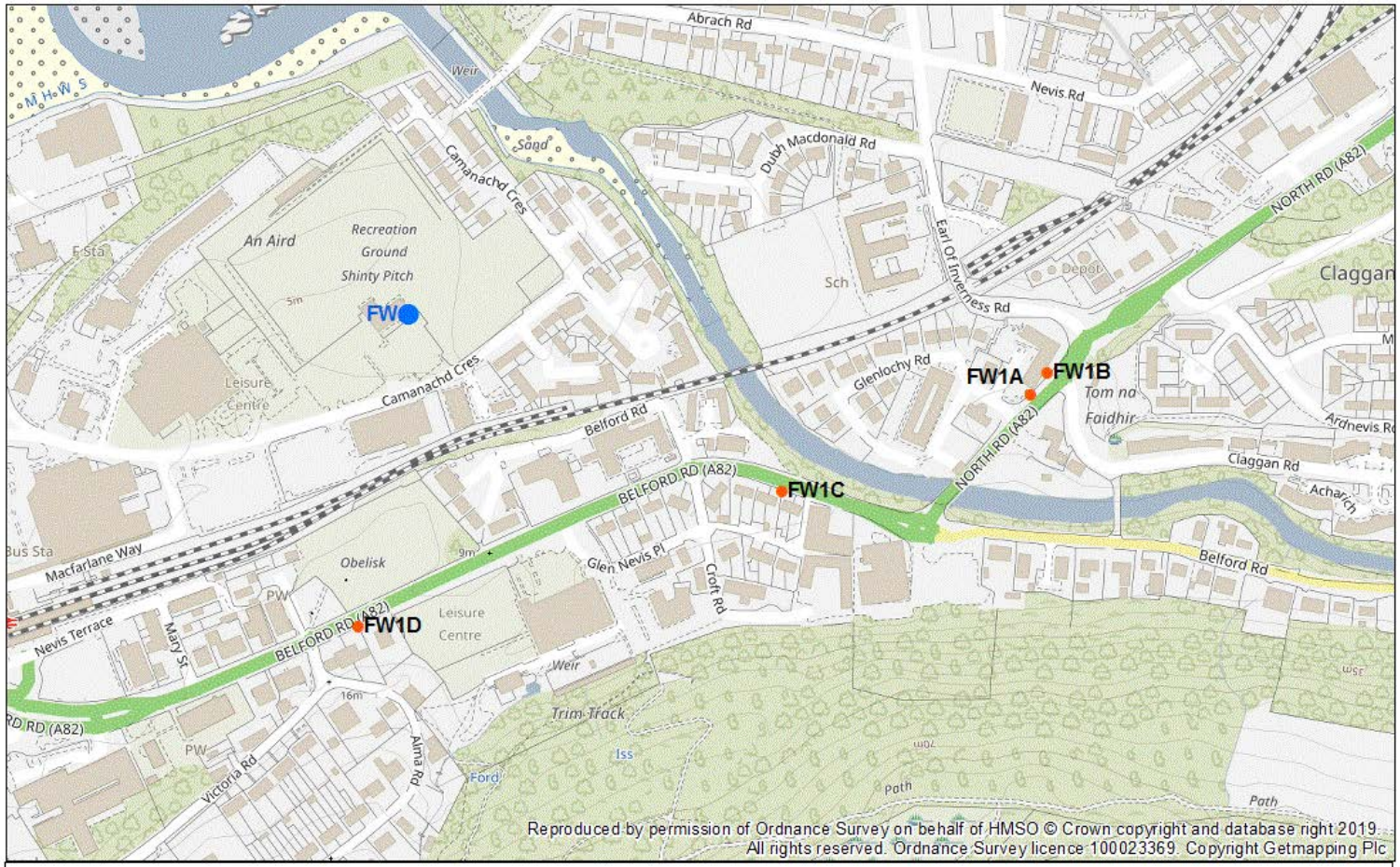


Table A. 3 Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
INV02	Roadside	Automatic	98.7	98.7	16	12.7	14	13	12.3
FW	Suburban	Automatic	93	93	8	5.3	6	7	6.6
INV03	Roadside	Automatic	99.4	99.4	**43**	28.2	29	29	20
INV04	Roadside	Automatic	63	63	31	22.6	29.6	23	18.8

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in bold.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 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.TG22 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. 4 Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2019	2020	2021	2022	2023
IV1	266681	845361	Roadside	92.3	92.3	25.0	14.9		19.9	15.8
IV2E	266610	845487	Roadside	92.3	92.3	34.0	21.3	30.1	27.8	23.5
IV2G	266704	845413	Roadside	92.3	92.3	37.0	22.1	29.6	27.6	24.6
IV3A	266650	845428	Roadside	100	100.0	38.0	22.2	28.7	25.8	21.1
IV3C	266609	845404	Roadside	100	100.0	33.0	18.8	24.3	22.2	19.3
IV4A, IV4B, IV4C	265710	845672	Roadside	100	100.0	17.0	13.3	14.7	14.6	13.1
IV6B	266513	845476	Roadside	100	100.0	18.0	11.2	14.3	12.7	11.7
IV8	266654	845532	Roadside	90.4	90.4	22.0	13.3	17.6	15.7	14.6
IV9A	266657	845447	Kerbside	92.3	92.3	**45.0**	27.1	33.7	31.0	24.7
IV9B	266666	845441	Kerbside	100	100.0	38.0	21.5	27.8	25.6	20.6

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2019	2020	2021	2022	2023
IV9C	266677	845451	Roadside	100	100.0	**40.0**	22.9	33.7	28.0	25.2
IV9D	266659	845467	Roadside	82.7	82.7	34.0	18.9	25.7	23.7	21.5
IV3H, IV3K, IV3L	266650	845446	Roadside	100	100.0	**41.0**	28.4	25.1	23.4	18.3
IV22A	267057	845167	Roadside	92.3	92.3					11.3
IV22B	267137	845051	Roadside	84.6	84.6					10.8
IV22C	267120	845012	Roadside	84.6	84.6					9.5
IV22D	267148	845018	Roadside	92.3	92.3					9.4
IV23A	268146	844694	Roadside	100	67.3					15.1
IV23B	268214	844695	Roadside	87.5	59.6					16.1
IV23C	268285	844674	Roadside	100	67.3					21.6
N1B	288688	856543	Roadside	92.3	92.3	19.0	15.6	17.2	17.7	17.3

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2019	2020	2021	2022	2023
N2A	288559	856629	Roadside	92.3	92.3	25.0	20.4	20.1	21.1	19.1
N2B	288503	856659	Roadside	100	100.0	33.0	28.1	27.9	28.5	26.3
N3A	282228	856458	Roadside	84.6	84.6					12.2
RC1	254429	858970	Roadside	57.7	57.7	20.0	14.6	14.0	11.9	13.6
RC2	255199	858189	Roadside	92.3	92.3	30.0	20.9	19.2	20.3	19.7
RC3	255113	859863	Urban Background	90.4	90.4	8.0	5.9	5.3	5.1	4.6
RC4	254419	859287	Urban Background	100	100.0	9.0	7.0	6.6	6.6	5.8
AV1A	289674	813669	Roadside	100	34.6					9.6
AV1B	289650	813656	Roadside	100	34.6					9.1
FW1A	211342	774369	Roadside	100	100.0	21.0	13.9	16.4	16.2	15.8
FW1B	211355	774386	Roadside	90.4	90.4	18.0	12.4	14.5	13.7	13.5

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2019	2020	2021	2022	2023
FW1C	211148	774294	Roadside	92.3	92.3	19.0	14.1	16.1	15.6	16.3
FW1D	210818	774188	Roadside	100	100.0	22.0	13.9	16.6	16.0	15.0

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in bold.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 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(22) 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. 5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
INV02	Roadside	Automatic	98.7	98.7	0	0	0	0	0
FW	Suburban	Automatic	93	93	0	0	0	0	0
INV03	Roadside	Automatic	99.4	99.4	0(143.7)	0	0	0(102)	0
INV04	Roadside	Automatic	63	63	0(95.1)	0	0(95.9)	0(89)	0(78)

Notes:

Exceedances of the NO_2 1-hour mean objective (200 µg/m^3 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. 6 – Annual Mean PM_{10} Monitoring Results (µg/m^3)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
INV02	Roadside	98	98	9	8	9	9	9

Notes:

Exceedances of the PM_{10} annual mean objective of 18 µg/m^3 are shown in bold.

All means have been “annualised” as per LAQM.TG(22), 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. 7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
INV02	Roadside	98	98	0	0	0	0	0

Notes:

Exceedances of the PM_{10} 24-hour mean objective (50 µg/m^3 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. 8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
INV02	Roadside	98	98	5	4	5	5	5

Notes:

Exceedances of the $PM_{2.5}$ annual mean objective of 10 µg/m^3 are shown in bold.

All means have been "annualised" as per LAQM.TG(22), 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%).

Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B. 1 NO_2 2023 Monthly Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
IV1	266681	845361	14.2	15.6	26.7	27.1	16.9	19.9	17.7	14.9	15.3	23.3	23.0		19.5	15.8		
IV2E	266610	845487	31.1	31.9	32.4	32.6	27.9	24.1	26.8	24.1	27.4	30.7	30.2		29.0	23.5		
IV2G	266704	845413	30.9	31.5	37.5		28.7	26.8	28.9	26.4	26.5	30.5	33.0	33.1	30.3	24.6		
IV3A	266650	845428	24.7	26.3	32.5	33.1	21.9	22.6	22.0	20.3	22.6	26.4	30.0	30.8	26.1	21.1		
IV3C	266609	845404	21.8	23.4	28.0	29.7	21.1	21.7	19.5	18.3	21.4	27.5	25.4	28.8	23.9	19.3		
IV4A	265710	845672	20.2	17.8	18.9	13.8	13.3	10.8	12.0	11.7	13.8	15.7	22.6	21.6	-	-		Triplicate Site with IV4A, IV4B and IV4C - Annual data provided for IV4C only
IV4B	265710	845672	20.9	19.1	18.6	14.0	13.5	11.4	12.8	12.3	14.0	15.3	23.5	22.0	-	-		Triplicate Site with IV4A, IV4B and IV4C - Annual data provided for IV4C only
IV4C	265710	845672	21.4	18.4	18.0	14.3	13.3	11.1	13.2	11.8	14.2	15.7	22.9	20.4	16.2	13.1		Triplicate Site with IV4A, IV4B and IV4C - Annual data provided for IV4C only
IV6B	266513	845476	14.0	10.5	17.1	17.9	11.5	12.0	11.2	11.1	12.3	18.0	20.1	17.9	14.5	11.7		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
IV8	266654	845532	22.4	16.5	21.0	20.2	13.3	14.4	13.8		10.8	20.7	23.5	22.4	18.1	14.6		
IV9A	266657	845447	31.0	31.4	36.9	36.7	28.8	27.5	26.1	24.9	26.9	32.2	33.6		30.5	24.7		
IV9B	266666	845441	24.5	25.0	30.8	29.7	23.0	21.1	23.8	20.6	21.0	26.2	29.2	29.8	25.4	20.6		
IV9C	266677	845451	27.7	29.6	38.1	39.3	29.5	29.4	29.8	24.9	25.7	33.6	33.3	33.4	31.2	25.2		
IV9D	266659	845467	22.3	26.0	34.9		25.1		25.1	21.7	22.2	29.4	29.6	29.8	26.6	21.5		
IV3H	266650	845446	19.7	22.2	27.6	27.2	19.9	19.5	19.5	18.3	18.6	25.4	26.3		-	-		Triplicate Site with IV3H, IV3K and IV3L - Annual data provided for IV3L only
IV3K	266650	845446	19.3	21.4	28.8	27.5	20.2	19.9	19.9	19.3	18.3	24.8	25.5	26.1	-	-		Triplicate Site with IV3H, IV3K and IV3L - Annual data provided for IV3L only
IV3L	266650	845446	19.0	21.6	26.7	27.7	20.1	19.5	20.0	18.5	18.8	26.7	27.4		22.6	18.3		Triplicate Site with IV3H, IV3K and IV3L - Annual data provided for IV3L only
IV22A	267057	845167		14.8	18.1	13.9	10.2	9.0	9.5	11.5	10.2	13.4	22.6	21.0	14.0	11.3		
IV22B	267137	845051		14.0	18.3	15.2	10.3	10.9	8.8	8.6	10.8	13.8	23.1		13.4	10.8		
IV22C	267120	845012		13.3	17.3	12.2	9.4	7.1	8.4	7.8	9.3	11.8	20.3		11.7	9.5		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
IV22D	267148	845018		13.2	15.1	10.6	8.2	8.1	7.6	6.8	8.9	10.9	21.0	17.9	11.7	9.4		
IV23A	268146	844694					14.5	12.7	15.3	13.6	14.7	18.0	25.6	23.1	17.2	15.1		
IV23B	268214	844695					16.6	17.0	16.0	15.0	15.8	17.9	25.5		17.7	16.1		
IV23C	268285	844674					23.0	20.8	23.1	21.3	21.7	23.4	34.3	29.0	24.6	21.6		
N1B	288688	856543	25.6	23.4	26.2	23.9	18.7	16.3	17.7	17.1	19.4	22.1	24.0		21.3	17.3		
N2A	288559	856629	30.7	31.6	26.1	23.2	22.1	17.8	19.6	20.4	23.4	19.1	24.8		23.5	19.1		
N2B	288503	856659	41.5	37.9	38.5	32.8	32.0	27.2	30.3	28.6	29.9	27.6	33.0	30.8	32.5	26.3		
N3A	282228	856458		15.9	18.6	17.9	12.7	14.7	12.3	12.9	11.0	15.2	19.8		15.1	12.2		
RC1	254429	858970	22.8	21.7	18.3	14.4	10.9	11.8	11.2						15.9	13.6		
RC2	255199	858189	30.5	28.0	27.8	24.8	19.4	21.0	18.6	20.5	23.6	21.2	32.8		24.4	19.7		
RC3	255113	859863	9.4	8.3		5.2	3.4	3.5	3.1	2.9	4.1	4.8	11.5	6.7	5.7	4.6		
RC4	254419	859287	12.0	9.3	8.2	5.3	4.8	4.7	4.2	4.1	5.8	6.1	13.6	8.4	7.2	5.8		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
AV1A	289674	813669								9.6	9.1	12.7	18.5		12.5	9.6		
AV1B	289650	813656								8.8	9.4	12.9	16.1		11.8	9.1		
FW1A	211342	774369	16.3	23.1	24.5	21.2	14.9	17.2	14.4	15.8	19.2	20.8	25.7	20.5	19.5	15.8		
FW1B	211355	774386	13.6	18.5	19.5	16.4	15.5	16.6	14.0		16.0	16.7	20.7	15.6	16.6	13.5		
FW1C	211148	774294	17.0	23.2	23.6	21.0		20.5	15.9	17.7	19.9	18.1	24.0	20.0	20.1	16.3		
FW1D	210818	774188	15.7	21.4	24.3	19.7	17.7	19.2	16.0	17.8	16.7	16.7	20.7	17.1	18.6	15.0		

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within The Highland Council During 2023

The following new sources were identified in 2023:

205Kw biomass boiler for a district heating scheme for 4 domestic properties, Glenborrodale, Acharacle (planning reference 23/01509/FUL).

295Kw biomass boiler and a log dryer at Killen (planning reference 23/05309/FUL).

The biomass developments were screened using the methods described in LAQM.TG22 and found to be not significant in terms of impacts upon air quality.

Additional Air Quality Works Undertaken by The Highland Council During 2023

Funding provided by the Scottish Government in April 2023 allowed the Highland Council to carry out an air quality monitoring and awareness raising project at ten Highland primary schools in 2023.

The monitoring included a combination of five NO_2 passive diffusion tubes at each school changed monthly over a three month period, and live Earthsense 'Zephyr®' monitoring of multiple parameters over a few weeks at each site.

Further information concerning the study is included in Appendix D including the diffusion tube monitoring location information, the annualised and bias adjusted Annual Mean NO_2 diffusion tube results, and the full monthly NO_2 diffusion tube results.

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 NO_2 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 NO_2 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. The most up to date rounds available are rounds 55 to 59, which cover the up to October 2023, details of which can be found at:

https://laqm.defra.gov.uk/wp-content/uploads/2023/11/LAQM-NO2-Performance-data_Up-to-Oct-2023_V1_Final.pdf

100% of submissions in both rounds 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 NO_2 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

The diffusion tube sites identified in Table C.2 were annualised using the Diffusion Tube Processing Tool v4.0.

Diffusion Tube Bias Adjustment Factors

The Highland Council have applied a combined local bias adjustment factor of 0.81 to the 2023 monitoring data. A summary of bias adjustment factors used by The Highland Council over the past five years is presented in **Error! Reference source not found.**. T wo local co-location studies were undertaken in 2023. Both studies had good overall precision and data capture. The diffusion tube data processing tool version 4.0 was used to determine a local bias factor for each site. The study at the AURN site on Telford Street, Inverness (INV02) returned a factor of 0.75. The study at the SAQN site on Queensgate, Inverness (INV03) returned a factor of 0.88. The processing tool calculated a combined local factor which was used for the bias adjustment of all diffusion tubes.

Table C. 1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	Local	-	0.81
2022	National	03/23	0.83
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

NO_2 Fall-off with Distance from the Road

No diffusion tube NO_2 monitoring locations within The Highland Council required distance correction during 2023.

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 all sites.

INV03 and INV04 are 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 Fort William and Strath Vaich, which are four weekly and quarterly.

All data reported in this document is ratified.

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

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

The type of PM_{10}/$PM_{2.5}$ monitor(s) utilised within The Highland Council do not require the application of a correction factor.

Automatic Monitoring Annualisation

Site INV04 required annualisation in 2023. Detail of the annualisation process is included in Table C.2.

NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within The Highland Council required distance correction during 2023.

Table C. 2 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Aberdeen Erroll Park	Annualisation Factor Dundee Mains Loan	Annualisation Factor Edinburgh St Leonards	Annualisation Factor Glasgow Townhead	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
INV04	0.9289	0.8731	0.8765	0.8706	0.8873	21.2	18.8	
IV23A	1.0933	1.0971	1.0425	1.1157	1.0872	17.2	18.7	
IV23B	1.1361	1.1510	1.0672	1.1476	1.1255	17.7	19.9	
IV23C	1.0933	1.0971	1.0425	1.1157	1.0872	24.6	26.7	
RC1	0.9924	1.0906	1.1081	1.0423	1.0584	15.9	16.8	
AV1A	1.0569	0.9237	0.8834	0.9542	0.9546	12.5	11.9	
AV1B	1.0569	0.9237	0.8834	0.9542	0.9546	11.8	11.3	

Table C. 3 – Local Bias Adjustment Calculations

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2
Periods used to calculate bias	12	11
Bias Factor A	0.75 (0.7 - 0.82)	0.88 (0.82 - 0.95)
Bias Factor B	33% (22% - 43%)	14% (5% - 22%)
Diffusion Tube Mean (µg/m^3)		
Mean CV (Precision)	16.2	22.3
Automatic Mean (µg/m^3)	2.6%	2.1%
Data Capture		
Adjusted Tube Mean (µg/m^3)	12.2	19.6

Notes:

A combined local bias adjustment factor of 0.81 has been used to bias adjust the 2023 diffusion tube results.

Appendix D: Primary School Awareness Raising Project

Funding provided by the Scottish Government in April 2023 allowed The Highland Council to carry out an air quality monitoring and awareness raising project at 10 Highland primary schools in 2023/24.

The monitoring included a combination of five NO_2 passive diffusion tubes at each school changed monthly over a three-month period, and live Earthsense Zephyr® monitoring of multiple parameters over a few weeks at each site.

In total 50 passive diffusion tube sites were deployed as part of the monitoring and awareness raising project. Maps showing the location of the monitoring sites are provided below. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

The schools were selected on the basis of their urban classification and proximity to A and B roads. The monitoring locations were selected to use current street furniture in closest proximity to school drop off zones or known idling zones.

The diffusion tube monitoring results were adjusted where possible to annual average (AA). The location of each diffusion tube is reported in Table D.2, the Annual Mean results are reported in Table D.3 and the monthly results are reported in Table D.4.

There were no exceedances of the air quality objectives at any of the sites where monitoring was undertaken as part of the Primary School Awareness Raising Project.

The data from the Zephyr® indicated raw data peaks in NO_2 coinciding with drop off and pick up times (9am/3pm) at some locations. The Zephyr® monitors are considered a useful tool to demonstrate the indicative concentrations of NO_2 present during daily cycles, however as they are not the subject of regular calibration, the results are not reported here.

The awareness raising element was undertaken through delivery of a project talk to pupils (Second Stage) in participating schools, delivery of monitoring data worksheets, and an end of project mini-report which were encouraged to be shared with pupils, staff or parents via school newsletters.

Photographs – Air quality talk with Primary pupils and Zephyr® monitor adjacent to Inverlochy Primary School

Table D. 1 Primary School 2023/34 Air Quality Awareness Raising Project

Primary Name	School Roll	LAQM (TG22) Site Type	Easting	Northing
Cradlehall (Inverness)	292	Suburban	270532	844590
Muirtown (Inverness)	205	Background Urban	265021	845837
Merkinch (Inverness)	277	Background Urban	265797	845900
Hilton (Inverness)	299	Background Urban	267527	843740
Bun-Sgoil Ghaidhlig Inbhir Nis (Inverness)	223	Background Urban	266887	842198
Central (Inverness)	191	Background Urban	266261	845074
Rosebank (Nairn)	324	Background Urban	288122	856391
Millbank (Nairn)	261	Background Urban	288347	856166
Lundavra (Fort William)	208	Background Urban	209646	772938
Inverlochy (Fort William)	141	Background Urban	211224	774484

The aim for 2024/25 is to repeat the project at six further priority urban Primary Schools selected by proximity to A and B roads.

Table D. 2 Details of Non-Automatic Monitoring Sites for Primary School Project

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
CH1	Cradlehall Primary School	Roadside	270528	844675	NO_2	No	3.0	7.5	No	5.5
CH2	Cradlehall Primary School	Suburban	270571	844488	NO_2	No	0.0	2.0	No	2.5
CH3	Cradlehall Primary School	Roadside	270505	844500	NO_2	No	0.0	2.0	No	2.5
CH4	Cradlehall Primary School	Kerbside	270411	844575	NO_2	No	4.5	0.5	No	2.5
CH5	Cradlehall Primary School	Roadside	270449	844634	NO_2	No	12.5	3.0	No	2.5
MT1	Muirtown Primary School	Urban Background	264947	845773	NO_2	No	0.0	1.5	No	2.5
MT2	Muirtown Primary School	Kerbside	265041	845742	NO_2	No	6.5	0.5	No	2.5
MT3	Muirtown Primary School	Kerbside	265055	845762	NO_2	No	7.0	0.5	No	2.5
MT4	Muirtown Primary School	Kerbside	265081	845791	NO_2	No	5.0	0.5	No	2.5
MT5	Muirtown Primary School	Kerbside	265112	845821	NO_2	No	5.0	0.5	No	2.5
MK1	Merkinch Primary School	Roadside	265902	845870	NO_2	No	0.5	1.5	No	2.5
MK2	Merkinch Primary School	Roadside	265866	845820	NO_2	No	0.5	1.5	No	2.5
MK3	Merkinch Primary School	Roadside	265809	845830	NO_2	No	0.0	1.8	No	2.5
MK4	Merkinch Primary School	Roadside	265778	845846	NO_2	No	0.0	1.8	No	2.5
MK5	Merkinch Primary School	Roadside	265751	845860	NO_2	No	10.0	2.0	No	2.5
HL1	Hilton Primary School	Roadside	267507	843764	NO_2	No	0.5	2.0	No	2.5
HL2	Hilton Primary School	Roadside	267476	843699	NO_2	No	0.5	2.0	No	2.5
HL3	Hilton Primary School	Roadside	267497	843671	NO_2	No	0.5	2.0	No	2.5
HL4	Hilton Primary School	Roadside	267567	843591	NO_2	No	0.5	2.0	No	2.5
HL5	Hilton Primary School	Kerbside	267650	843680	NO_2	No	10.0	0.5	No	2.5
BSG1	Bun-Sgoil Ghàidhlig Inbhir Nis	Kerbside	266992	842211	NO_2	No	66.0	0.5	No	2.5
BSG2	Bun-Sgoil Ghàidhlig Inbhir Nis	Roadside	266940	842180	NO_2	No	10.5	2.7	No	2.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
BSG3	Bun-Sgoil Ghàidhlig Inbhir Nis	Urban Background	266916	842219	NO_2	No	3.0	1.0	No	2.5
BSG4	Bun-Sgoil Ghàidhlig Inbhir Nis	Urban Background	266904	842229	NO_2	No	3.0	1.0	No	2.5
BSG5	Bun-Sgoil Ghàidhlig Inbhir Nis	Urban Background	266865	842238	NO_2	No	10.0	1.0	No	2.5
CE1	Central Primary School	Roadside	266170	845092	NO_2	No	12.0	1.7	No	2.5
CE2	Central Primary School	Roadside	266184	845067	NO_2	No	10.0	1.7	No	2.5
CE3	Central Primary School	Roadside	266308	845088	NO_2	No	13.5	1.8	No	2.5
CE4	Central Primary School	Roadside	266286	845116	NO_2	No	13.5	1.8	No	2.5
CE5	Central Primary School	Roadside	266263	845144	NO_2	No	17.0	1.8	No	2.5
RB1	Rosebank Primary School	Roadside	288039	856423	NO_2	No	3.5	1.5	No	2.5
RB2	Rosebank Primary School	Roadside	288120	856441	NO_2	No	0.5	2.8	No	2.5
RB3	Rosebank Primary School	Roadside	288223	856334	NO_2	No	13.0	3.0	No	2.5
RB4	Rosebank Primary School	Kerbside	288230	856333	NO_2	No	25.0	0.5	No	2.5
RB5	Rosebank Primary School	Roadside	288203	856326	NO_2	No	1.5	2.5	No	2.5
MB1	Millbank Primary School	Roadside	288308	856218	NO_2	No	0.5	1.8	No	2.5
MB2	Millbank Primary School	Roadside	288285	856196	NO_2	No	0.5	1.8	No	2.5
MB3	Millbank Primary School	Roadside	288260	856177	NO_2	No	0.5	1.7	No	2.5
MB4	Millbank Primary School	Roadside	288210	856169	NO_2	No	0.5	1.8	No	2.5
MB5	Millbank Primary School	Urban Background	288439	856171	NO_2	No	2.0	50.0	No	2.5
LV1	Lundavra 1	Urban Background	209624	772863	NO_2	no	1.0	60.0	No	2.5
LV2	Lundavra 2	Roadside	209720	772965	NO_2	no	10.0	1.6	No	2.5
LV3	Lundavra 3	Roadside	209700	772882	NO_2	no	10.0	1.6	No	2.5
LV4	Lundavra 4	Roadside	209682	772856	NO_2	no	10.0	1.6	No	2.5
LV5	Lundavra 5	Roadside	209699	772912	NO_2	no	10.0	1.6	No	2.5
NV1	Inverlochy 1	Roadside	211258	774547	NO_2	no	4.0	1.6	No	2.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
NV2	Inverlochy 2	Roadside	211263	774514	NO_2	no	24.0	1.6	No	2.5
NV3	Inverlochy 3	Roadside	211268	774487	NO_2	no	2.0	1.6	No	2.5
NV4	Inverlochy 4	Roadside	211278	774459	NO_2	no	2.0	1.4	No	2.5
NV5	Inverlochy 5	Urban Background	211230	774434	NO_2	No	1.0	53.0	No	2.5

Table D. 3 – Annual Mean NO_2 Monitoring Results ($\mu g/m^3$) for Primary School Sites

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)(1)	Valid Data Capture 2023 (%)(2)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
						2019	2020	2021	2022	2023
CH1	270528	844675	Roadside	100	25.0					4.5
CH2	270571	844488	Suburban	100	25.0					4.2
CH3	270505	844500	Roadside	100	25.0					4.6
CH4	270411	844575	Kerbside	100	25.0					5.7
CH5	270449	844634	Roadside	100	25.0					6.5
MT1	264947	845773	Urban Background	66.7	17.3					-
MT2	265041	845742	Kerbside	100	25.0					11.7
MT3	265055	845762	Kerbside	33.3	9.6					-
MT4	265081	845791	Kerbside	100	25.0					12.1
MT5	265112	845821	Kerbside	100	25.0					12.1
MK1	265902	845870	Roadside	100	25.0					8.8
MK2	265866	845820	Roadside	66.7	17.3					-
MK3	265809	845830	Roadside	100	25.0					8.7
MK4	265778	845846	Roadside	66.7	17.3					-
MK5	265751	845860	Roadside	100	25.0					9.2
HL1	267507	843764	Roadside	100	25.0					6.6

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)[1]	Valid Data Capture 2023 (%)[2]	NO_2 Annual Mean Concentration (µg/m^3)				
						2019	2020	2021	2022	2023
HL2	267476	843699	Roadside	66.7	17.3					-
HL3	267497	843671	Roadside	100	25.0					6.5
HL4	267567	843591	Roadside	100	25.0					7.2
HL5	267650	843680	Kerbside	100	25.0					7.8
BSG1	266992	842211	Kerbside	100	25.0					11.8
BSG2	266940	842180	Roadside	100	25.0					7.7
BSG3	266916	842219	Urban Background	100	25.0					6.6
BSG4	266904	842229	Urban Background	100	25.0					6.2
BSG5	266865	842238	Urban Background	100	25.0					6.1
CE1	266170	845092	Roadside	100	25.0					7.5
CE2	266184	845067	Roadside	100	25.0					8.4
CE3	266308	845088	Roadside	100	25.0					13.0
CE4	266286	845116	Roadside	100	25.0					13.5
CE5	266263	845144	Roadside	100	25.0					13.7
RB1	288039	856423	Roadside	100	25.0					13.0
RB2	288120	856441	Roadside	100	25.0					13.7
RB3	288223	856334	Roadside	100	25.0					7.4
RB4	288230	856333	Kerbside	100	25.0					7.6
RB5	288203	856326	Roadside	100	25.0					6.8
MB1	288308	856218	Roadside	100	25.0					5.4
MB2	288285	856196	Roadside	100	25.0					5.5
MB3	288260	856177	Roadside	100	25.0					5.7
MB4	288210	856169	Roadside	100	25.0					7.4
MB5	288439	856171	Urban Background	100	25.0					4.6
LV1	209624	772863	Urban Background	100	23.6					6.2
LV2	209720	772965	Roadside	100	23.6					7.1
LV3	209700	772882	Roadside	100	23.6					6.3
LV4	209682	772856	Roadside	100	23.6					6.0

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)(1)	Valid Data Capture 2023 (%)(2)	NO_2 Annual Mean Concentration (µg/m^3)				
						2019	2020	2021	2022	2023
LV5	209699	772912	Roadside	100	23.6					6.6
NV1	211258	774547	Roadside	100	23.6					11.3
NV2	211263	774514	Roadside	100	23.6					11.3
NV3	211268	774487	Roadside	100	23.6					10.8
NV4	211278	774459	Roadside	100	23.6					11.4
NV5	211230	774434	Urban Background	100	19.8					-

Notes:

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG(22) 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 D. 4 – NO_2 2023 Monthly Diffusion Tube Results (µg/m^3) for Primary School Sites

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean Raw Data (µg/m^3)	Bias Adjusted (0.81) and Annualised Mean (µg/m^3)
CH1	270528	844675									3.7	4.6	10.2		6.5	4.5
CH2	270571	844488									3.6	4.4	9.3		6.0	4.2
CH3	270505	844500									4.0	4.7	10.3		6.6	4.6
CH4	270411	844575									5.5	5.6	12.6		8.2	5.7
CH5	270449	844634									9.0	6.1	12.3		9.4	6.5
MT1	264947	845773									5.4		12.5		-	-
MT2	265041	845742									15.3	16.1	19.1		17.0	11.7
MT3	265055	845762											19.1		-	-
MT4	265081	845791									15.7	17.2	19.3		17.5	12.1
MT5	265112	845821									16.3	17.3	18.8		17.6	12.1
MK1	265902	845870									8.9	11.2	17.2		12.8	8.8
MK2	265866	845820									8.2		17.0		-	-
MK3	265809	845830									8.9	12.3	15.8		12.6	8.7
MK4	265778	845846									9.2		19.2		-	-
MK5	265751	845860									9.2	12.3	17.4		13.3	9.2
HL1	267507	843764									5.0	7.8	14.7		9.6	6.6
HL2	267476	843699										7.5	15.1		-	-
HL3	267497	843671									5.0	7.2	14.8		9.4	6.5
HL4	267567	843591									5.4	8.4	16.2		10.5	7.2
HL5	267650	843680									6.4	9.4	16.7		11.3	7.8
BSG1	266992	842211									13.1	15.1	22.0		17.1	11.8
BSG2	266940	842180									6.9	10.4	15.3		11.2	7.7
BSG3	266916	842219									5.1	8.1	14.5		9.6	6.6
BSG4	266904	842229									4.9	7.2	13.9		9.0	6.2
BSG5	266865	842238									4.4	6.9	13.9		8.8	6.1
CE1	266170	845092									6.3	10.6	14.8		10.9	7.5

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean Raw Data (µg/m^3)	Bias Adjusted (0.81) and Annualised Mean (µg/m^3)
CE2	266184	845067									7.8	13.0	15.1		12.2	8.4
CE3	266308	845088									14.7	18.9	22.2		18.9	13.0
CE4	266286	845116									15.0	21.6	21.8		19.6	13.5
CE5	266263	845144									16.4	18.9	23.6		19.9	13.7
RB1	288039	856423									15.1	16.9	23.6		18.9	13.0
RB2	288120	856441									14.0	22.7	22.4		19.9	13.7
RB3	288223	856334									5.6	9.1	16.2		10.7	7.4
RB4	288230	856333									6.8	9.7	15.4		11.0	7.6
RB5	288203	856326									7.0	7.9	13.5		9.8	6.8
MB1	288308	856218									5.2	6.7	10.7		7.8	5.4
MB2	288285	856196									5.1	6.6	11.6		8.0	5.5
MB3	288260	856177									5.2	6.7	12.2		8.3	5.7
MB4	288210	856169									6.7	8.5	16.0		10.8	7.4
MB5	288439	856171									4.7	5.7	9.0		6.7	4.6
LV1	209624	772863									3.4	5.5	13.3		7.7	6.2
LV2	209720	772965									5.2	6.9	13.6		8.8	7.1
LV3	209700	772882									4.8	6.2	12.0		7.8	6.3
LV4	209682	772856									3.9	5.9	11.8		7.5	6.0
LV5	209699	772912									4.1	6.1	13.7		8.2	6.6
NV1	211258	774547									8.5	11.4	20.9		14.0	11.3
NV2	211263	774514									10.1	10.9	20.2		14.0	11.3
NV3	211268	774487									8.1	10.6	20.2		13.3	10.8
NV4	211278	774459									9.4	10.8	21.1		14.0	11.4
NV5	211230	774434									6.3	8.3	17.8		-	-

Figure 13 non-automatic monitoring locations Cradlehall Primary School, Inverness

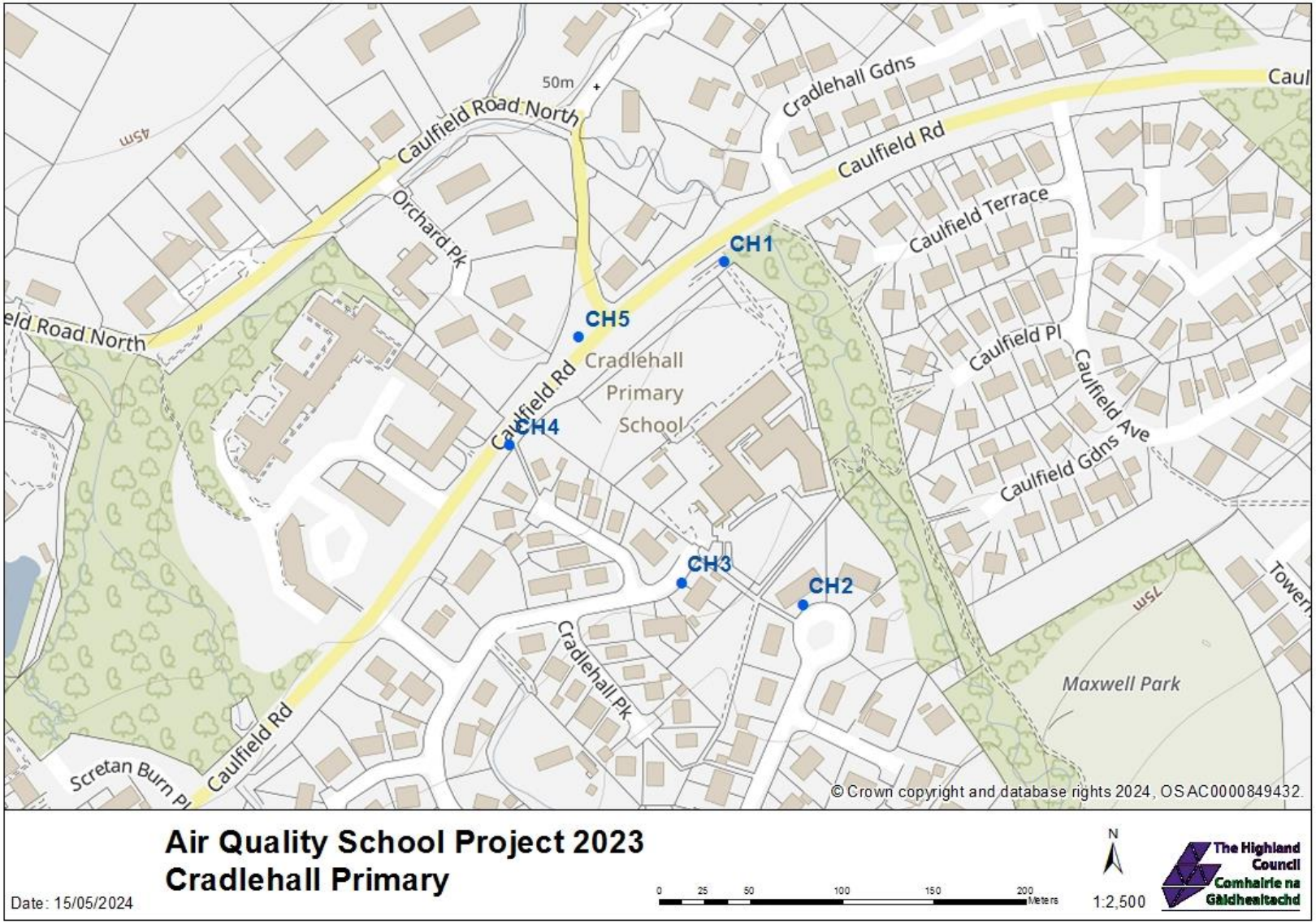


Figure 14 non-automatic monitoring locations Muirtown Primary School, Inverness

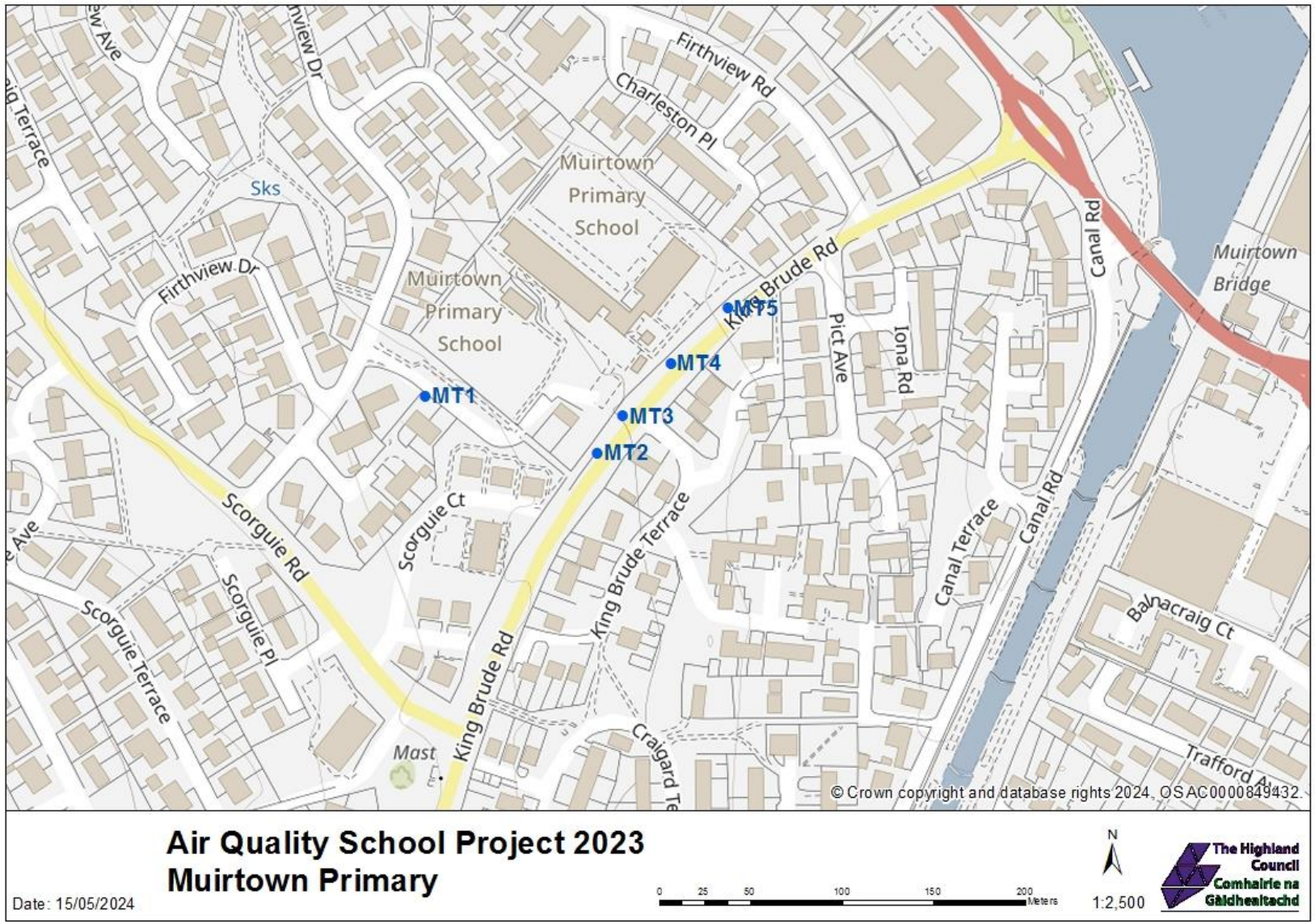


Figure 15 non-automatic monitoring locations Merkinch Primary School, Inverness

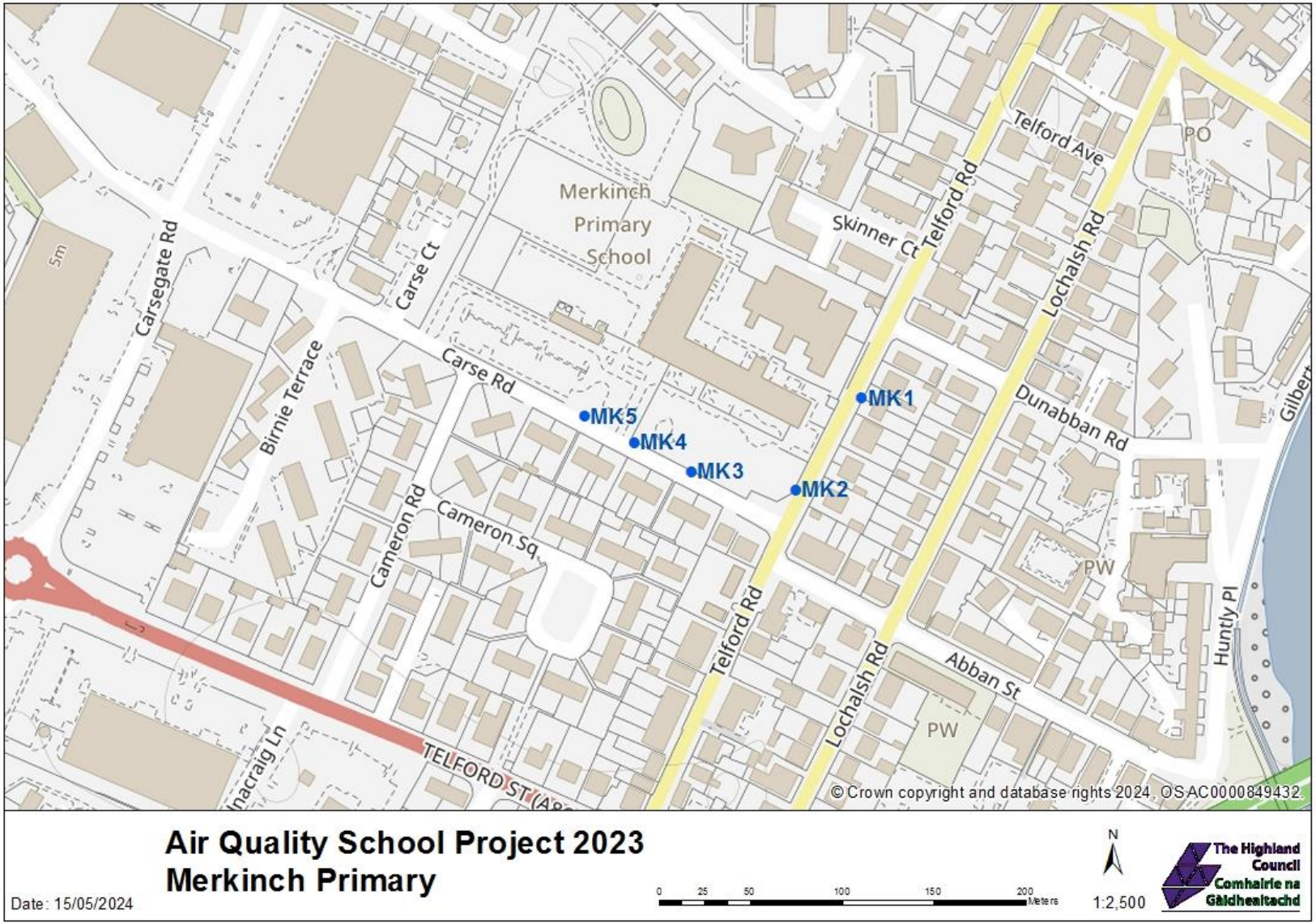


Figure 16 non-automatic monitoring locations Hilton Primary School, Inverness

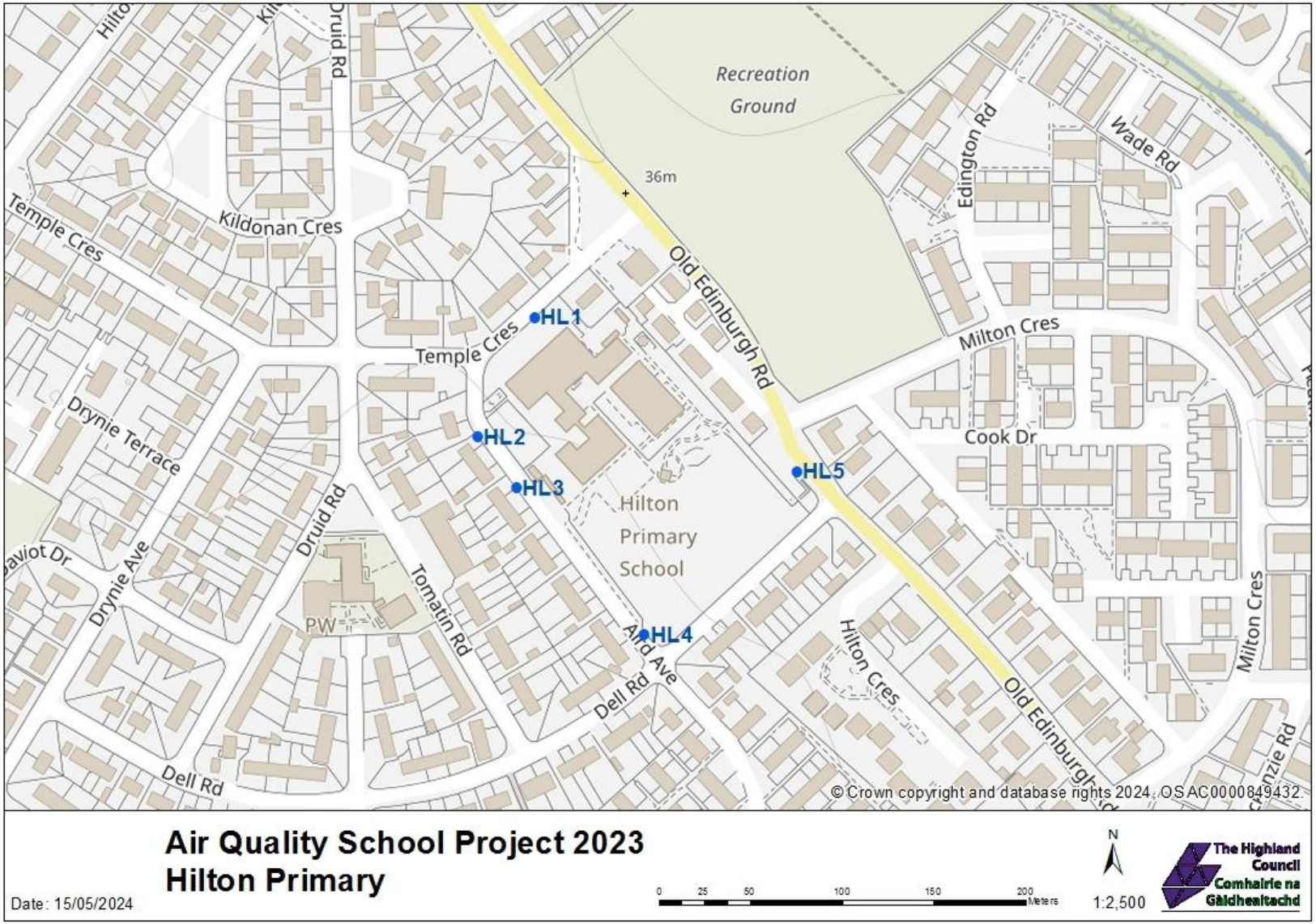


Figure 17 non-automatic monitoring locations Bun-Sgoil Ghàidhlig Inbhir Nis

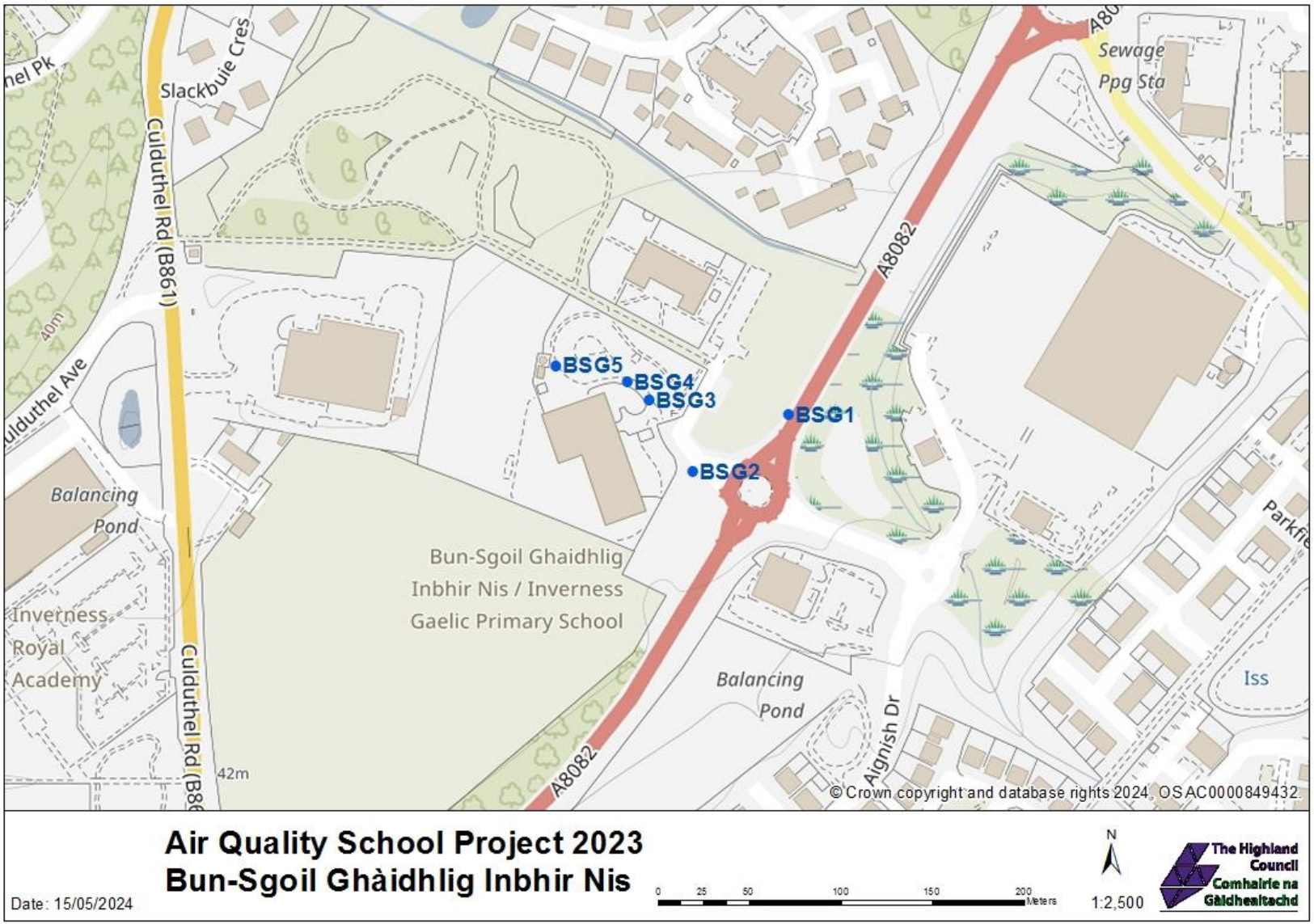


Figure 18 non-automatic monitoring locations Central Primary School, Inverness

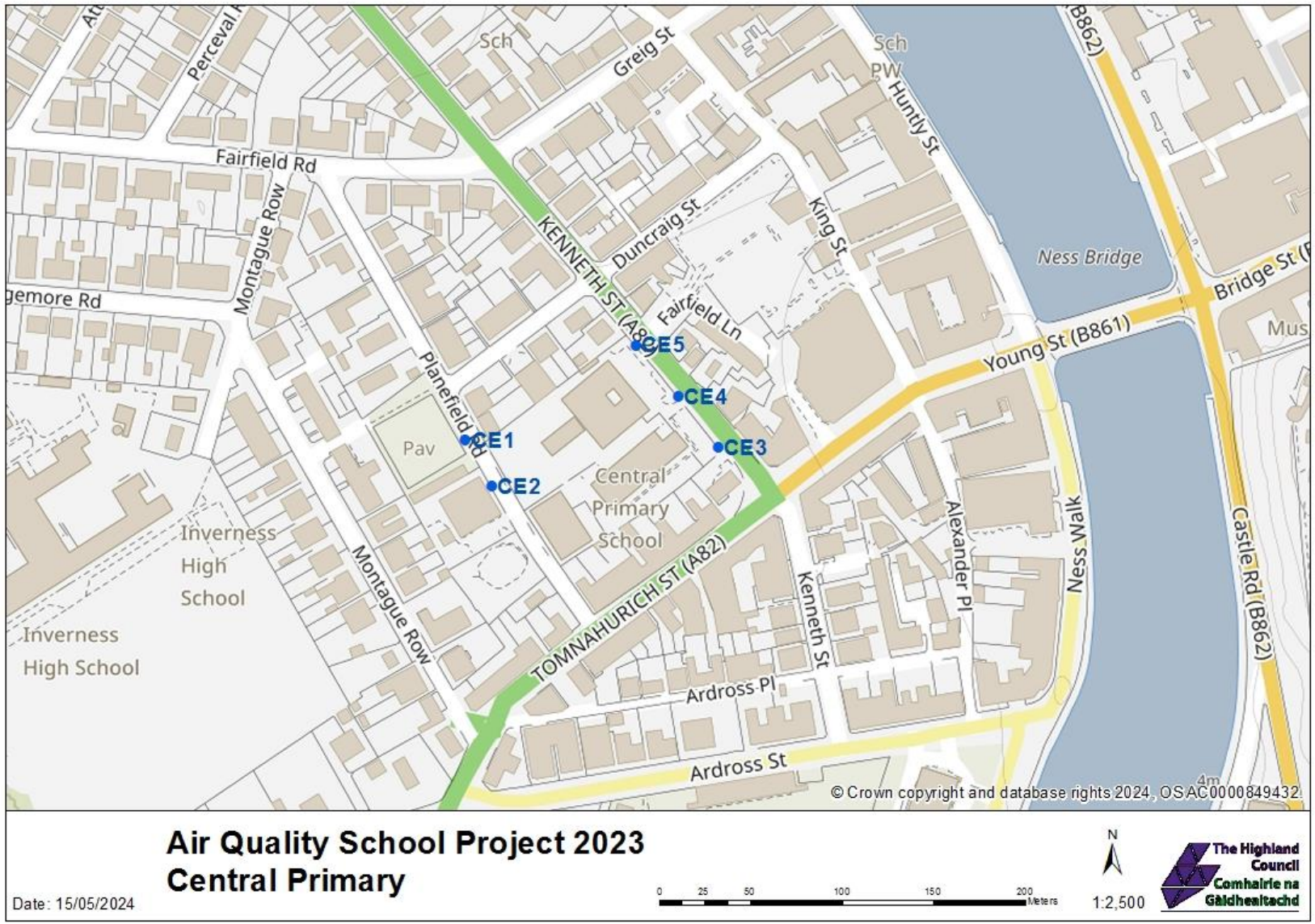


Figure 19 non-automatic monitoring locations Rosebamk and Millbank Primary Schools, Nairn

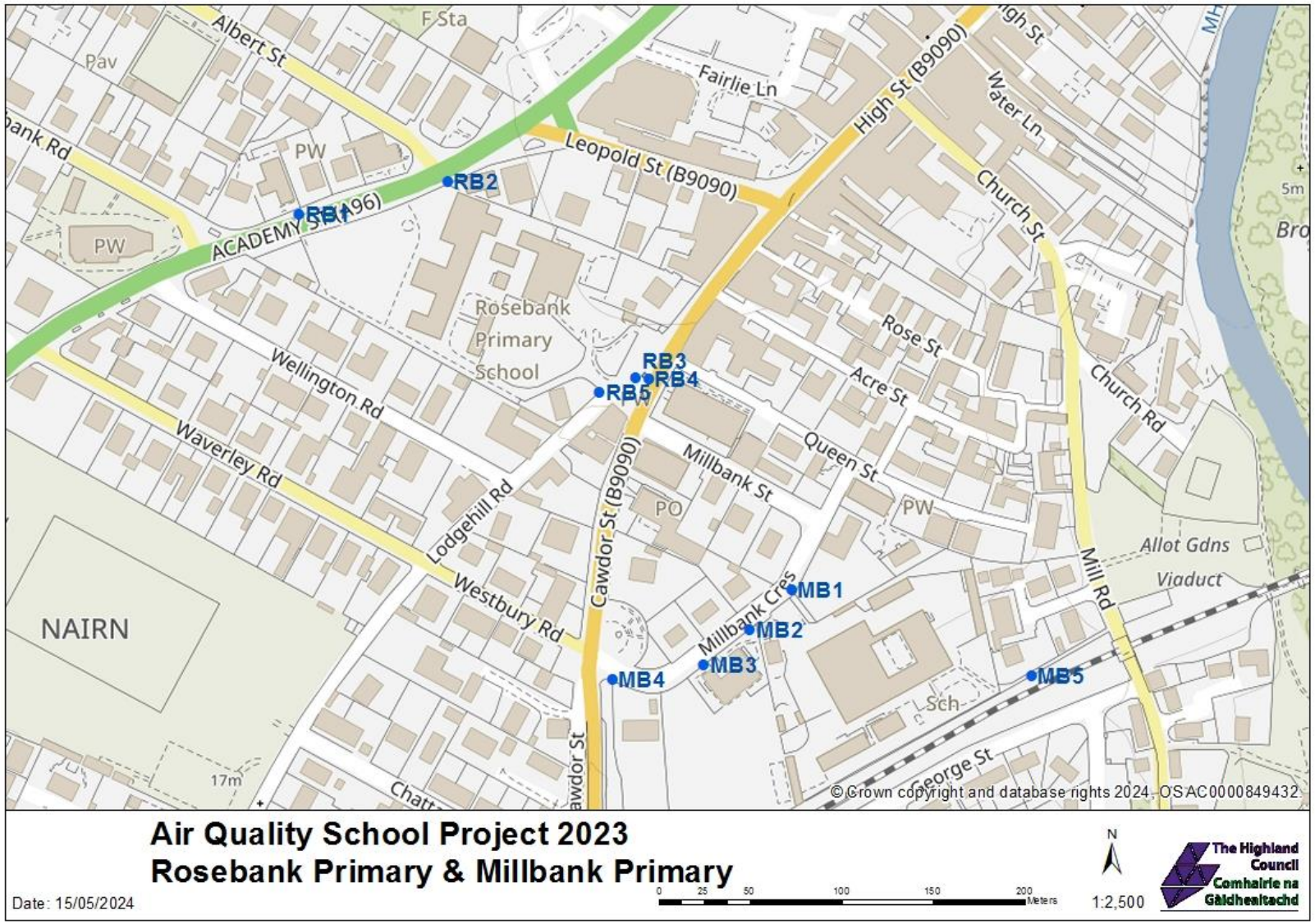


Figure 20 non-automatic monitoring Inverlochy Primary School, Fort William

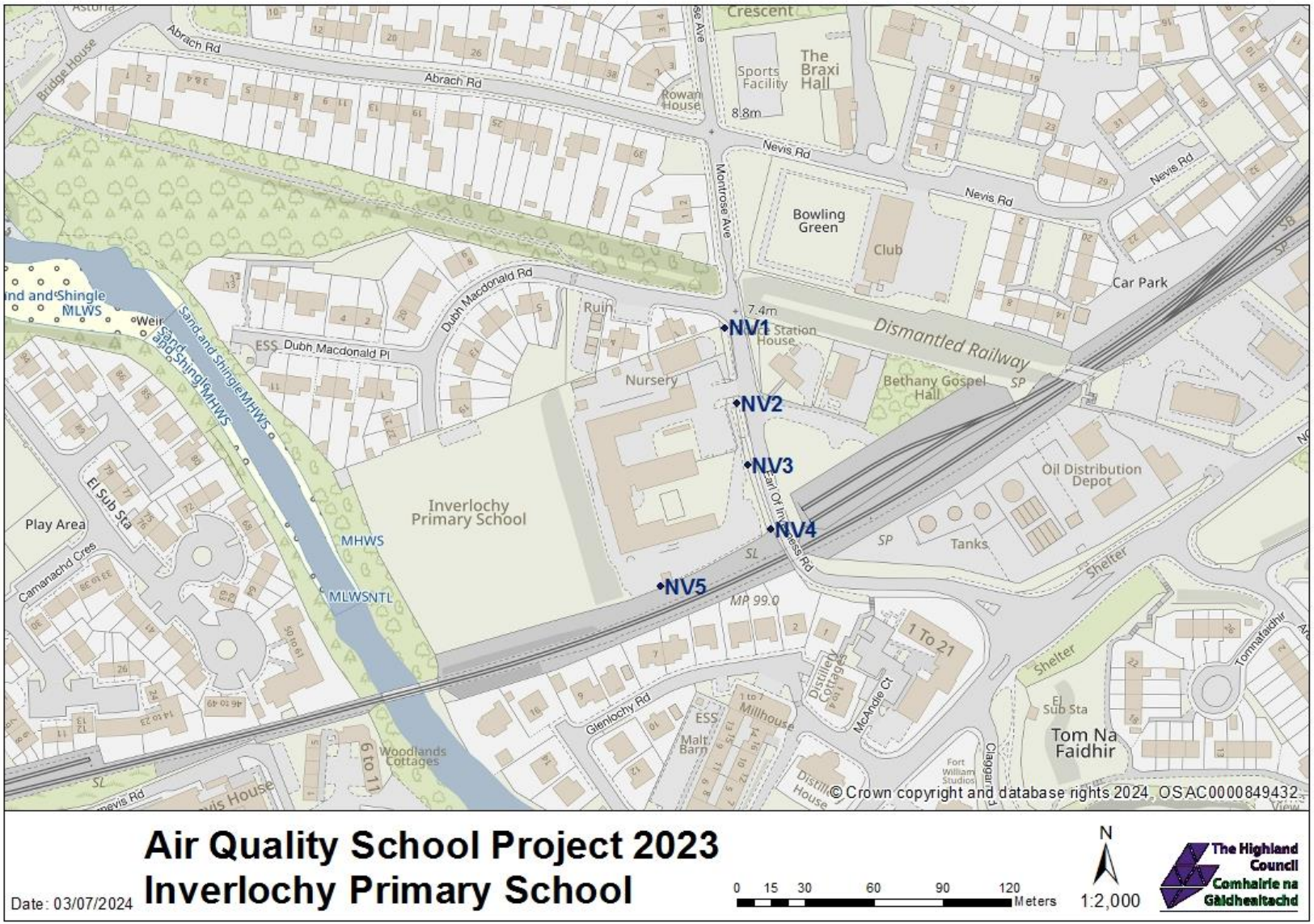
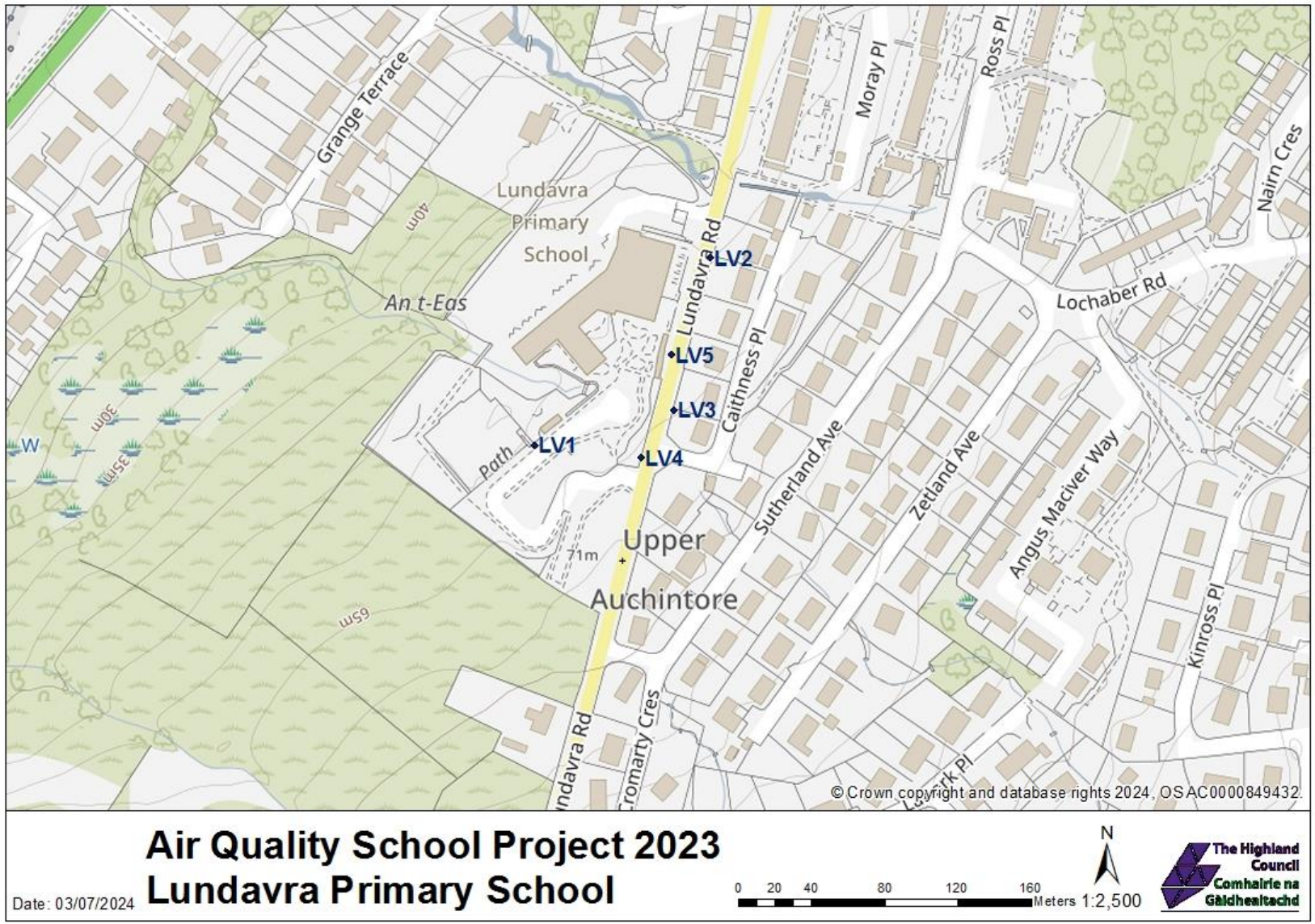


Figure 21 non-automatic monitoring locations Lundavra Primary School, Fort William



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
DT	Diffusion Tube
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

1. **The Air Quality (Scotland) Regulations 2000**
2. **The Air Quality (Scotland) (Amendment) Regulations 2002**
3. **The Air Quality (Scotland) (Amendment) Regulations 2016**
4. DEFRA in partnership with the devolved administrations, **Local Air Quality Management Policy Guidance LAQM.(TG22)** 2022
5. The Scottish Government, **Cleaner Air For Scotland 2 (CAFS2): Towards a better place for Everyone**, July 2021
6. The Highland Council, **Air Quality in The Highlands – First Stage Review and Assessment** 1998.
7. The Highland Council, **Addendum to Air Quality in the Highlands**, 2001.
8. The Highland Council, **Updating and Screening Assessment**, 2003
9. The Highland Council, **Progress Report**, 2005
10. The Highland Council, **Detailed Assessment Report**, 2005
11. The Highland Council, **Updating and Screening Assessment**, 2006.
12. The Highland Council, **Progress Report** 2007.
13. The Highland Council, **Progress Report** 2008.
14. The Highland Council, **Updating and screening Assessment**, 2009
15. The Highland Council, **Progress Report** 2010.
16. The Highland Council, **Progress Report** 2011
17. The Highland Council, **Updating and screening Assessment**, 2012
18. The Higlhand Council, **Progress Report** 2013
19. The Highland Council, **Progress Report** 2014

20. The Highland Council, **Updating and Screening Assessment**, 2015

21. Air Quality Consultants on behalf of The Highland Council, **Detailed Assessment of Air Quality in Inverness** May 2014

22. The Highland Council, **Annual Progress Report** 2016

23. The Highland Council, **Action Plan for Inverness City Centre AQMA (Draft)** 2016

24. The Highland Council, **Annual Progress Report** 2017

25. The Highland Council, **Annual Progress Report** 2018

26. The Highland Council, **Annual Progress Report** 2019

27. The Highland Council, **Annual Progress Report** 2020

28. The Highland Council, **Annual Progress Report** 2021

29. The Highland Council, **Annual Progress Report** 2022

30. The Highland Council, **Annual Progress Report** 2023

31. NETCEN, **Air Quality Monitoring: Highland**, 2005

32. The Highland Council, **Inner Moray Firth Local Development Plan 2**, 2024

33. **Environment Act 1995**

34. **Clean Air Act 1993**

35. **Environment Act 2021**

36. http://www.scottishairquality.scot/data

37. http://www.scottishairquality.scot/laqm

38. DEFRA, **Diffusion Tube Data Processing Tool v4.0**, March 2024.

39. AEA Energy and Environment on behalf of the Scottish Government, **Measurement and Modelling of Fine Particulate Emissions (PM10 and PM2.5) from Wood Burning Biomass Boilers**, 2008

40. Ricardo on behalf of The Environment Agency, **AURN QAQC Annual Technical Report 2022**, July 2023.

41. Gradko (International) Ltd, **Passive Diffusion Tube Monitors – Instruction manual for Exposure and Location**.

42. AEA Energy and Environment, **Technical Guidance – Screening Assessment for Biomass Boilers**, 2008

43. Air Quality Consultants, **Nitrogen dioxide Concentrations and Distance from Roads**, 2008

44. http://www.uwe.ac.uk/aqm/review/

45. AEA Energy and Environment for DEFRA and the devolved administrations, **Diffusion Tubes for Ambient NO_2 Monitoring – Practical Guidance for Laboratories and Users**, 2008

46. LGC for BV/NPL on behalf of DEFRA and the devolved administrations, **Summary of Laboratory Performance in AIR NO_2 Proficiency Testing Scheme** https://laqm.defra.gov.uk/wp-content/uploads/2022/07/LAQM-NO2-Performance-data_Up-to-June-2022_V2.1.pdf