Annual Progress Report (APR)

FALKIRK COUNCIL

2025 Air Quality Annual Progress Report (APR) for Falkirk Council

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

Local Air Quality Management

June 2025

Information	Falkirk Council Details
Local Authority Officer	John Millar
Department	Environmental Protection
Address	Falkirk Stadium, Suite 1b, 4 Stadium Way, Falkirk FK2 9EE
Telephone	07701005862
E-mail	JohnA.Millar@falkirk.gov.uk
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Executive Summary: Air Quality in Our Area

Air Quality in Falkirk Council

In 2024, the air quality within the Falkirk Council area continued to be good.

There were no National Air Quality Strategy (NAQS) objective exceedances recorded throughout Falkirk Council's air quality monitoring network in 2024.

Falkirk Council endeavours to help reduce emissions by completing agreed Air Quality Action Plan (AQAP) long-term key point measures, promotion of alternative / sustainable modes of transport and to educate / inform the public on relevant local air quality issues.

In 2024/25, Falkirk Council developed and published its first ever Air Quality Strategy 2025-2029, this Strategy (AQS) allows air quality objectives, aims and measures to be established and reported on in future Annual Progress Reports (APR). The AQS focuses on nine key areas where the Council can actively improve air quality and in doing so commits to the following aims:

1. Health: Educate and raise awareness of the health impact of air pollution and the benefits of reducing emissions.

2. Integrated Policy: Work collaboratively with partners to create effective policy and a comprehensive approach to air pollution control and other environmental issues.

3. Placemaking: Integrate good air quality practices into the planning decision making process.

4. Data: Continue to monitor air quality and provide high quality data.

5. Public Engagement and Behaviour Change: Encourage the local community and visitors to the area to contribute to improving air quality.

6. Industrial: Minimise emissions from industry and communicate with local residents on any concerns.

7. Non-Transport Emissions: Tackle emissions from domestic combustion consistent with Scottish Government (SG) guidance and funding.

8. Transport: Support sustainable transport modes such as walking, cycling, car sharing and public transport.

9. Governance: Provide long term commitment to deliver and fund air quality improvements within the area.

The overarching AQS vision is stated as follows:

“This is the first AQS for Falkirk Council to cover the period 2025-2029. We aim to make this detailed, robust and ambitious to ensure that the Falkirk Council area endeavours to regularly achieve the best air quality in Scotland. This will help protect the health and wellbeing of residents and visitors to the area into the future.”

In 2024, Falkirk Council revoked the Grangemouth Air Quality Management Area (AQMA) for SO_2 (15-min mean). Three detailed Grangemouth air quality reports were developed and published to support this revocation, these were: 2023 Proposal for the Revocation of the Grangemouth AQMA, 2024 Grangemouth AQMA Detailed Assessment and 2024 Grangemouth Emissions Study.

There were eleven SO_2 (15-min mean) NAQS objective exceedances recorded at three Grangemouth monitoring sites over the last eighteen years. No further NAQS objective exceedances have been recorded at any Grangemouth monitoring site since 2012. These results demonstrate that the SO_2 concentrations recorded in the past ten years (since 2012) have complied with the overall NAQS objective. Falkirk Council expects continued compliance in future years. This has been a result of the achievement of on-going work of the relevant, agreed Air Quality Action Plan (AQAP) measures and other associated improvements in industrial processes and utilisation of cleaner fuels / technologies.

In 2024, Falkirk Council (using SG provided Local Air Quality Management (LAQM) funding) installed two Palas Fidas 200 continuous reference method particulate matter ($PM_{10+2.5}$) analysers at the Grangemouth Moray and Bo’ness air quality stations respectively. These important equipment additions will provide reference method / consistent / high quality air quality monitoring data into the future. All nine of Falkirk Council’s air quality stations now have the capability to measure $PM_{10+2.5}$ pollutants going forwards.

Falkirk Council made significant progress in implementing relevant AQAP measures. To illustrate, there are now over one-hundred charging bays providing various charging capacities (7, 22, 50 and 150kW) with additional bays being planned to be installed in

various locations throughout the Falkirk Council area in 2025. More information can be found Falkirk Council Electric Vehicles webpage.

Part of a Council-wide Green Fleet initiative to achieve a zero emission fleet, the newly added electric vehicles (EV) in 2024 will replace ageing diesel counterparts currently used by various departments.

Falkirk Council Fleet has trialled hydrogenated vegetable oil (HVO) in seventeen heavy goods vehicles (HGV) since the start of 2022 – fourteen refuse collection vehicles and three Roads vehicles now run on HVO. The fuel is made from cooking and vegetable oils and performs in exceptionally cold environments. HVO is a low carbon, low emission, fossil-free and sustainable alternative to conventional fossil fuels. It is fully interchangeable with conventional diesel and can be mixed at any percentage. Using HVO instead of using traditional fossil fuels such as diesel saves a huge 90% on Falkirk Council's carbon footprint and supports Scotland's Net Zero targets.

The Council also promoted a variety of active and sustainable travel measures such Take the Right Route and Falkirk's Active Travel Strategy 2023-33 to help reduce overall local road traffic emissions. Full details of the progress Falkirk Council are making towards these measures are outlined in Section 2 ‘Actions to Improve Air Quality’.

Summary of Falkirk Council's Air Quality Monitoring Results

Nitrogen Dioxide (NO_2)

The 2024 air quality monitoring results (as displayed in Appendix A Table A.3' and Table A.5) show that all seven automatic nitrogen dioxide (NO_2) analysers in Falkirk Council's air quality monitoring network achieved both NO_2 NAQS (1hr and annual mean) objectives.

Particulate Matter (PM_{10})

Falkirk Council measured particulate matter (PM_{10}) concentrations at eight site locations during 2024 (as displayed in Appendix A Tables A.6 and A.7). The relevant Scottish NAQS objectives for PM_{10} (24-hr and annual mean) were achieved at all eight site locations. The PM_{10} analyser: Palas Fidas 200, 'Mean Corrections' were applied to the results and shown within the above tables. Further information on the adjusted PM data can be found in section QA/QC of Automatic Monitoring, PM_{10} and $PM_{2.5}$ Monitoring Adjustment (Palas Fidas 200 Analyser). Good overall data capture (>90%) (DC) was recorded at seven PM measured sites in 2024. One site: A9 Grangemouth Moray recorded a low DC rate of 20% as it was recently installed in October 2024. This is expected to increase in 2025 to a similar good DC rate as the other PM sites. There was one PM_{10} daily exceedance recorded at the Falkirk West Bridge Street site in 2024. The PM_{10} daily mean can be exceeded up to seven times before an overall NAQS objective exceedance is declared.

Particulate Matter ($PM_{2.5}$)

Falkirk Council measured particulate matter ($PM_{2.5}$) concentrations at eight site locations during 2024 (as displayed in Table A8). The relevant Scottish NAQS (annual mean) objective for $PM_{2.5}$ was achieved at all eight site locations. The $PM_{2.5}$ analyser: Palas Fidas 200, mean corrections were applied and shown within the above tables. Further information on adjusted PM data can be found in section: QA/QC of Automatic Monitoring, PM_{10} and $PM_{2.5}$ Monitoring Adjustment (Palas Fidas 200 Analyser).

Sulphur Dioxide (SO_2)

In 2024, Falkirk Council monitored SO_2 at six site locations. There were no overall exceedances of the SO_2 NAQS objectives (15-min, hourly or daily) recorded at any of the Falkirk Council monitoring locations during 2024 (as displayed in Table A9). There was however, an significant increase in the number of 15-min mean counts above 266µg/m^3, with the highest being recorded at the Grangemouth Municipal Chambers (33 count) and Grangemouth AURN (32) sites respectively. These increases are likely to be atrributed to nearby industrial flaring coupled with onshore winds at certain periods throughout the year.

Extensive operator maintenance was undertaken in the industrial area in 2024 which is likely to have caused an increase in flaring and subsequently SO_2 concentrations in the local area. In 2024, there were periods of Icelandic volcanic activity with specific weather conditions which is also a likely contributing natural source of SO_2.

Benzene and 1,3-Butadiene

The benzene and 1, 3-butadiene diffusion tube monitoring completed by Falkirk Council in 2024 met the NAQS (annual running mean) objectives for each pollutant respectively.

Actions to Improve Air Quality

Falkirk Council made significant improvements to its air quality monitoring network during 2024.

Two New Continuous Particulate Matter ($PM_{10+2.5}$) Analysers Installed

Two new continuous reference method combined ($PM_{10+2.5}$) Palas Fidas 200 analysers were installed at the Bo'ness and Grangemouth Moray sites in October 2024. These installs enabled Falkirk Council to increase its particulate matter ($PM_{10+2.5}$) monitoring capability from seven to all nine of its fixed air quality monitoring sites.

Photo 1: New Continuous Particulate ($PM_{10+2.5}$) Analyser at Bo'ness Air Quality Site

Photo 2: New Continuous Particulate ($PM_{10+2.5}$) Analyser at Grangemouth Moray

New Air Conditioning Unit at Grangemouth Moray

A new air conditioning (A/C) system was installed at the Grangemouth Moray air quality station to replace the older unit that was unsuitable / insufficient for providing site heating and cooling throughout the year.

Photo 3: New A/C at Grangemouth Moray AQ Station

Photo 4: New A/C at Grangemouth Moray AQ Station

Grangemouth Zetland Park Skyview Weather System Upgrade

The Grangemouth Zetland Park Skyview weather monitoring system was upgraded in 2024 to allow mobile transmission of data via an internal 4G/5G enabled modem. This will allow continuous, stable and high-quality weather data to be polled from this site into the future.

Photo 5: Upgraded Skyview Systems Interface

Onsite Gas Regulator Upgrades – Dial-a-Flow Type

All of Falkirk Council's air quality site's onsite gas cylinders have had their regulators upgraded to "dial-a-type" versions in 2024. These regulators provide a stable flow of gas with increased safety features from the existing, older supply of regulators. These new regulators have been put on a 5-year replacement programme to ensure increased safety.

Photo 6: Dial-a-Flow Type Regulator

AQ Sites Residual Current Device (RCD) Power Unit Upgrades

All of Falkirk Council's air quality site RCD power distribution boards have been upgraded in 2024 and 2025. This ensures compliance with current electrical regulations and ensures stable and safe power distribution to our sites into the future.

Photo 7 Grangemouth AURN RCD Power Unit Upgrade Example

Environmental Health Electric Van

The Falkirk Council Environmental Health department own a fully electric van (Renault Kangoo ZE33), this van is used for all routine local air quality site work.

Local Priorities and Challenges

In 2025, Falkirk Council will be developing our engagement with local schools through promotion of air quality education resources such as the Learn About Air teaching package, promoting the Clean Air Day Scotland and working closer with the Falkirk Council Transport Planning and Climate Change departments on promoting alternative, sustainable local transport and clean energy solutions.

Low Emission Zones

Low Emission Zones (LEZ) are currently operated in four major Scottish cities: Glasgow, Edinburgh, Aberdeen and Dundee. There are no current plans for any form of LEZ in the Falkirk Council area. Falkirk Council has undertaken the 'Stage 1 Screening Exercise (clause 2.2.25)' assessment in the 2020 APR in accordance with the Scottish Government's National Low Emissions Framework to inform this process.

How to Get Involved

To obtain further information on air quality within the Falkirk Council area, please visit our Local Air Quality policy webpage.

There are nine automatic air quality monitoring sites across the Falkirk Council area. The air quality data from all the monitoring sites can be viewed on the Air Quality in Scotland website.

To learn more about the ECOStars Fleet Recognition Scheme and for details of how to join if you are a commercial fleet operator please visit Ecostars Fleet Sustainability Solutions website.

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1 Local Air Quality Management

This report provides an overview of air quality in Falkirk Council during 2024. 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 or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Progress Report (APR) summarises the work being undertaken by Falkirk 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 within the shortest possible time. Measures should be provided with milestones and a final date for completion. The AQAP 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.

The AQMA that is currently active is:

1. Falkirk Town Centre AQMA - Declared on 31st January 2013 for NO_2 (annual mean)

The Falkirk town centre (FTC) NO_2 (annual mean) AQMA remains justified as although there were no exceedances of the NAQS objective recorded in 2024, there have been consecutive diffusion tube exceedances (such as the NA27 Falkirk West Bridge Street location) in previous years which haven't been affected by Coronavirus (COVID-19) Scottish Government travel restrictions[Ref1].

It is anticipated that the FTC AQMA (NO_2 annual mean) will be revoked by Summer / Autumn 2025 if recent (automatic and non-automatic) monitoring results continue to comply with the relevant NAQS objective.

The AQMAs that have been revoked in recent years are:

1. Grangemouth AQMA - Declared on 1st November 2005 SO_2 (15-min mean). Revoked on 27th September 2024

There have been over ten years where the SO_2 (annual mean) results at all Grangemouth AQMA automatic monitoring locations (Grangemouth AURN, Moray, Municipal Chambers and Zetland Park) have complied with the SO_2 NAQS (15-min mean) objective of 266µg/m^3, not to be exceeded more than thirty-five times a year (at each monitoring site).

In 2021/22, Scottish Government LAQM funding was provided to undertake a critical assessment of the Grangemouth AQMA in accordance with relevant LAQM guidance following years of compliance with NAQS objective for SO_2. Falkirk Council then commissioned the 2020 Grangemouth Emissions Study completed in collaboration with consultants Sweco.

In 2023, Falkirk Council developed and published the Proposal for the Revocation of the Grangemouth AQMA. In addition to the Proposal Report, Falkirk Council collaborated with consultants Sweco to produce a comprehensive Grangemouth AQMA Detailed Assessment which was published in August 2024. These two documents formed the evidence required to progress the revocation of the Grangemouth AQMA. Falkirk Council undertook extensive public consultation in accordance with relevant LAQM guidance and finally revoked the AQMA on 27th September 2024.

2. Falkirk Town Centre AQMA - Declared on 25th January 2013 for PM_{10} (24-hr and annual mean), Revoked on 23rd March 2023

There had been over five-years where PM_{10} (24-hr and annual mean) results at both FTC AQMA automatic monitoring locations (Falkirk Hope Street and Falkirk West Bridge Street) have complied with the PM_{10} NAQS (Scottish annual mean) objective of 18µg/m^3. Road traffic was identified as the main source of this pollutant. Falkirk Council undertook extensive public consultation in accordance with LAQM guidance and revoked the AQMA on 23rd March 2023. Please see the relevant report for details: Proposal for the Revocation of the Falkirk Town Centre AQMA for Particulate Matter (PM_{10}).

3. Haggs - Declared on 18th March 2010 for NO_2 (annual mean), Revoked on 5th October 2021)

The Haggs AQMA was declared on the 18th March 2010 following NAQS objective exceedances for NO_2 (annual mean) with road traffic being identified as the main source of this pollutant. Since the AQMA was declared, measured concentrations (using automatic and non-automatic monitoring methods) of NO_2 have complied with the NAQS objective consistently since 2015. Falkirk Council undertook extensive public consultation in accordance with relevant LAQM guidance and revoked the AQMA on 5th October 2021. Please see the relevant report for details: Proposal for the Revocation of Haggs AQMA.

4. Banknock - Declared on 18th August 2011 for PM_{10} (24-hr and annual means), Revoked on 7th January 2021

The Banknock AQMA was declared on the 18th August 2011 following NAQS objective exceedances for PM_{10} (24-hr and annual mean) with local quarrying operations being identified as the main source of this pollutant. Since the AQMA was declared, measured concentrations (using automatic monitoring methods) of PM_{10} in this area have complied with the relevant NAQS objectives. Falkirk Council undertook extensive public consultation in accordance with LAQM guidance and revoked the AQMA on 7th January 2021. Please see the relevant report for details: Proposal for the Revocation of the Banknock AQMA.

Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=371 – see full list at https://uk-air.defra.gov.uk/aqma/list.

A summary of AQMAs declared by Falkirk 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 the Falkirk Council AQMAs webpage.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
Falkirk Town Centre	NO_2 annual mean	Falkirk	An area encompassing an area of Falkirk Town Centre	AQAP (Falkirk Town Centre and Haggs) 2015 2015 Falkirk and Haggs Air Quality 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 Falkirk 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. Falkirk Council has the following strategies, plans and policies currently in place which would help contribute to the principles of CAFS2:

Falkirk Local Development Plan 2

The Falkirk Local Development Plan 2 (LDP2) is the statutory document which guides future development in the Council area for the period 2020-2040. It was adopted on the 7th of August 2020. LDP2 contains a vision for the area, an overall strategy, and detailed policies and proposals indicating where development should, or should not take place. It provides criteria which the Council uses in assessing planning applications. Air quality is considered throughout this plan and specifically within the following sections:

'Place and Environment' 'PE01 Placemaking' section 2 (p.30):

"Development should not exacerbate existing air quality issues or introduce new sources of pollution which impact on local air quality without appropriate mitigation."

‘Place and Environment’ ‘PE20 Natural Environment’ section 4.21 (p.39):

“Trees and woodlands have many benefits, including timber production, placemaking, landscape enhancement, screening, shelter, biodiversity value, carbon fixing, air quality improvement, natural flood management, recreation, and opportunities to interact with nature. Hedgerows similarly have important benefits for landscape enhancement, screening, biodiversity, and air quality improvement. Protection of existing trees and woodland will be a priority, and the principles of the Scottish Governments Policy on ‘Control of Woodland Removal’ will be followed where woodland is affected. In addition, a number of Tree Preservation Orders (TPOs) are in force across the Council area, as shown on the Proposals Map. New development will be expected to contribute to woodland and green network objectives through management and new planting as appropriate.”

‘Place and Environment’ ‘PE26 Air Quality’ (p.42):

“Development should not exacerbate existing air quality issues or introduce new sources of pollution which impact on local air quality without appropriate mitigation. Impacts on air quality will be taken into account in assessing development proposals, particularly within Air Quality Management Areas (AQMA). An Air Quality Assessment may be required for developments that are within an AQMA or where the proposed development may cause or significantly contribute towards a breach of National Air Quality Standards. Development proposals that result in either a breach of National Air Quality Standards or a significant increase in concentrations within an existing AQMA will not be permitted unless there are overriding issues of national or local importance.”

‘Place and Environment’ ‘PE26 Air Quality’ Section 4.28 (p.42):

“Good air quality is an important element of sustainable place making which contributes towards health and well-being as set out in the Cleaner Air for Scotland Framework. Planning has an important part to play in improving air quality, which can be affected by new development, and air quality can be a material consideration in determining planning applications. In areas with significant potential for further industrial development such as Grangemouth proposals may require an air quality assessment even where no breach of air quality standards is anticipated. The Council has put in place a network of monitoring equipment to measure whether it is meeting National Air Quality Standards, and Air Quality Management Areas have been established at Banknock, Grangemouth, Falkirk Town Centre and Haggs related to breaches in various air quality objectives. The Scottish

Government has also committed to introducing Low Emission Zones (LEZ) to all AQMA areas by 2023."

'Infrastructures and Resources' 'IR05 Travel Hierarchy and Transport Assessment' Section 2 (p.53):

"Transport assessments will be required for development proposals where the impact of the development on the transport network is likely to result in an increase in the number of trips, such that there will be significant impact on the operation of the transport network, requiring mitigation. Assessments will focus on the hierarchy of travel and should include, where appropriate:

• Travel plans

• Safety audits of proposed mitigation measures; and

• Air quality impact assessments."

'Infrastructures and Resources' 'IR12 Energy Generation Development' Section 1 (p.55):

Energy infrastructure developments will be assessed in relation to the following factors:

• Impacts on communities, whether settlements or individual residential properties, including issues of noise, shadow flicker and air quality

Energy in Falkirk

Falkirk Council's energy consumption represents a significant part of both its carbon footprint and budget. Effective management of energy is therefore essential to controlling these costs and protecting the environment.

Energy efficiency measures are implemented to reduce the Council's energy use and cover:

- Street lighting
- Vehicle fuel consumption
- Electricity use in our buildings
- Energy use to heat our buildings.

To improve local air quality and increase our decarbonisation aims, a growing number of Electric Vehicle charging points will be installed throughout the Council area. We have

expanded our District Heating System, providing an efficient and clean source of energy to more of the Callendar Park buildings.

The Falkirk Council Active Travel Strategy was published in 2023. Air quality is an integral part of this Falkirk Council policy, specifically:

“Longer journeys combine walking, wheeling or cycling with reliable, affordable public transport. Roads are more attractive and welcoming communal spaces, and reduced congestion increases air quality and decreases journey times for bus routes and emergency services.”

“In the Falkirk District, we have two active Air Quality Management Areas (AQMAs) – Falkirk Centre, and Grangemouth. These are areas where we know that the national air quality targets are not currently being met. Across the region, but particularly in these areas, it is essential that we make it easy to travel actively, to reduce the number of cars on the road and improve air quality.”

Falkirk Council also has published the following policies, strategies and initiatives which will aim to improve local air quality:

Sustainable Procurement

Historic Environment Strategy

Contaminated Land Strategy

Falkirk Open Space Strategy

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.

Falkirk Council has many sustainable transport options available which aims to improve local air quality in town centre locations throughout the Falkirk Council area including:

Local Transport Strategy 2023

Take the Right Route

Green Travel Map

Low Emission Zones (LEZ) are operated in the four Scottish cities: Glasgow, Edinburgh, Aberdeen and Dundee. There are no current plans for any form of LEZ in the Falkirk Council area. Falkirk Council has undertaken the 'Stage 1 Screening Exercise (clause 2.2.25)' assessment in the 2020 APR in accordance with the Scottish Government's National Low Emissions Framework to inform this process. Although Falkirk Council have completed this assessment, we are always willing to explore initiatives with partner organisations to help reduce transport sourced emissions to help improve local air quality in town centres.

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. Falkirk Council has taken forward a number of measures within the AQAP during the current reporting year of 2024 in pursuit of improving local air quality and meeting the air quality NAQS objectives within the shortest possible time. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in the air quality action plan relating to each AQMA.

Key completed measures for this reporting year are:

- Measure 1: "Falkirk Council's 5-Year Air Quality Strategy Aims": In 2024/25 Falkirk Council developed and published its first Air Quality Strategy 2025-2029. This AQS will allow air quality objectives, aims and measures to be established and reported in future APRs. The strategy focuses on nine key areas where the council can improve air quality and in doing so commits us to the following: 1. Health: Educate and raise awareness of the health impact of air pollution and the benefits of reducing emissions. 2. Integrated Policy: Work collaboratively with partners to create effective policy and a comprehensive approach to air pollution control and other environmental issues. 3. Placemaking: Integrate good air quality practices into the planning decision making process. 4. Data: Continue to monitor air quality and provide high quality data. 5. Public Engagement and Behaviour Change: Encourage the local community and visitors to the area to contribute to improving air quality. 6. Industrial: Minimise emissions from industry and communicate with local residents on any concerns. 7. Non-Transport Emissions: Tackle emissions from domestic combustion consistent with Scottish Government guidance and funding. 8. Transport: Support sustainable transport modes such as walking, cycling, car sharing and public transport. 9. Governance: Provide long term commitment to deliver and fund air quality improvements within the area.
- Measure 2: "Grangemouth AQMA Revocation / Improving SO_2 Data Access and NAQS Objective Alerts". In 2024, Falkirk Council revoked the Grangemouth AQMA for SO_2 (15-min mean). Three detailed Grangemouth air quality reports were developed and published to support the revocation, these were: 2023 Proposal for the Revocation of the Grangemouth AQMA, 2024 Grangemouth AQMA Detailed

Assessment and 2024 Grangemouth Emissions Study. There were eleven SO_2 (15-min mean) NAQS objective exceedances recorded at three Grangemouth monitoring sites over the last eighteen years. No further NAQS objective exceedances have been recorded since 2012. These results demonstrate that the SO_2 (15-min mean) concentrations recorded in the past ten years (since 2012) have complied with the relevant NAQS objective. Falkirk Council expects continued compliance in future years. This has been a result of the on-going work of the relevant, agreed AQAP measures and other associated improvements in industrial processes and utilisation of cleaner fuels / technologies.

- Measure 3 "AQ Monitoring Network Review": In 2024, Falkirk Council (using Scottish Government provided LAQM funding) installed two Palas Fidas 200 continuous reference method particulate matter ($PM_{10+2.5}$) analysers at the Grangemouth Moray and Bo'ness air quality monitoring sites. These installs will provide reference method / consistent / high quality air quality monitoring data into the future. All nine of Falkirk Council's air quality stations will now measure $PM_{10+2.5}$ pollutants into the future.

Progress on the following measures has been slower than expected on the following measure:

- Measure 3 "AQ Monitoring Network Review": FTC AQMA revocation has been slower to revoke as Falkirk Council waited for full compliance of results against the NAQS objective (NO_2, annual mean) before progressing the revocation.

Falkirk Council expects the following measures to be completed over the course of the next reporting year (2025):

- Measure 3 "AQ Monitoring Network Review": It is anticipated that the FTC AQMA (NO_2, annual mean) will be revoked by summer / autumn 2025 if relevant (automatic and non-automatic) AQ monitoring results continue to comply with the relevant NAQS objective.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Expected/Actual Completion year	Organisations Involved	Measure Status	Funding Status	Key Milestones	Progress	Barriers to implementation
1	Falkirk Council's 5-Year Air Quality Strategy (AQS) Aims	All	Falkirk Council's AQS published in 2025 – ongoing objectives	Falkirk Council, SEPA, Scottish Government, many external organisations	Review achievement of aims at end of 5-year period in 2029	Scottish Government (SG) LAQM and AQRG funding ongoing to help achieve aims	Publication of AQS in 2025	Ongoing	Barriers can be overcome by working towards achieving the overall aims.
2	Grangemouth AQMA Revocation / Improving SO_2 Data Access and NAQS Objective Alerts	Public Information	Grangemouth AQMA Revocation Completed: 27/09/2024, Ongoing monthly SO_2 exceedance reports distributed to key partners and effective pollution monitoring	Falkirk Council, SEPA and relevant Grangemouth industrial operators	Grangemouth (SO_2, 15-min mean) AQMA revocation completed and monthly reports / monitoring ongoing	Fully funded (SG LAQM funding for Grangemouth AQMA Detailed Assessment report and continuing all AQ monitoring.	Grangemouth AQMA revocation completed: 27/09/2025.	Monthly SO_2 NAQS objective exceedance summary reports sent to stakeholders / interested parties with ongoing totals and likely industrial sources of exceedances.	None – monthly reporting to continue for the foreseeable future.
3	AQ Monitoring Network Review	Public information	Ongoing	Falkirk Council, Scottish Government and ESUs	Annual review of network completed as part of LAQM process. Improved AQ data accuracy, quality, consistency and capture.	Fully funded (SG LAQM Grant) for all AQ monitoring network equipment.	In 2024, Two Falkirk Council monitoring sites had $PM_{10+2.5}$ continuous reference method analysers installed, and the A/C was upgraded at the G Moray site.	All sites have had their power and gas regulator equipment upgraded in 2024 which has improved overall data accuracy and capture rates.	Future SG LAQM Grant funding could limit the expansion and improvement of network equipment.

4	Falkirk Council Sustainable / Active Travel Scheme: Take the Right Route	Promoting travel alternatives	Ongoing	Falkirk Council	Scheme uptake and participation statistics compiled by Sustainable Transport annually.	Scottish Government funded	TtRR continued success in 2024 with successful projects such as: Safer Street (Cycle / walking Infrastructure Improvements), Improved advertising / public awareness, workplace travel planning and development of a Falkirk Council Employee Travel Plan.	Improved public engagement statistics for 2024	If grant funding were reduced or not provided then the active travel scheme could not make sufficient progress to promote and provide travel alternatives.
5	Electric Vehicles (EV) / Charging Infrastructure	Promoting low emission transport	No end date identified – continuous service.	Falkirk Council and Scottish Government	Annual increase in EV charging bays / facilities within Falkirk Council area	SG funded Falkirk Council Car Club	In 2020, the Falkirk Stadium Vehicle Charging Hub was opened and became operational accepting electric vehicles to park and charge-up. The Falkirk Stadium Vehicle Charging hub is an integral part of Transport Scotland's Electric A9 project.	Falkirk Council's vehicle fleet was enhanced and expanded in 2024 Part of a Council-wide Green Fleet Initiative to achieve a zero-emission fleet, the newly added EVs in 2024 will replace ageing diesel counterparts.	Future external funding could limit the expansion and uptake of low emission transport.
6	Soft Measures to Improve Local AQ e.g. Council-led travel planning (larger employers, schools), journey sharing, changes to mileage, home and mobile working.	Promoting travel alternatives	Ongoing	Falkirk Council	Anticipated reduction in NO_X and PM emissions due to an increase in green travel alternatives	SG funded	Development of LA Travel Plans, Flexible Work Pattern Plans and Sustainable Transport Alternatives / solutions	Formation of the following FC plans completed: Flexible Working Policy Local Transport Strategy	If grant funding were reduced or not provided then the aforementioned plans could not make sufficient progress to promote and

								Take the Right Route Green Travel Map	provide travel alternatives.
7	Inclusion of Air Quality in the Falkirk Council Local Development Plan 2	Policy guidance and development control	Completed and ongoing	Falkirk Council	Inclusion of air quality policy statements in local development plan	LA funded	See specific AQ related statements within the current FC LDP in section PE01 Placemaking, PE20 Place and Environment, PE26 Air Quality and other sections	Inclusion of air quality policy statements in local development plan 2, addition of more air quality policies as they are developed in future.	LA funded however would require some annual LA funding to develop the FC LDP into the future.
8	Promotion of the ECO Stars Fleet Recognition Scheme	Vehicle fleet efficiency	Completed and ongoing	Falkirk Council, The Scottish Government and TRL	The latest Falkirk Eco Stars report shows that recruitment in Falkirk has 316 members and is steadily increasing each year.	Fully funded (SG AQAP Grant)	Improved ratings achieved for the increased number of engaged EcoStars operators across the FC area. Full details on Fleet and Taxi operators and their ratings can be found here.	Continued annual increase in signed up operators. Regular liaison is achieved between TRL and FC on Fleet and Taxi operator progress.	Future SG AQAP Grant funding could limit the expansion and improvement of its EcoStars Fleet and Taxi operators.
9	Member of the East of Scotland Vehicle Emissions Partnership (EoSVEP)	Promoting low emission transport	Ongoing	Falkirk Council, West Lothian Council / neighbouring LAs and SG	Member of the partnership to help reduce vehicle idling, to report local vehicle idling complaints and provision of educational resources for the public	SG funded	Anticipated reduction in NO_X and PM emissions in town centre areas through anti-idling enforcement. Provides the public with a service to report idling or smoky vehicles.	The EoSVEP continues to assist in promoting anti idling in the Falkirk Council area. Various idling complaints have been investigated by the partnership with road	If SG funding were reduced or not provided then the EoSVEP scheme could not make sufficient progress to promote anti-vehicle idling help reduce pollution

								signs installed in a variety of FC areas. Improvements of the associated 'Switch Off and Breathe' website have taken place along with local advertising to raise awareness.	

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.

Falkirk Council undertook automatic (continuous) monitoring at nine sites during 2024. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at the Air Quality in Scotland website.

Maps showing the location of the monitoring sites are provided in Appendix A, Figure 29 A) to H). Further details on how the monitors are calibrated and how the data has been adjusted for quality purposes (QA/QC) are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Falkirk Council undertook non-automatic (passive) monitoring of NO_2 at 61 sites during 2024. Table A.2 in Appendix A shows the details of the sites.

Falkirk Council also undertook non-automatic (passive) monitoring of 1, 3 butadiene at 3 sites during 2024. Table A.10 in Appendix A shows the details of the 1, 3 butadiene sites.

In addition, Falkirk Council also undertook non-automatic (passive) monitoring of benzene at 16 sites during 2024. Table A.11 in Appendix A shows the details of the benzene sites.

3.1.3 Other Monitoring Activities

Strathclyde University / Falkirk Council PhD Project: "Monitoring and modelling of human exposure to indoor air pollution from wood burning stoves."

This project was first established in 2019 when Falkirk Council Environmental Health were responding to many complaints in relation to smoke from domestic solid fuel appliances (SFA) use such as wood burning stoves. Falkirk Council wanted to gain further information on the impact to residents and felt there could be an opportunity for a project to be undertaken to understand this in more detail. The project commenced in 2021 after Scottish Government LAQM part funding was provided to Falkirk Council to enable a PhD project to commence with Strathclyde University under the guidance of Dr Iain Beverland (Senior Lecturer, Civil and Environmental Engineering) and Dr Tara Beattie (Programme lead MSc Environmental Engineering). Strathclyde University provided the remaining funding to enable the project to commence for its planned duration.

PhD student Imogen West began working on the project in October 2022 and has made very good progress. Falkirk Council has been working continuously with Imogen, Dr Beverland and Dr Beattie to assist and support the successful completion of this project. The largest part of the PhD project has focused on using portable and low-cost air pollution monitors to monitor the indoor concentrations of $PM_{2.5}$, Black Carbon and NO_2 in homes with wood burning stoves and control homes in the West of Scotland. Beginning in 2023, a pilot study was conducted in two homes with wood burning stoves, where pollutant concentrations were monitored in the living room and the kitchen of each home for 1 week. This was then expanded upon to include a third room in the home without a pollution source and monitored eight homes with wood burning stoves and three control homes in the winter. In the summer, three of the wood burning homes and the three control homes were also monitored.

Imogen presented a poster at the Annual Aerosol Science Conference in Teddington in November 2023 which included the results from the pilot study and the summer monitoring in two homes, and Imogen also presented the results of the larger winter and summer monitoring in an oral presentation at the International Society of Exposure Science Annual Meeting in Montreal, Canada in October 2024.

The PhD work has also included developing suitable calibration methods for the indoor environment for the low-cost sensors; and communicating the results of experiments to the

participants; and investigating the impact of refuelling methods on the particulate emissions from wood burning stoves. The project will also include modelling the indoor dispersal of $PM_{2.5}$ during wood burning using Computational Fluid Dynamics.

Figure 1 - Strathclyde University / Falkirk Council PhD Poster

Indoor concentrations of $PM_{2.5}$ and Black Carbon in households with wood burning stoves during summer and winter in the West of Scotland

I. West[1], J. Millar[2], T. K. Beattie[1] and I.J. Beverland[1]
[1]Department of Civil and Environmental Engineering, University of Strathclyde
[2]Growth, Planning & Climate Division, Falkirk Council
(imogen.west.2020@uni.strath.ac.uk)

University of Strathclyde Glasgow

Falkirk Council

Figure 1: Wood burning stove, at household 1, with the door open to light the fire.

1. Introduction

Exposure to particulate matter (PM) and black carbon are associated with numerous negative health effects (World Health Organization (WHO), 2021a). Much of the exposure to these aerosols occurs indoors, since people spend the majority of their time inside. Therefore, indoor sources including solid fuel combustion and cooking can be important exposure pathways.

2. Aim

To assess exposure to $PM_{2.5}$ and Black Carbon indoors in the living room and kitchen of two households with wood burning stoves during different occupant activities in different seasons.

3. Methods

- Monitoring Black Carbon using a micro-aethalometer and $PM_{2.5}$ using a PurpleAir in the living room and kitchen of two houses with wood burning stoves.
- For 1 week each in winter (February 2023) and summer (June/July 2023)
- The times of activities, including wood burning, cooking, vacuuming, and burning candles, were recorded by participants.
- The wood burning stoves were both Defra-exempt stoves meaning they were suitable for use in smoke control areas.

Figure 2: Equipment in the living room of Household 1. Left: micro-aethalometer inside a protective box with inlet tubing extending out. Right: PurpleAir attached to clamp stand to expose the sensor inlet.

4. Results

- Mean winter $PM_{2.5}$ concentrations were above the WHO 24-hour air quality guideline (AQG) [15 µg m^{-3}] in household 1 and above the WHO annual AQG [5 µg m^{-3}] (WHO, 2021b) in both houses (Table 1). There are no AQGs for black carbon.
- Mean hourly concentrations of $PM_{2.5}$ were significantly higher in the winter than in the summer in both houses in each room. Black carbon concentrations were significantly higher in the winter than in the summer in both rooms of household 1, and the living room of in household 2.
- Large peaks in $PM_{2.5}$ and black carbon concentrations in both rooms occurred each time the wood burning stove was lit or refuelled (Fig. 3). $PM_{2.5}$ concentrations also peaked in both rooms during cooking.
- Peak concentrations of $PM_{2.5}$ were higher in the summer in household 1 than in the winter (Fig. 3). This may have been caused by higher emissions from cooking in household 1 in the summer monitoring period than in the winter.
- High correlations between the hourly living room and kitchen concentrations of each pollutant were observed in household 1 (r = 0.78-0.91) but not in household 2 (r = 0.21-0.47).

Table 1. Hourly mean $PM_{2.5}$ and black carbon concentrations in each room of households 1 and 2 during each season & activity. Concentrations in µg m^{-3}.

Living Room		Household 1		Household 2	
		$PM_{2.5}$	Black Carbon	$PM_{2.5}$	Black Carbon
Winter	Overall	15.1	5.66	14.7	0.381
	Cooking	27.6	7.97	21.2	0.690
	Wood Burning	26.4	12.3	30.9	1.25
Summer	Overall	9.0	0.307	4.6	0.161
	Cooking	42.4	0.587	6.1	0.180
Kitchen		**Household 1**		**Household 2**	
		$PM_{2.5}$	Black Carbon	$PM_{2.5}$	Black Carbon
Winter	Overall	15.4	4.46	13.2	0.270
	Cooking	31.0	6.66	33.5	0.661
	Wood Burning	23.9	8.76	27.7	0.631
Summer	Overall	6.1	0.280	2.8	0.201
	Cooking	55.8	0.576	5.1	0.413

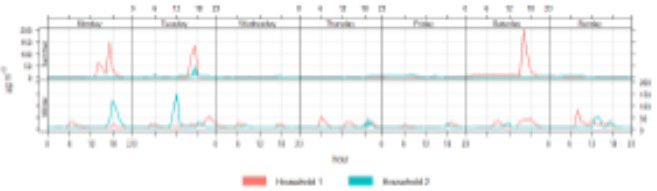

Figure 3: Winter and summer concentrations of $PM_{2.5}$ at the two households.

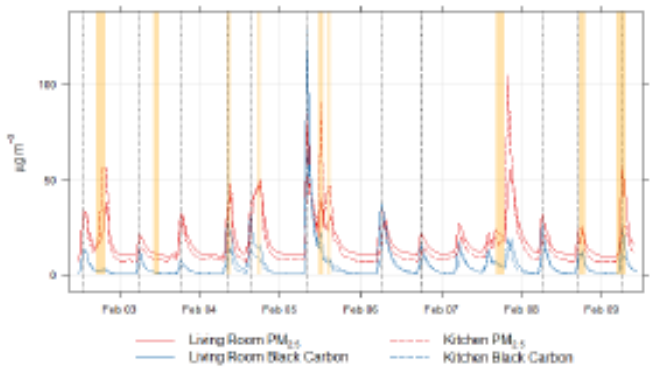

Figure 4: Time series of concentrations in household 1 during the winter monitoring period. Cooking times are highlighted by the orange shaded regions. The times the wood burning stove was used are indicated by the vertical dashed lines.

5. Conclusions

This study observed that cooking and wood burning are important sources of indoor $PM_{2.5}$ repeatedly released as short-term peaks in concentrations that can accumulate to daily average concentrations above the WHO AQG during winter. Wood burning is similarly an important source of exposure to indoor black carbon. There was marked variation in pollutant concentrations and pollutant transport between the homes

6. Future Work

- Study of additional households to examine the effects of different building types.
- Further research on how pollutants are transported around homes, including monitoring of additional rooms, and neighbouring households.

Acknowledgements

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References

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WHO (2021b). *WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide,* Geneva, World Health Organization

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 NAQS objective of 40µg/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 NAQS objective of 40µg/m^3 at non-automatic monitoring sites.

For diffusion tubes, the full 2024 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 NAQS objective of 200µg/m^3, not to be exceeded more than 18 times per year.

NO_2 Automatic Analyser Results

The 2024 monitoring results (as displayed in Appendix A, Tables A.3 and A.5) show that all seven automatic NO_2 analysers in the Falkirk Council's air monitoring network met both NO_2 NAQS objectives (1hr and annual mean). The highest NO_2 annual mean result in 2024 was recorded at the A7 Falkirk West Bridge Street site (24µg/m^3) - this result has decreased (by 4.5µg/m^3) from 2023's result (28.5µg/m^3). The lowest result was recorded at the A9 Grangemouth Moray (10µg/m^3) site showing a slight decrease from 2023's result (10.9µg/m^3). The Grangemouth AURN NO_2 annual mean result has decreased from 13.3µg/m^3 in 2023 to 11µg/m^3 in 2024.

Over a five-year period (from 2020 to 2024), six monitoring sites have recorded annual mean NO_2 concentration reductions. One site, A10 Grangemouth MC has shown a slight increase of 1µg/m^3 over this period. There have been minor fluctuations in results during this period but all remain within the NO_2 NAQS (1hr and annual mean) objectives.

Long term NO_2 trend graphs are shown in Appendix A, Figures 2 to 8. There is an overall downward trend in NO_2 (annual mean) concentrations at all monitoirng sites which is a positive trend.

Data capture (DC) rates were not as good as previous years due to various technical issues. Four sites achieved good data capture (>90%) – A4, A5, A10 and A15. The A8 Grangemouth

AURN site experienced a fault with the sample inlet system which was then consqeuently fixed however, this meant that a yearly quarter of data being removed due to uncerrtainly of data quality. A datalogger fault was noted at Falkirk West Bridge Street during 2024 which resulted in a lower DC rate (68%) than usual, this datalogger was replaced with no further issues. The A9 Grangemouth Moray site's NO_x analyser experienced a technical fault which resulted in a lower than expected DC rate. All of these technical faults were fully investigated and subsequently resolved.

Likely contributing factors to the reduction in NO_2 concentrations at the above sites include the Coronavirus (COVID-19) pandemic[Ref 1] in March 2020 to 2021 (resulting in less road traffic), traffic-light timing amendments (on Falkirk West Bridge Street) to minimise congestion and prevent excessive idling (within the FTC area), road upgrades (M80 at Haggs) and speed limit enforcement measures (30mph on the A803 and 20mph within the Airth area). Increased ownership of hybrid and EVs and the increased availability of charging locations may also have contributed to the overall NO_2 reduction.

Annual NO_2 Diffusion Tube Results

The 2024 annual NO_2 diffusion tube monitoring results (as displayed in Appendix A, Table A.4) shows that no (non-automatic) NO_2 tubes exceeded the NAQS (annual mean) objective limit of 40µg/m^3. All sixty-one sites in Falkirk Council's network met the objective.

The highest NO_2 annual mean diffusion tube concentration in 2024 was recorded at the NA27 Falkirk West Bridge Street roadside location (32.2µg/m^3).

The lowest NO_2 annual mean diffusion tube concentration in 2024 was recorded at the NA105 West of Shieldhill (4.4µg/m^3) rural location.

In addition, diffusion tubes are affected by several sources of interference which can cause substantial under or overestimation (often referred to as "bias") compared to the automatic NO_2 (chemiluminescence) reference analyser (as defined within the EU as the reference method)[Ref 2]. Due to this, NO_2 concentrations recorded using diffusion tubes are typically of lower accuracy than that recorded by the reference method using automatic (chemiluminescence) NO_2 analysers.

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 NAQS objective of 18 µg/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 NAQS objective of 50µg/m^3, not to be exceeded more than seven times per year.

Falkirk Council measured PM_{10} concentrations at eight locations during 2024. The relevant Scottish NAQS objectives for PM_{10} were met at all seven locations.

In accordance with the Scottish Government Guidance Note: Measurement of Ambient Particulate Matter (PM) and the LAQM Reporting of Measured Concentrations May 2023[Ref3]. Corrected and uncorrected results (greyed out) are displayed in Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3) and Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3) for PM concentrations with Palas Fidas 200 analysers in operation.

The sites with the highest recorded annual mean PM_{10} concentrations in 2024 (but within the Scottish NAQS PM_{10} objective) were: A7 Falkirk West Bridge Street (12.1µg/m^3) and A10 Grangemouth MC (11µg/m^3).

The site with the lowest PM_{10} (annual mean) concentration was A8 Grangemouith AURN (9µg/m^3).

Good overall data capture (>90%) was recorded at 7 sites in 2024. One site: A9 Grangemouth Moray recorded a lower concentration of 20% as a new PM analyser was installed in October 2024. Data capture is expected to be good at this site in 2025.

Over a five year period (from 2020 to 2024), two sites have recorded PM_{10} (annual mean) concentration reductions, these were: A4 Falkirk Haggs and A15 Main St, Bainsford. The A11 Grangemouth Zetland Park site has been in operation for four years and has recorded a slight increase in 2024 (9.9µg/m^3) from 2021's result (9.5µg/m^3).

There were one PM_{10} daily exceedances recorded in 2024 at A7 Falkirk West Bridge Street. It is likely this is road traffic related however it is wthin the relevant NAQS objective.

Over a five year period (from 2020 to 2024), all eight sites have generally recorded PM_{10} (24-hr mean >50µg/m^3) zero counts.

3.2.3 Particulate Matter ($PM_{2.5}$)

in Appendix A compares the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years with the NAQS objective of 10µg/m^3.

$PM_{2.5}$ is measured at eight locations within the Falkirk Council area, these are: A4 Haggs, A5 Falkirk Hope Street, A7 Falkirk West Bridge Street, A8 Grangemouth AURN, A9 Grangemouth Moray, A10 Grangemouth Municipal Chambers, A11 Grangemouth Zetland Park and A15 Main Street, Bainsford.

In accordance with the Scottish Government Guidance Note: Measurement of Ambient Particulate Matter (PM) and the LAQM Reporting of Measured Concentrations May 2023[Ref3]. Corrected and uncorrected results (greyed out) are displayed in Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3) and Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3) for PM concentrations with Palas Fidas 200 analysers in operation.

During 2024, there were no exceedances of the $PM_{2.5}$ Scottish NAQS (annual mean) objective limit (10µg/m^3) at any of the monitoring sites.

The site with the highest recorded $PM_{2.5}$ (annual mean) concentration of 9µg/m^3 in 2024 (but within the Scottish NAQS $PM_{2.5}$ annual mean objective) was A8 Grangemouth AURN.

The sites with the lowest $PM_{2.5}$ (annual mean) concentrations in 2024 were: A4 Falkirk Haggs, A5 Falkirk Hope Street, A11 Grangemouth Zetland Park, and A15 Main Street, Bainsford (5.3µg/m^3 at each).

Over a five-year period (from 2020 to 2024) three sites (A4 Falkirk Haggs, A7 Falkirk West Bridge Street, A11 Grangemouth Zetland Park and A15 Main Street, Bainsford) have recorded $PM_{2.5}$ (annual mean) concentration reductions.

The $PM_{2.5}$ concentrations at the Grangemouth AURN site have, in general, remained at the same level of approx. 7µg/m^3. 2023 saw a marginal concentration decrease to 5.1µg/m^3 however, in 2024 this has increased to 9µg/m^3 - these concentrations remain reasonably low and within the Scottish $PM_{2.5}$ NAQS (annual mean) objective. This reduction may be may be attributed to the commissioning of the Tail Gas Treatment (TGT) unit at the INEOS Grangemouth complex in 2013. Since the commissioning of the TGT unit, SO_2 concentrations have reduced within the Grangemouth AQMA. As sulphate species are known to contribute towards the formation of secondary $PM_{2.5}$, a reduction in SO_2 could also impact local $PM_{2.5}$ concentrations.

Long-term trend analysis (for available, ratified data) has been completed on four sites for $PM_{2.5}$ and can be shown in Appendix A, Figures 16 - 19. In general terms, there has been no significant change in $PM_{2.5}$ concentrations recorded at these monitoinrg sites since 2020.

Data captures rates are generally good (around 90% or greater) for all sites. A new $PM_{2.5}$ analyser was installed at site A9 Grangemouth Moray in October 2024 which resulted in a low DC rate of 20%, this is expected to return to good DC rate in 2025.

3.2.4 Sulphur Dioxide (SO_2)

In 2024, Falkirk Council monitored SO_2 at six locations.There were no overall exceedances of the SO_2 NAQS objectives (15-min, hourly or daily) recorded at any of the Falkirk Council monitoring sites during 2023. There was however, an increase in the number of 15-min mean counts above 266µg/m^3, with the highest being recorded at the A10 Grangemouth Municipal Chambers (33 count) and A8 Grangemouth AURN (32) sites respectively. These increases are likley to be atrributed to Icelandic volcanic activity experienced in May 2024. Further information on this can be found here. Nearby industrial flaring coupled with onshore winds at periods throughout the year can also contribute to these increased counts. Extensive maintenance was undertaken in 2024 within the industrial area which is likely to have caused an increase in flaring and subsequently SO_2 concentrations in the local area.

Long term SO_2 concentration trend graphs are displayed in Appendix A Figures 22 – 27.

Polar roses displaying average SO_2 concentrations (in a directional format) for the Grangemouth sites are shown in Appendix A Figure 28, A) to H).

A long term SO_2 site exceedance graph is displayed in Appendix A Figure 29.

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

Carbon Monoxide

No monitoring undertaken.

Lead

No monitoring undertaken.

1, 3-Butadiene

In 2024, Falkirk Council monitored 1, 3-butadiene at three locations using passive diffusion tubes. All the results recorded were within the NAQS objective and are shown in Appendix A Table A.10. No changes have occurred since the submission of the previous APR.

Benzene

In 2024, Falkirk Council monitored benzene at sixteen locations using passive diffusion tubes. In addition, at the A8 Grangemouth AURN site, a pumped diffusion tube operates as part of the AURN network. The results from the passive diffusion tubes are shown in Appendix A Table A.11 with the pumped diffusion tube results shown in Appendix A Table A.12.

All the benzene concentrations recorded by the passive diffusion tubes were within the NAQS objective. All benzene tubes achieved 100% data capture.

In 2024, the pumped diffusion tube at the A8 Grangemouth AURN site recorded an annual average concentration of 0.69µg/m^3.The concentration recorded continues to be within the relevant annual mean NAQS objective (of 3.25µg/m^3) and has experienced a decrease (of 0.1µg/m^3) compared to 2023's result (0.79µg/m^3).

The historical and current Grangemouth AURN benzene data / information can be found here: https://uk-air.defra.gov.uk/networks/site-info?site_id=GRAN#NAHC

4 New Local Developments

4.1 Road Traffic Sources

Narrow Congested Streets

There have been no significant changes from last year's APR. There are no new locations that are likely to be considered as congested residential streets that have not been assessed in previous APRs or are not already in AQMAs.

Busy Streets

Falkirk Council has not identified any streets where pedestrians may spend one hour or more in close proximity to road traffic.

For information: the Falkirk Council automatic air monitoring network recorded no exceedances of the NO_2 NAQS (1-hr mean) and the NO_2 non-automatic diffusion tube NAQS objectives in 2024.

Roads with a High Flow or Buses and / or HGVs

Since the closure of the FTC bus station in August 2018, additional buses are using Upper Newmarket Street. As this road has witnessed an increase in bus traffic, Falkirk Council have kept the additional NO_2 (diffusion tube) monitoring location on Glebe Street (NA118) and nearby Upper Newmarket Steet (NA50) active.

HGVs may have been reduced as the restrictions impacted on non-essential retail and non-essential activities that would be dependent on delivery vehicles within the Upper Newmarket Street area.

Junctions

There were no new road junctions constructed during 2024 within the Falkirk Council area.

New Roads Constructed or Proposed

There were no major roads with significantly changed traffic flows in 2024 within the Falkirk Council area.

Roads with Significantly Changed Traffic Flows

There were no roads with significantly changed traffic flows in 2024 within the Falkirk Council area.

Bus or Coach Stations

The FTC bus station was located adjacent to Meadow Street and closed in August 2018 after many years of operation. Bus routes have subsequently been diverted via the Upper Newmarket Street hub since the closure of the main town centre bus station. There are no new bus or coach stations constructed or planned for the foreseeable future within the Falkirk Council area.

4.2 Other Transport Sources

Airports

The nearest major airport to the Falkirk Council area is Edinburgh. The Airport's "Terminal and Transit Passengers" in 2024 were 15,780,353[Ref 4] - this is an increase of 10% from 2023 (14,396,794). This airport does not need considering further as it is greater than 1km from the Falkirk Council boundary.

Falkirk Council is not aware of any significant changes to Cumbernauld airport. This is a small airport situated near to the Falkirk Council boundary.

No other new airports are constructed or planned for the foreseeable future.

Stationary trains

Falkirk Council has not identified any new locations where locomotives or trains are stationary for more than 15 minutes that would not have been assessed in previous APRs.

Railways (diesel and steam trains)

Falkirk Council confirms that there are no new locations with a large number of movements of diesel trains, and potential long-term relevant exposure within 30m.

Ports for Shipping

Falkirk Council confirms that there are no ports or shipping that requires further consideration. The Grangemouth Port is the nearest major port within the Falkirk Council area and this has been operating for many years.

4.3 Industrial Sources

Hydrogen Production and Refuelling Facility at CalaChem, Grangemouth

In April 2024, Falkirk Council received an application for a new Hydrogen Production and Refuelling Facility at CalaChem, Grangemouth (FC Planning Ref: PRE_24_0034_PAA). The proposed development will establish a facility for the generation of green hydrogen utilising steam methane reforming technology for subsequent use as a transport fuel through an integrated compression and dispensing system. The dispensing system will be configured to permit the filling of cars, vans, HGVs and PSVs onsite as well as the filling of tube trailers and cylinders for transport offsite. The development also includes carbon dioxide compression, storage and dispensing facilities, a hydrogen innovation centre, site offices and a maintenance workshop which will contribute to the decarbonisation of the oil and gas sector. The steam methane reformers (SMRs) installed as part of the development will react biomethane from the local grid and water to generate their own steam and produce hydrogen gas and carbon dioxide gas. These gaseous products will be compressed and stored onsite in above-ground tanks for subsequent dispensing.

Air quality is considered within the provided WSG Energy Services Planning Statement 013737-DEV-000 Rev 1: 26/04/2024 "Proposed changes to construct a Hydrogen Production and Refuelling Facility at CalaChem, Grangemouth, Falkirk".

The air quality impacts of the development are considered to be minimal. Electrical power requirements for the hydrogen generation, compression and dispensing (GCD) equipment will be from mains without the use of onsite generators. The CO_2 by-product of the hydrogen generation process will be collected at the point of production through a capture and storage process for subsequent tanker collection, therefore negating atmospheric emission. The shrouded flare would not normally operate and would only be activated in the event of maintenance activities. It is anticipated that emissions from transport will not be significant, as the HRS facility will cater for hydrogen-fuelled (and therefore low emission) vehicles. Tractor units for the transportation of the tube trailers as well as for CO_2 collection are also likely to be hydrogen-fuelled, given that they can be refuelled at the facility.

4.4 Commercial and Domestic Sources

4.4.1 Biomass Combustion Plants

Falkirk Council did not receive any applications in 2024 for any proposed biomass combustion plants.

4.4.2 Biomass Combustion Plants – Combined Sources

Falkirk Council has not received any significant number of:

- Complaints about nuisance dust or odour relating to burning from combined domestic biomass appliances.
- Visual signs of chimney smoke being emitted from several properties in close proximity to each other.
- Significant odours of burning biomass fuel.
- Known high levels of sales of biomass or other fuels via home delivery or local outlets.
- Areas known to have limited or no access to mains gas.

4.4.3 Domestic Solid Fuel Burning

In 2024, Falkirk Council received a large volume of complaints in relation to smoke and odour from domestic biomass sources such as wood burning stoves, open garden bonfires and fire pits etc. These complaints were thoroughly investigated by Environmental Health and / or the Falkirk Council Housing department and advice was provided on smoke control area rules, Department for Environment Food and Rural Affairs (DEFRA) approval of stoves including using authorised fuels, guidance on efficient stove use and recommended regular maintenance / smoke minimisation measures. Relevant and current guidance is provided by Falkirk Council Environmental Health within the initial planning phase of new residential and commercial developments in relation to installing new combustion appliances such as wood burning stoves. This guidance includes adhering to local smoke control area rules, DEFRA approval of stoves, using authorised fuels and providing information on flue height and termination to allow effective smoke dispersal to minimise local smoke / odour nuisance.

A map of the smoke control areas in the Falkirk Council area is available to view via the following webpage: https://www.falkirk.gov.uk/environmental-policy/air-quality/smoke-control-areas

A Falkirk Council webpage has been developed to provide relevant guidance on solid fuel appliances (SFA) such as wood burning stoves to residents: https://www.falkirk.gov.uk/environmental-policy/solid-fuel-appliances

4.5 New Developments with Fugitive or Uncontrolled Sources

In 2024 there were no new developments with fugitive or uncontrolled sources in the Falkirk Council area.

5 Planning Applications

New McDonalds Drive-Through Restaurant, Kilsyth Road, Haggs

Falkirk Council received an application from McDonalds restaurants in October 2024 to develop a drive-through restaurant at Kilsyth Road, Haggs. An air quality impact assessment (AQIA) was requested by Falkirk Council as the area of Haggs had historically poor air quality and previously held an AQMA (NO_2, annual mean) for traffic-related airborne pollution as its in close proximity to an on/off slip road to the M80 motorway.

Increased road traffic from the planned development has been assessed within the Encon Associates AQIA (Ref: A6658) on Page 40 '7. Operational Impacts' with conclusions stated: "The impact of the development on local NO_2, PM_{10} and $PM_{2.5}$ are therefore deemed to be negligible." Within section '7.2 Exposure Assessment' states "Concentrations at the Site are therefore expected to be meeting the 1-hour NAQS objective limit for NO_2 µg/m³. The impact of the proposals in terms of new exposure are therefore considered to be negligible." Construction traffic (including fugitive dust) has been assessed in Section 4. Methodology, again the impacts have been stated as "negligible." Within Section 8. "Conclusion" states: "The assessment has concluded that pollution levels across the borough are well within the relevant NAQS limit values therefore impacts associated with exposure within the Site will be negligible." It is unlikely that air quality / dust issues should arise if the mitigation measures outlined in Appendix F 'Construction Mitigation Measures' are fully implemented with regards to the construction phase of the development.

All legislation, policies, standards, methods and guidance referenced within the report are current, applicable and correct therefore the Encon Associates AQIA for the proposed McDonalds restaurant at Kilsyth Road, Haggs was assessed as satisfactory.

Transport Assessment – Proposed Residential Development at 21 Polmont Road, Polmont

Falkirk Council received an application from Manor Forrest Ltd. In February 2024 seeking permission for a residential development (of 48 dwellings) on a site west of no.21 Polmont Road, Polmont. Falkirk Council Environmental Health requested a transport assessment for the full development to ascertain whether an AQIA was necessary in accordance with relevant Institute of Air Quality Management (IAQM) guidance. Andrew Carrie Traffic and Transportation Ltd. consultants were commissioned Manor Forrest Ltd. to undertake this traffic assessment (Ref: February 2024) in support of this development.

Within Appendix C "TRICS Trip Generation Data" on p.11 of the associated Transport Assessment suggests a daily two-way trip rate (in and out combined) of 4.6 on average, between 7am and 7pm. There will be a few more trips overnight, so it would be reasonable to take a 24-hour daily trip rate of 5 resulting in 240 trips for a development of 48 houses. The threshold for requesting an AQIA in accordance with the Institute of Air Quality Management (IAQM) guidance is >500 Annual Average Daily Trips (AADT). So therefore, no AQIA was required for this development and on this basis Falkirk Council Environmental Health stated that no significant local air quality concerns were associated with this application.

Proposed Residential Development on the land South of Kilsyth Road, Banknock

Falkirk Council Planning department received an application in January 2020 seeking permission for a large residential development on land south of Kilsyth Road, Banknock. An initial AQIA (ITP Energised, Ref: 2876, 16/01/2020) was completed in 2020 for this larger scheme which included the 2024 smaller-sized development. This AQIA concluded that the air quality impacts for the larger scheme (consisting of 105 new dwellings) would be of negligible significance in terms of IAQM non-statutory professional guidance. The 2020 AQIA assumed baseline air quality from 2018. Falkirk Council advised that an updated AQIA will be required as part of the application for planning permission for the 2024 application.

Increased road traffic from the 2024 planned development has been assessed on the Airshed AQIA (Ref: AS 1055 Banknock) Page 1 'Operational Impacts'. The conclusion stated "Although the proposed scheme is forecast to generate traffic above the threshold that would trigger the requirement for a quantitative assessment according to IAQM's non-statutory professional guidance, the scheme flows are lower than were assessed in 2020

and local air quality has improved significantly since 2018. The background levels of pollution are well below the statutory limit value for NO_2 and the Scottish Government NAQS objectives for PM_{10} and $PM_{2.5}$. The local and national trend in air quality is likely to continue to gradually improve as older, more polluting vehicles are removed from the roads. Air quality impacts from the scheme are therefore unlikely to adversely affect local air quality." It is unlikely that air quality / dust issues would arise if the mitigation measures outlined in Appendix 2 'Dust Control Measures During Construction' were fully implemented with regards to the construction phase of this development. All legislation, policies, standards, methods and guidance referenced within the report were written as current, applicable and correct. Therefore, the AQIA (Ref: AS 1055 Banknock) for the Kilsyth Road, Banknock proposed residential development was deemed satisfactory.

6 Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

In 2024, the air quality within the Falkirk Council area continued to be good from 2023.

There were no NAQS objective exceedances recorded throughout Falkirk Council's air quality monitoring network in 2024.

Nitrogen Dioxide (NO_2)

The 2024 air quality monitoring results show that all seven automatic nitrogen dioxide (NO_2) analysers in Falkirk Council's air monitoring network achieved both NO_2 NAQS (1-hr and annual mean) objectives.

Particulate Matter (PM_{10})

Falkirk Council measured particulate matter (PM_{10}) concentrations at eight site locations during 2024. The relevant Scottish NAQS objectives for PM_{10} were achieved at all eight site locations.

Particulate Matter ($PM_{2.5}$)

Falkirk Council measured particulate matter ($PM_{2.5}$) concentrations at eight site locations during 2024. The relevant Scottish NAQS objectives for $PM_{2.5}$ were achieved at all eight site locations.

Sulphur Dioxide (SO_2)

In 2024, Falkirk Council monitored SO_2 at six site locations. Four of the monitoring sites are located within the Grangemouth AQMA (declared for 15-min SO_2 NAQS objective) and two of the sites are located outwith this AQMA.

There were no exceedances of the SO_2 NAQS objectives (15-min, hourly or daily) recorded at any of the Falkirk Council monitoring site locations during 2024.

Benzene and 1,3-Butadiene

The benzene and 1, 3-butadiene diffusion tube monitoring completed by Falkirk Council in 2024 met the NAQS (annual running mean) objectives for each pollutant respectively.

The AQMA that is currently active is:

1. Falkirk Town Centre AQMA - Declared on 31st January 2013 for NO_2 (annual mean)

The FTC NO_2 (annual mean) AQMA remains justified as although there were no exceedances of the NAQS objective recorded in 2024, there have been consecutive diffusion tube exceedances (such as the NA27 Falkirk West Bridge Street location) in previous years which haven't been affected by Coronavirus (COVID-19) Scottish Government travel restrictions[Ref1].

It is anticipated that the FTC AQMA (NO_2 annual mean) will be revoked by Summer / Autumn 2025 if recent (automatic and non-automatic) AQ monitoring results continue to comply with the relevant NAQS objective.

6.2 Conclusions relating to New Local Developments

All new local developments that were deemed to be significant in terms of their impact on air quality have been summarised in the following previous sections within this APR: **4.3 Industrial Sources, 4.4 Commercial or Domestic Sources, 4.5 New Developments with Fugitive or Uncontrolled Sources and 5. Planning Applications.** All developments within these sections had AQIAs (or dust and odour reports) requested and assessed by Falkirk Council Environmental Health. All new local development AQIAs were assessed as satisfactory and no objections to these developments were submitted to the Planning department on the grounds of significant air quality concerns.

6.3 Proposed Actions

It is anticipated that the Falkirk town centre AQMA (NO_2 annual mean) will be revoked in the Summer / Autumn 2025 if relevant (automatic and non-automatic) AQ monitoring results continue to comply with the NAQS objective.

Falkirk Council will continue to have (automatic, reference method and non-automatic methods) air quality monitoring capabilities for many years to come. It is anticipated that annual Scottish Government LAQM funding will continue to be provided to ensure air quality monitoring continuity and improvements. This will provide a valuable resource for public health resources into the future.

The Air Quality Progress Report (APR) as required by the Scottish Government shall be submitted by Falkirk Council in June 2025.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
A3	Bo'ness	Urban Background / Industrial	299815	681481	SO_2, PM_{10}, $PM_{2.5}$	N	SO_2: API Teledyne T100, UV Fluorescence. $PM_{10+2.5}$: Palas Fidas 200 (Optical).	5	22	1.2
A4	Falkirk Haggs	Roadside	278977	679271	NO_2, PM_{10}, $PM_{2.5}$	Y (NO_2)	NO_2: API Teledyne T200, Chemiluminescence. $PM_{10+2.5}$: Palas Fidas 200 (Optical).	5	2	1.2
A5	Falkirk Hope Street	Roadside	288688	680218	SO_2, NO_2, PM_{10}, $PM_{2.5}$	Y (NO_2 and PM_{10})	SO_2: API Teledyne T100, UV Fluorescence. NO_2: API Teledyne T200,, Chemiluminescence. $PM_{10+2.5}$: Palas Fidas 200 (Optical).	1	5	1.5
A7	Falkirk West Bridge Street	Roadside	288457	680064	NO_2, PM_{10}, $PM_{2.5}$	Y (NO_2 and PM_{10})	NO_2: API Teledyne T200, Chemiluminescence. $PM_{10+2.5}$: Palas Fidas 200 (Optical).	1	2	1.2

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
A8	Grangemouth Automatic Urban and Rural Network (AURN)	Urban Background / Industrial	293830	681022	Benzene, SO_2, NO_2, PM_{10} and $PM_{2.5}$	Y (SO_2)	Benzene: Pumped absorption tube. SO_2: API Teledyne T100, UV Fluorescence. NO_2: API Teledyne T200, Chemiluminescence. PM_{10}: Met One 1020 Beta Attenuation Monitor (BAM). $PM_{2.5}$: Met One 1020 Beta Attenuation Monitor (BAM).	5	20	3.5
A9	Grangemouth Moray	Urban Background / Industrial	293469	681321	SO_2, NO_2, PM_{10}, $PM_{2.5}$	Y (SO_2)	SO_2: API Teledyne T100, UV Fluorescence. NO_2: API Teledyne T200, Chemiluminescence. $PM_{10+2.5}$: Palas Fidas 200 (Optical).	1	25	3.5
A10	Grangemouth Municipal Chambers	Urban Background / Industrial	292816	682009	SO_2, NO_2, PM_{10}, $PM_{2.5}$	Y (SO_2)	SO_2: API Teledyne T100, UV Fluorescence. NO_2: API Teledyne T200, Chemiluminescence. $PM_{10+2.5}$: Palas Fidas 200 (Optical).	1	40	3.5
A11	Grangemouth Zetland Park	Urban Background / Industrial	292969	681106	SO_2, PM_{10}, $PM_{2.5}$	Y (SO_2)	SO_2: API Teledyne T100, UV Fluorescence. $PM_{10+2.5}$: Palas Fidas 200 (Optical).	1	135	3.5
A15	Main St, Bainsford	Roadside	288566	681508	NO_2, PM_{10}, $PM_{2.5}$	N	NO_2: API Teledyne T200, Chemiluminescence. $PM_{10+2.5}$: Palas Fidas 200 (Optical).	1	2	1.2

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Tube Height (m)
NA3	Tinto Drive, Grangemouth	Urban Background	293427	680386	Benzene, NO_2	N	<5	2.6	N	3
NA5	Copper Top pub, Camelon	Roadside	287332	680333	NO_2	N	<2	0.6 (Traffic Island)	N	2.3
NA9	Bellsdyke Rd, Larbert	Roadside	286048	683542	NO_2	N	<2	0.7	N	2.5
NA19	Kilsyth Rd, Banknock	Roadside	278779	679301	NO_2	N	<2	2.2	N	1.9
NA20	Garngrew Rd, Haggs	Urban Background	278957	679172	NO_2	N	<5	1.5	N	2.5
NA21	Grangemouth Rd, Falkirk College	Roadside	290112	680500	Benzene, NO_2	N	<2	1.8	N	2.5
NA24	Kerse Lane, Falkirk	Roadside	289189	680018	NO_2	Y, FTC AQMA	<2	3	N	2.5
NA26	Weir St, Falkirk	Urban Background	289207	680123	NO_2	Y, FTC AQMA	<5	1.7	N	2.5
NA27	West Bridge St, Falkirk	Roadside	288490	680055	Benzene, NO_2	Y, FTC AQMA	<2	0.5	Y	2.2
NA29	Wellside Place, Falkirk	Urban Background	288467	680220	NO_2	N	<5	1.6	N	2.4
NA36	Kerr Crescent, Haggs	Roadside	278985	679273	NO_2	N	<5	2.1	N	2.5
NA37	Denny Town House	Urban Centre	281226	682526	Benzene, NO_2	N	<5	8.9	N	2.5
NA38	Larbert Village Primary School	Urban Background	285937	682309	Benzene, NO_2	N	<5	2.3	N	2.4
NA41	Seaview Place, Bo'ness	Roadside	299722	681594	Benzene, 1,3 Butadiene, NO_2	N	<2	0.1	N	2.5
NA42	Municipal Chambers, Grangemouth	Urban Centre / Industrial	292817	682000	Benzene, NO_2	N	<5	37.5	Y	3

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Tube Height (m)
NA44	Harvey Avenue, Polmont	Urban Background	293720	678911	Benzene, NO_2	N	<5	1.6	N	2.4
NA48	Hayfield, Falkirk	Urban Background	289197	681564	NO_2	N	<5	3.1	N	2.5
NA50	Upper Newmarket St, Falkirk	Urban Background	288671	680047	NO_2	Y, FTC AQMA	<5	9	N	2.3
NA51	Mary St, Laurieston	Roadside	290965	679490	NO_2	N	1	4.5	N	2.4
NA52	Main St, Larbert	Roadside	285866	682356	NO_2	N	<2	4.4	N	2.6
NA53	Denny Cross	Roadside	281211	682727	NO_2	N	<2	0.8	N	2.9
NA58	Callendar Rd, Falkirk	Roadside	290194	679624	NO_2	N	<2	0.5	N	2.5
NA59	Carron Rd, Bainsford	Roadside	288392	681931	NO_2	N	<2	1.2	N	2.4
NA60	Ronades Rd, Carron	Roadside	288133	681587	NO_2	N	<2	1.6	N	2.3
NA61	Canal Rd, Falkirk	Roadside	287976	680656	NO_2	N	<2	1.5	N	2.3
NA62	Arnot St, Falkirk	Roadside	289125	679705	NO_2	Y, FTC AQMA	<2	1.2	N	2.1
NA63	Camelon Rd, Falkirk	Urban Background	288055	680134	NO_2	On FTC AQMA boundary	<5	1.4	N	2.3
NA64	New Hallglen Rd, Falkirk	Roadside	288807	678422	NO_2	N	<2	1.7	N	2.7
NA65	Redding Rd, Redding	Roadside	291356	678644	NO_2	N	<2	0.6	N	2.4
NA67	Queen St, Falkirk	Urban Background	289430	680433	NO_2	N	<5	1.8	N	2.9
NA69	Kerse Lane, Falkirk	Roadside	289025	679991	NO_2	Y, FTC AQMA	<2	2.3	N	2.7
NA71	Park St, Falkirk	Roadside	288910	680112	NO_2	Y, FTC AQMA	<2	1.5	N	2.1
NA72	Vicar St, Falkirk	Roadside	288824	680120	NO_2	Y, FTC AQMA	<2	1.5	N	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 collocated with a Continuous Analyser?	Tube Height (m)
NA73	West Bridge St RHS, Falkirk	Roadside	288467	680048	NO_2	Y, FTC AQMA	<2	0.3	N	2.5
NA76	Tryst Rd, Stenhousemuir	Roadside	286851	683229	NO_2	N	<2	1.8	N	2.4
NA77	Kinnaird Village	Roadside	286490	683775	Benzene, NO_2	N	<2	3.9	N	2.5
NA78	Glen Brae, Falkirk	Roadside	288525	678991	NO_2	N	<2	2.6	N	2.2
NA80	Cow Wynd, Falkirk	Roadside	288765	679456	Benzene, NO_2	N	<2	1.8	N	2.5
NA81	Grahams Rd, Falkirk	Roadside	288817	680911	Benzene, NO_2	N	<2	0.5	N	2.3
NA82	Castings Av, Falkirk	Roadside	288858	681036	NO_2	N	<2	1	N	2.5
NA83	Main St, Bainsford	Roadside	288614	681415	NO_2	N	<2	0.5	N	2.6
NA85	Auchincloch Dr, Banknock	Roadside	278752	679049	NO_2	N	<2	0.8	N	2.5
NA86	Wolfe Rd, Falkirk	Urban Background	289667	679871	NO_2	N	<2	2	N	2.5
NA87	M80 Slip South, Haggs	Roadside	279017	679305	NO_2	N	<2	1.6	N	1.8
NA88	Ure Crescent, Bonnybridge	Roadside	282444	681074	NO_2	N	<2	1.7 (16 to M876)	N	2.5
NA89	Grahams Rd / Meeks Rd, Falkirk	Roadside	288856	680336	NO_2	Y, FTC AQMA	<2	2.2	N	2.3
NA94	A905 (Glensburgh Road), Grangemouth	Roadside	291213	681074	NO_2	N	7	5.4	N	2.4
NA98	Arnothill, Falkirk	Urban Background	288080	680073	NO_2	N	23	1.6	N	2.2
NA99	St Crispins Pl, Falkirk	Roadside	288924	679675	NO_2	Y, FTC AQMA	7.6	2.7	N	2
NA101	Glensburgh Rd (2), Grangemouth	Roadside	291127	682007	NO_2	N	7	0.9	N	2.2
NA105	West of Shieldhill	Rural	288279	676875	Benzene, NO_2	N	Background Rural Site	1.7	N	1.6

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 collocated with a Continuous Analyser?	Tube Height (m)
NA107	Main St (East), Bainsford	Roadside	288640	681396	NO_2	N	4	0.5	N	2.3
NA111	Falkirk West Bridge St, Air Quality Station	Urban Centre	288457	680064	NO_2	Y, FTC AQMA	4.3	2.3	Y	1.8
NA114	Glasgow Rd, Camelon	Roadside	286624	680577	NO_2	N	2	0.5	N	2.6
NA115	Brown St, Camelon	Urban Background	286761	680413	NO_2	N	2	1.5	N	2.1
NA116	Kersiebank Avenue, Grangemouth	Urban Background / Industrial	293671	680347	Benzene, NO_2	N	2	2.75	N	2.27
NA117	Oswald Avenue (East), Grangemouth	Urban Background / Industrial	294101	681532	Benzene, NO_2	Y, GM AQMA	2.5	2.2	N	2.27
NA118	Glebe Street, Falkirk	Roadside	288726	680096	NO_2	Y, FTC AQMA	2.5	1.6	N	2.27
NA119	Hendry Street, Falkirk	Urban Background	288728	681383	NO_2	N	3	1.3	N	2.3
NA120	Powdrake Road, Grangemouth	Roadside / Industrial	294097	681488	Benzene, NO_2, 1,3 Butadiene	Y, GM AQMA	2.9	1.9	N	2.4
NA121	Beancross Roundabout, Grangemouth	Roadside	291956	680522	NO_2	Y, GM AQMA	3	1.6	N	2.1

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual Mean 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 2024 (%) (2)	2020	2021	2022	2023	2024
A4 - Falkirk Haggs	Roadside	Automatic	100	100	18	21	18	17.5	16
A5 - Falkirk Hope St	Roadside	Automatic	95	95	14	15.5	14	17.1	14
A7 – Falkirk West Bridge St	Roadside	Automatic	68	68	27	31.4	27	28.5	24
A8 – Grangemouth AURN	Urban Background / Industrial	Automatic	50	50	11	13.1	14	13.3	11
A9 – Grangemouth Moray	Urban Background / Industrial	Automatic	78	78	12	13.8	12	10.9	10
A10 – Grangemouth Municipal Chambers	Urban Background / Industrial	Automatic	97	97	12	13.4	14	13.5	13
A15 – Main St, Bainsford	Roadside	Automatic	96	96	20.3	19.7	19	18	17

Notes:

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

NO_2 annual means exceeding 60 µg/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 ($\mu g/m^3$) Monitoring Results: Non-Automatic Monitoring ($\mu g/m^3$)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2024 (%)	2020	2021	2022	2023	2024
3	293427	680386	Urban Background	100	100	15.0	14.9	13.0	13.7	11.5
5	287332	680333	Roadside	100	100	19.0	19.3	18.0	18.6	16.1
9	286048	683542	Roadside	100	100	18.0	17.0	16.0	16.4	14.6
19	278779	679301	Roadside	100	100	21.0	19.9	18.0	18.9	16
20	278957	679169	Urban Background	91.7	91.7	18.0	16.6	17.0	16.0	12.4
21	290112	680500	Roadside	100	100	21.0	19.7	18.0	19.3	16.1
24	289189	680018	Roadside	91.7	91.7	25.0	24.0	24.0	24.5	21.6
26	289234	680121	Urban Background	100	100	13.0	13.6	12.0	12.6	10.4

27	288490	680055	Roadside	91.7	91.7	35.0	34.8	30.0	34.3	32.2
29	288467	680220	Urban Background	100	100	13.0	12.0	12.0	12.8	12
36	278985	679273	Roadside	91.7	91.7	27.0	25.2	24.0	24.6	20.9
37	281226	682526	Urban Centre	100	100	14.0	12.6	12.0	11.8	9.2
38	285937	682309	Urban Background	91.7	91.7	13.0	12.1	11.0	10.8	11.4
41	299722	681594	Roadside	100	100	19.0	17.4	16.0	16.1	13.4
42a, 42b, 42c	292817	682000	Urban Centre	100	100	15.0	14.1	13.0	12.8	10.7
44	293720	678911	Urban Background	100	100	14.0	13.1	12.0	13.0	10.7
48	289197	681564	Urban Background	100	100	15.0	15.7	13.0	14.1	11.5
50	288671	680047	Urban Background	75	75	18.0	18.2	15.0	14.9	18.4

51	290965	679490	Roadside	100	100	18.0	16.8	17.0	17.6	15.1
52	285866	682356	Roadside	100	100	20.0	18.0	17.0	16.7	14.1
53	281211	682727	Roadside	83.3	83.3	21.0	19.9	18.0	18.2	9.8
58	290194	679624	Roadside	100	100	16.0	14.5	14.0	14.4	12.1
59	288392	681931	Roadside	83.3	83.3	23.0	21.8	21.0	20.3	17.5
60	288133	681587	Roadside	91.7	91.7	21.0	19.8	22.0	18.7	14.9
61	287976	680656	Roadside	100	100	19.0	17.9	16.0	17.1	13.4
62	289125	679705	Roadside	100	100	27.0	23.6	25.0	25.8	21.7
63	288055	680134	Roadside	100	100	27.0	27.0	24.0	26.6	23.2
64	288807	678422	Roadside	100	100	11.0	11.4	10.0	11.3	9.3
65	291356	678644	Roadside	100	100	19.0	18.1	15.0	15.9	13.1
67	289430	680433	Urban Background	100	100	22.0	21.7	20.0	22.2	18.6

69	289025	679991	Roadside	100	100	23.0	23.3	21.0	24.3	20.1
71	288910	680112	Roadside	91.7	91.7	25.0	24.4	22.0	23.4	21.8
72	288824	680120	Roadside	100	100	22.0	20.8	18.0	19.4	17.9
73	288467	680048	Roadside	100	100	24.0	23.4	21.0	22.6	19.3
76	286851	683229	Urban Background	100	100	16.0	15.0	14.0	13.6	11.5
77	286490	683775	Roadside	100	100	18.0	17.3	16.0	15.6	13.1
78	288525	678991	Roadside	100	100	21.0	19.7	19.0	18.7	15.7
80	288765	679456	Roadside	100	100	25.0	19.8	20.0	19.3	17.1
81	288817	680911	Kerbside	100	100	24.0	22.1	21.0	21.9	18.7
82	288858	681036	Urban Background	91.7	91.7	15.0	13.3	13.0	13.2	11.3
83	288614	681415	Roadside	100	100	25.0	25.1	24.0	25.3	20.7
85	278752	679049	Urban Background	91.7	91.7	14.0	13.9	14.0	16.0	13.4

86	289667	679871	Urban Background	100	100	12.0	11.3	10.0	10.6	9.1
87	279017	679305	Roadside	100	100	21.0	21.0	19.0	19.4	14.2
88	282444	681074	Roadside	100	100	20.0	20.1	19.0	18.9	16.3
89	288856	680336	Roadside	100	100	23.0	21.8	20.0	21.0	18.2
94	291213	681927	Roadside	100	100	24.0	22.4	21.0	20.1	16.4
98	288095	680105	Urban Background	91.7	91.7	16.0	15.4	14.0	14.0	12.4
99	288924	679675	Roadside	91.7	91.7	20.0	18.2	18.0	18.1	17.1
101	291127	682007	Roadside	91.7	91.7	17.0	16.3	15.0	15.9	13.9
105	288292	676889	Rural	100	100	6.0	5.8	5.0	5.3	4.4
107	288640	681396	Roadside	100	100	23.0	18.9	17.0	16.4	15
111a, 111b, 111c	288457	680064	Urban Centre	100	100	31.0	29.4	27.0	28.9	25.2
114	286624	680577	Roadside	91.7	91.7	31.0	28.9	25.0	17.1	14.6

115	286761	680413	Urban Background	91.7	91.7	13.0	13.2	11.0	12.6	10.5
116	293671	680347	Industrial	100	100	15.0	15.1	14.0	14.6	11.8
117	294101	681532	Industrial	100	100	15.0	13.6	12.0	12.9	11.1
118	288726	680096	Roadside	100	100	18.0	17.3	15.0	18.7	18.2
119	288728	681383	Urban Background	100	100	18.0	17.4	15.0	16.2	13.4
120	294097	681488	Industrial	100	100			14.0	15.5	12.5
121	291956	680522	Roadside	100	100			19.0	18.2	16.6

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22 (confirm by selecting in box).**

☒ **Diffusion tube data has been bias adjusted (confirm by selecting in box).**

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction (confirm by selecting in box).**

Notes:

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

NO_2 annual means exceeding 60 µg/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.

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

(4) 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 > 200 µg/m^3

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
A4 Falkirk Haggs	Roadside	Automatic	100	100	0	0	0	0	0
A5 Falkirk Hope St	Urban Background	Automatic	95	95	0 (81)	0	0	0	0
A7 Falkirk West Bridge St	Roadside	Automatic	68	68	0	0	0	0	0 (91)
A8 Grangemouth AURN	Urban Background / Industrial	Automatic	50	50	0	0 (71.7)	0	0	0 (56)
A9 Grangemouth Moray	Urban Background / Industrial	Automatic	78	78	0 (70)	0	0	0	0 (60)
A10 Grangemouth Municipal Chambers	Urban Background / Industrial	Automatic	97	97	0	0	0	0	0
A15 Main St, Bainsford	Roadside	Automatic	96	96	0 (88)	0	0	0	0

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%).

Figure 2 – A4 Falkirk Haggs Long Term NO_2 Concentrations

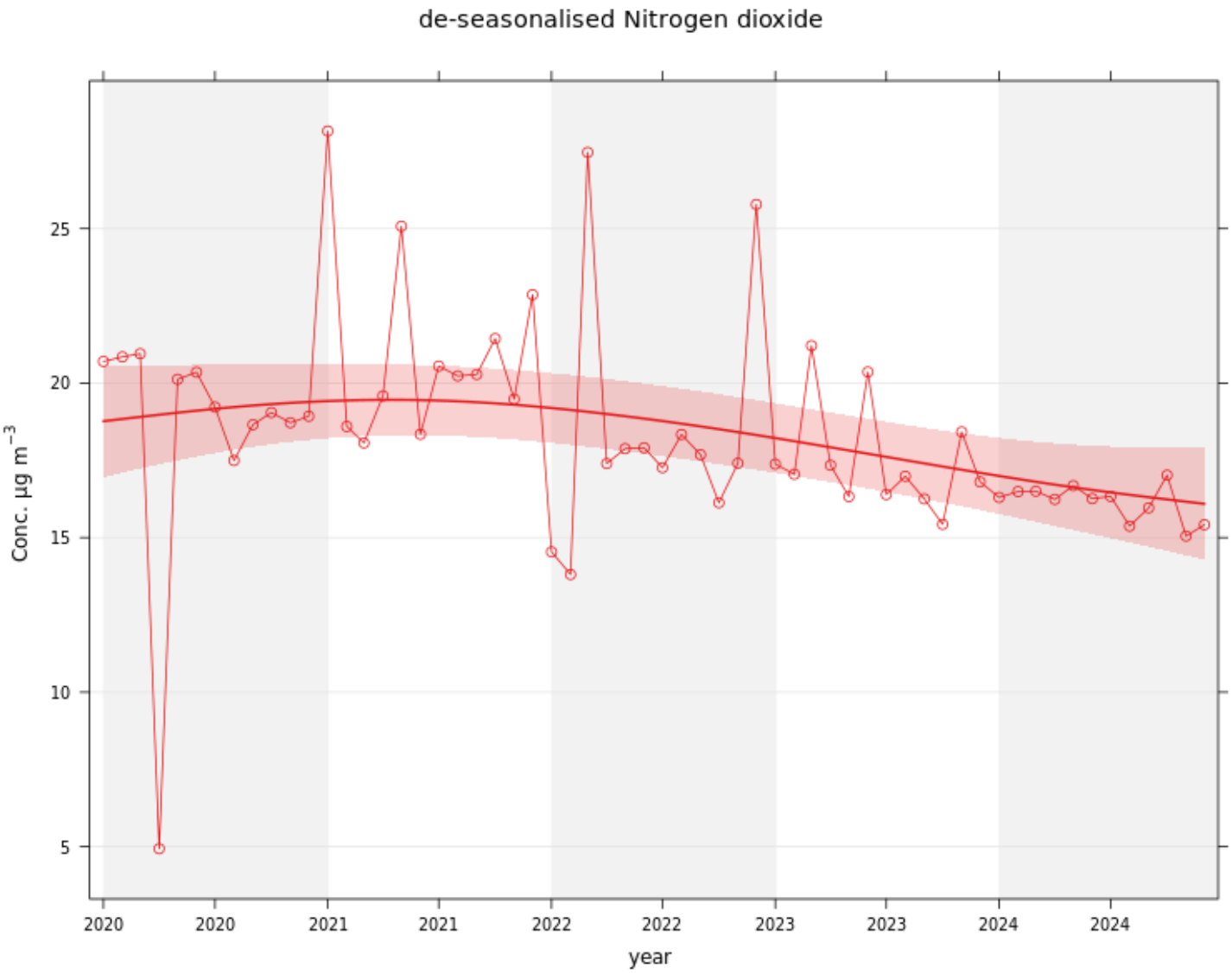


Figure 3 – A5 Falkirk Hope St Long Term NO_2 Concentrations

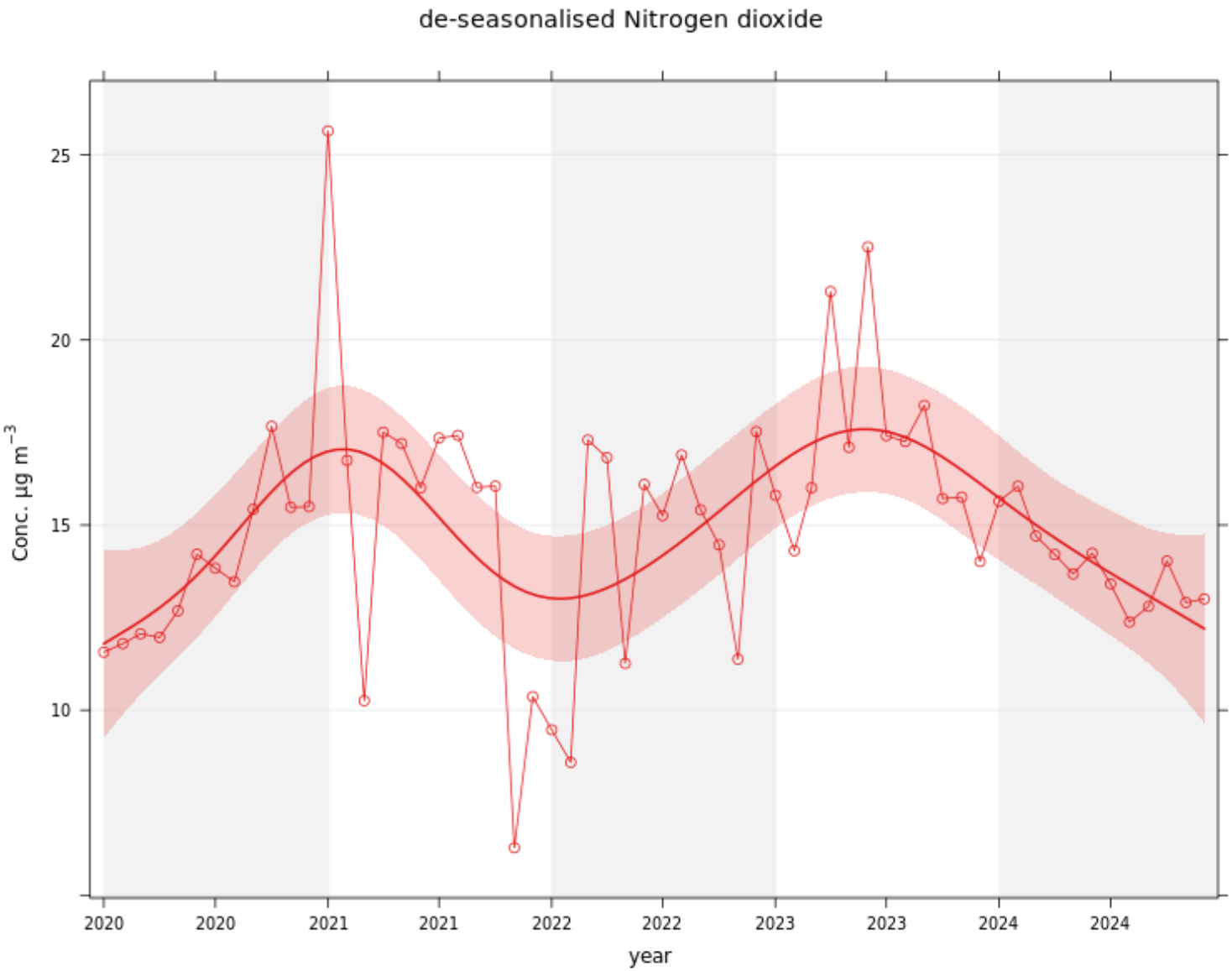


Figure 4 – A7 Falkirk West Bridge St Long Term NO_2 Concentrations

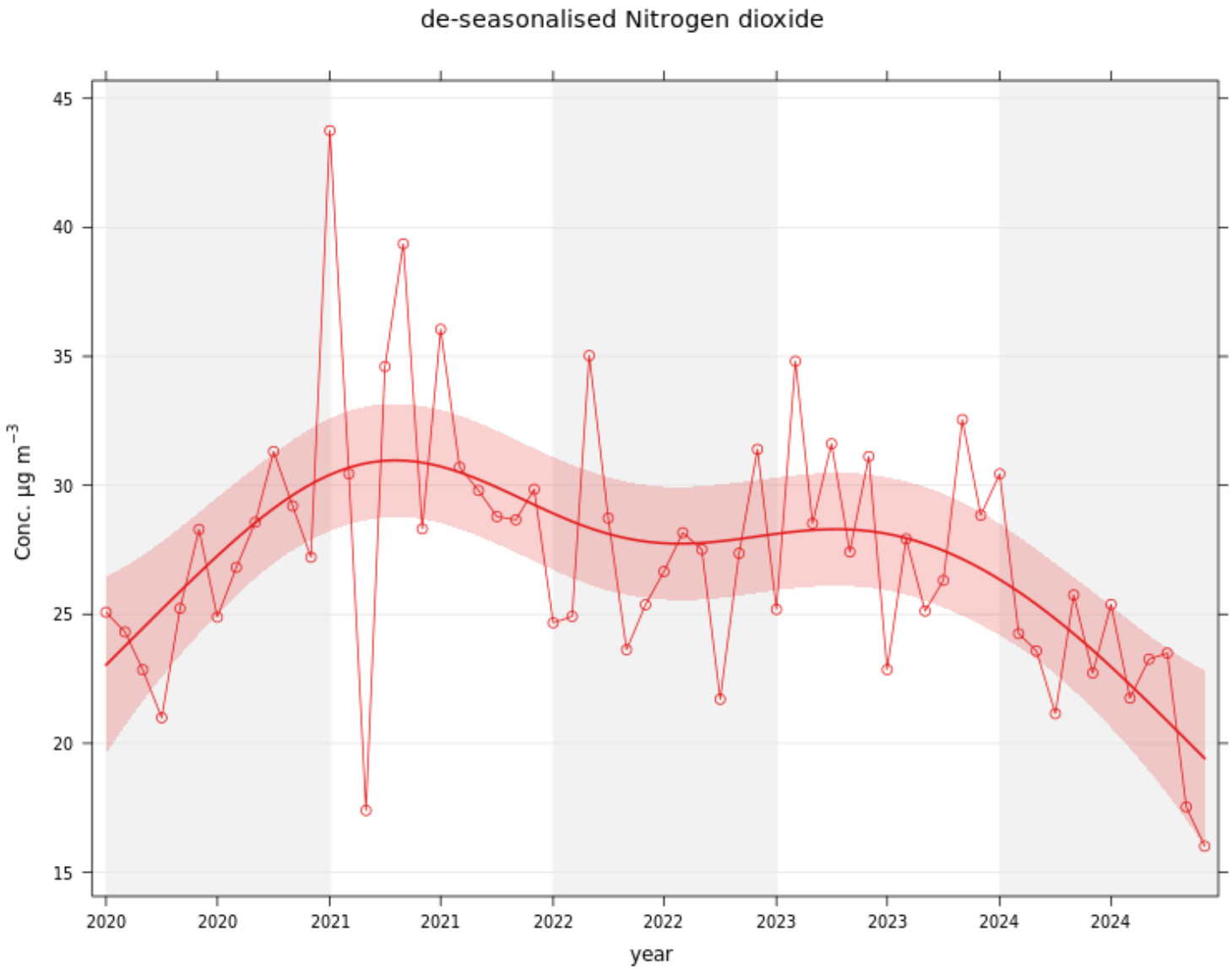


Figure 5 – A8 Grangemouth AURN Long Term NO_2 Concentrations

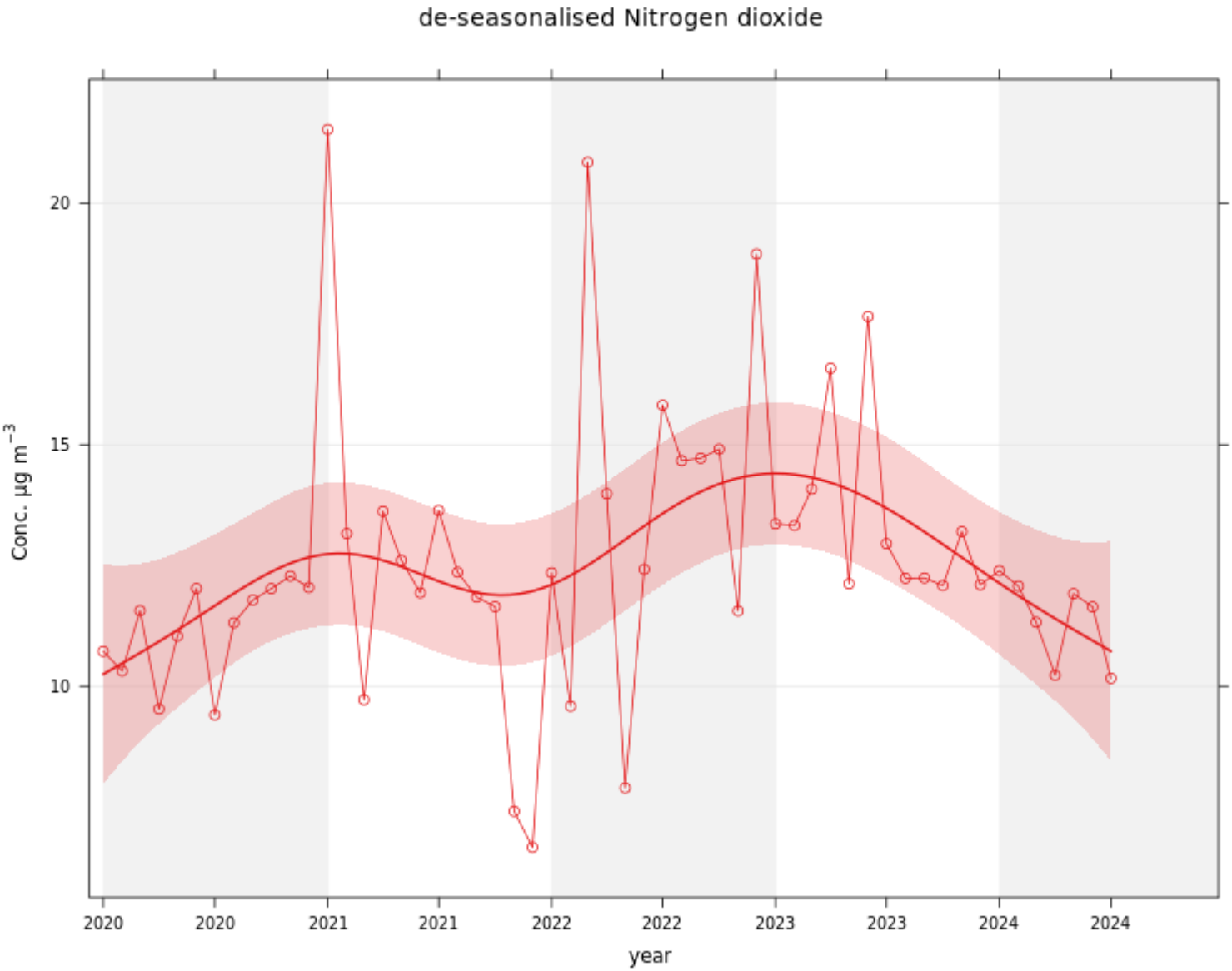


Figure 6 – A9 Grangemouth Moray Long Term NO_2 Concentrations

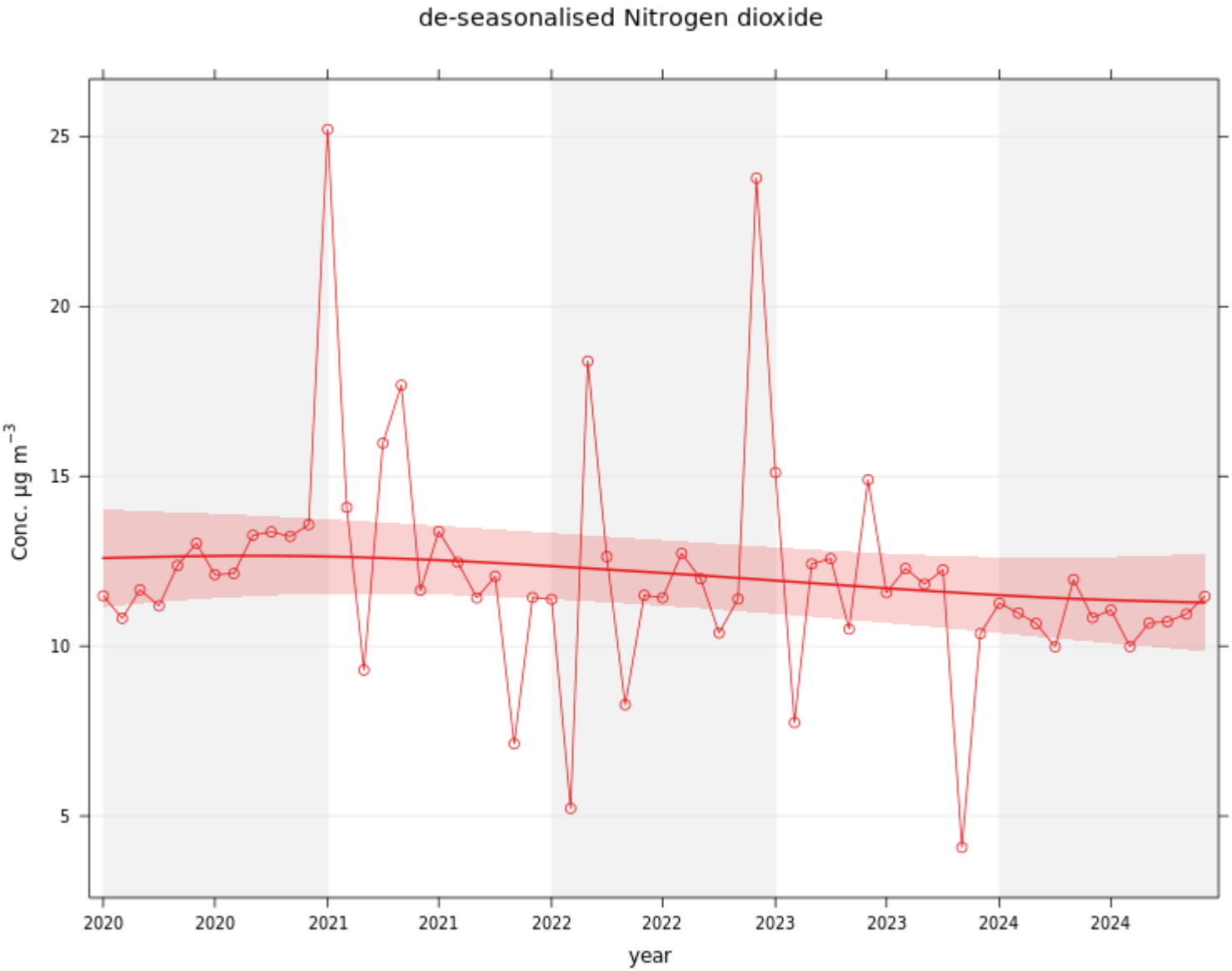


Figure 7 – A10 Grangemouth Municipal Chambers Long Term NO_2 Concentrations

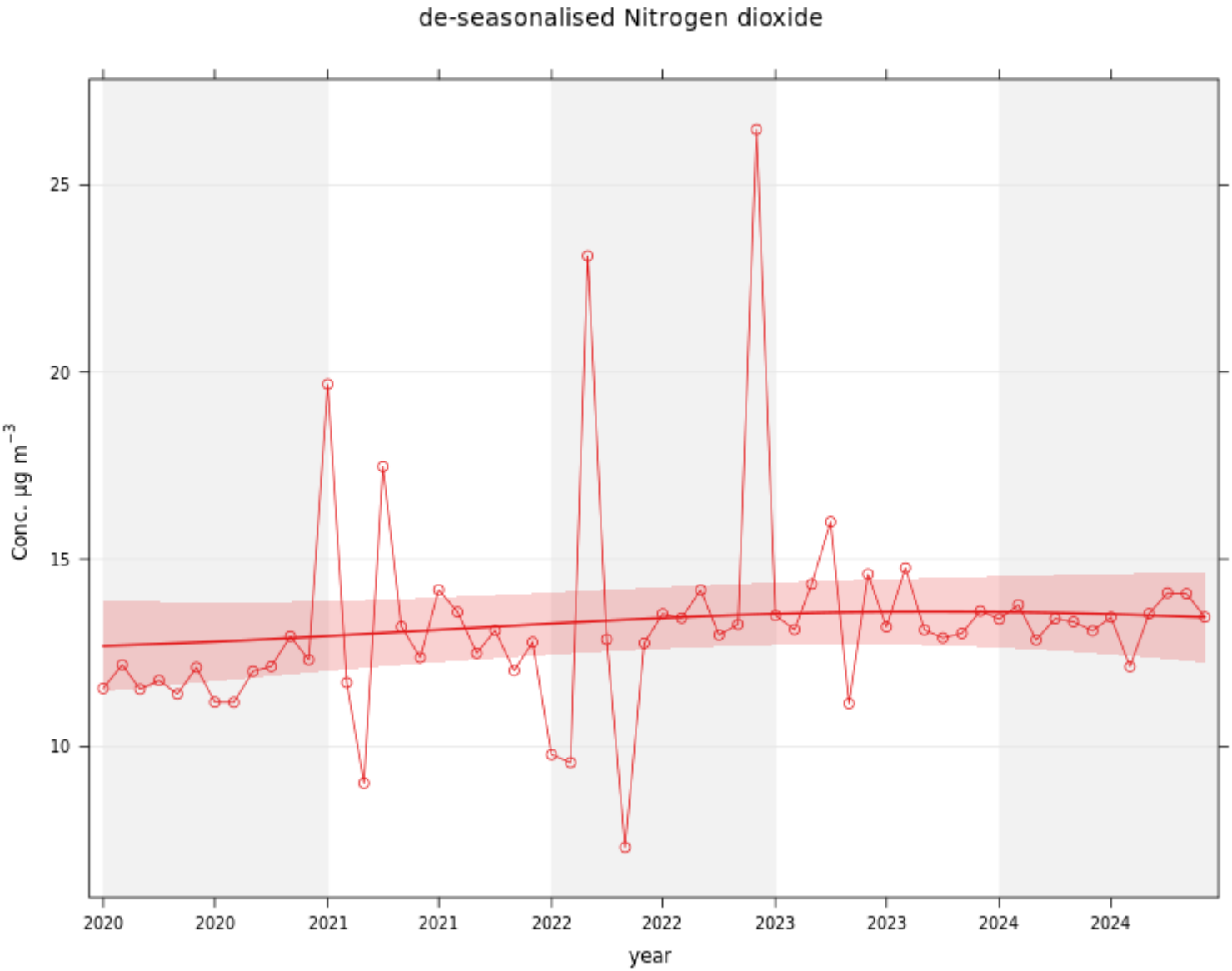


Figure 8 – A15 Main St, Bainsford Long Term NO_2 Concentrations

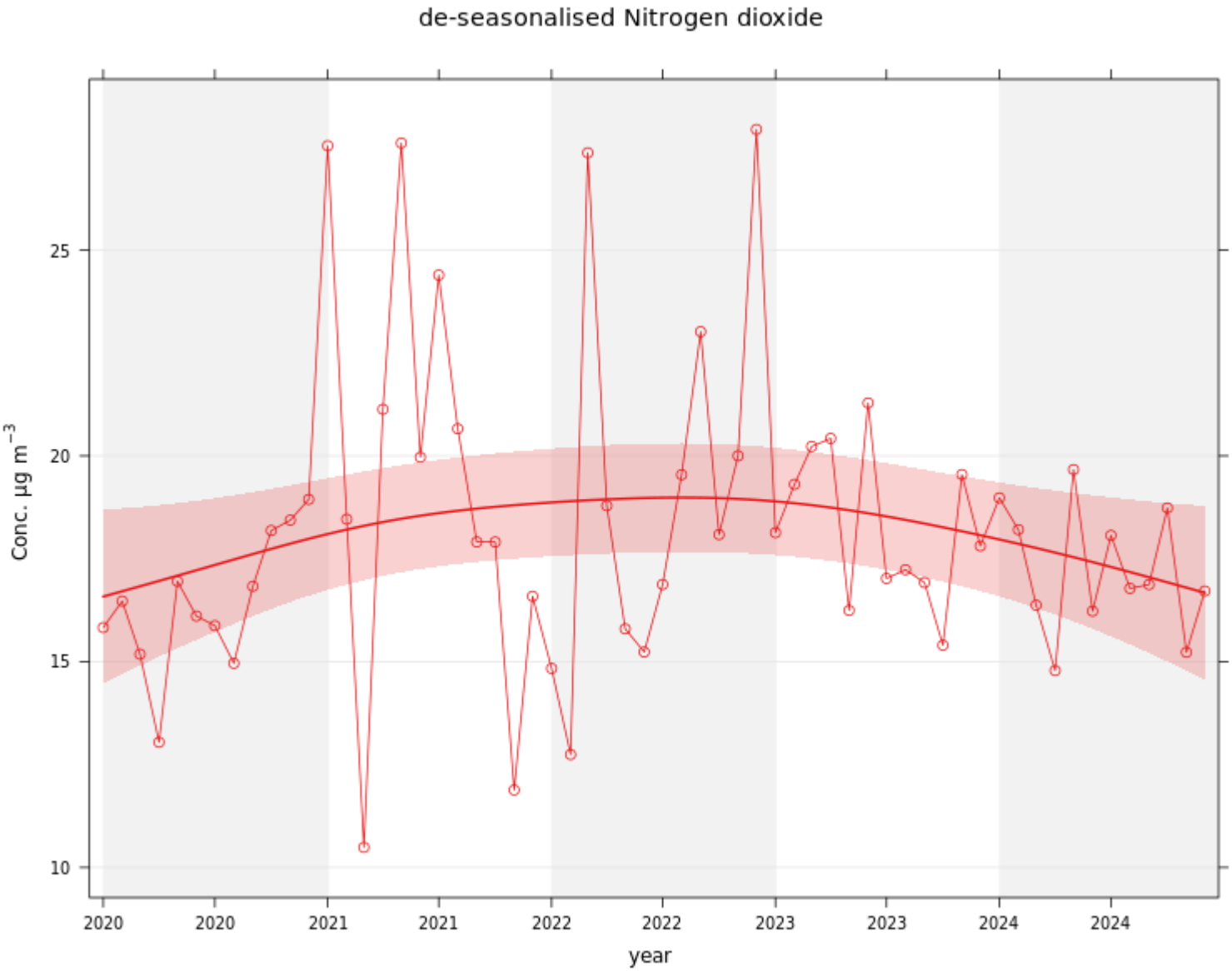


Table A.6 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
A4	Falkirk Haggs (Uncorrected)	100	100	10	10.4	11	10.1	**9**
	Falkirk Haggs (Mean Corrected – Fidas)(3)			10.5	11.5	12.1	11.1	9.9
A5	Falkirk Hope St (Uncorrected)	100	100	9	9	9.3	8.6	9
	Falkirk Hope St (MC – Fidas)(3)				9.9	10.2	9.5	9.9
A7	Falkirk West Bridge St (Uncorrected)	93	93	7.4	9.2	9.6	10.1	11
	Falkirk West Bridge Street (MC – Fidas)(3)			8.1	10.1	10.6	11.1	12.1
A8	Grangemouth AURN	98	98	9	9.3	10	8.7	9
A9	Grangemouth Moray (Uncorrected)	20	20					8
	Grangemouth Moray (MC – Fidas)	20	20					8.8
A10	Grangemouth Municipal Chambers (Uncorrected)	100	100	7.7	8.6	9.1	9.1	10
	Grangemouth Municipal Chambers (MC – Fidas)(3)			8.5	9.5	10	10	11
A11	Grangemouth Zetland Park (Uncorrected)	100	100	N/A	8.6	9.8	8.3	9
	Grangemouth Zetland Park (MC - Fidas)(3)			N/A	9.5	10.8	9.1	9.9
A15	Main St, Bainsford (Uncorrected)	99	99	10.6	11.1	11.2	10.1	9
	Main St, Bainsford (MC – Fidas)(3)			11.7	12.2	12.3	11.1	9.9

Notes:

Exceedances of the PM_{10} annual mean objective of 18 $\mu g/m^3$ 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 > 50 µg/m^3

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
A4	Falkirk Haggs	100	100	0 (21)	0	0	0	0
A5	Falkirk Hope St	100	100	0	0	0	0	0
A7	Falkirk West Bridge St	93	93	0 (18)	0	0	0	1
A8	Grangemouth AURN	98	98	0	0	0	0	0
A9	Grangemouth Moray	20	20					0
A10	Grangemouth Municipal Chambers	100	100	0 (17)	0	0	0	0
A11	Grangemouth Zetland Park	100	100		0	0	0	0
A15	Main St, Bainsford	99	99	0	0 (25)	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%).

Figure 9 – A4 Haggs Long Term PM_{10} (Hourly Measured) Concentrations

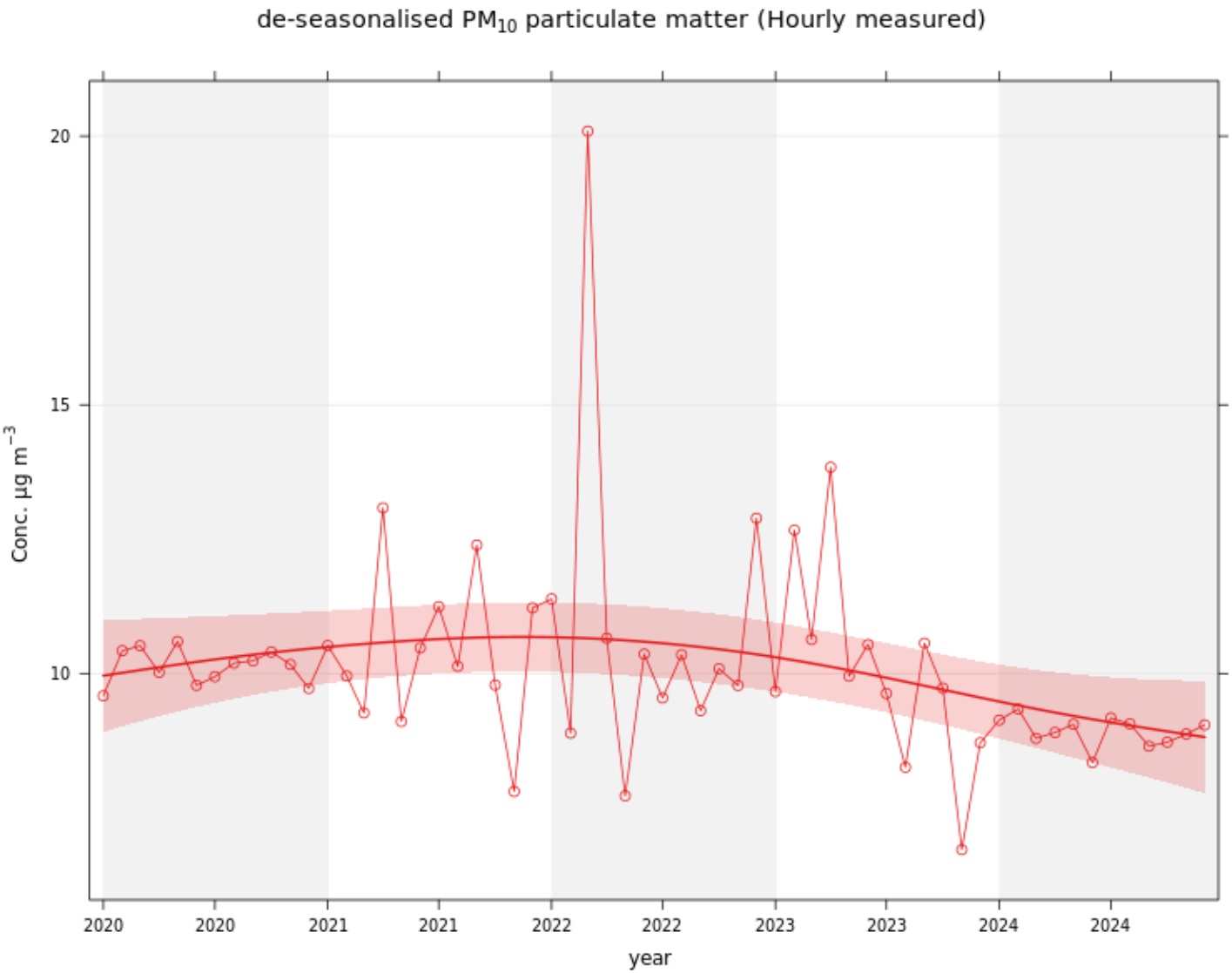


Figure 10 – A5 Falkirk Hope St Long Term PM_{10} (Hourly Measured) Concentrations

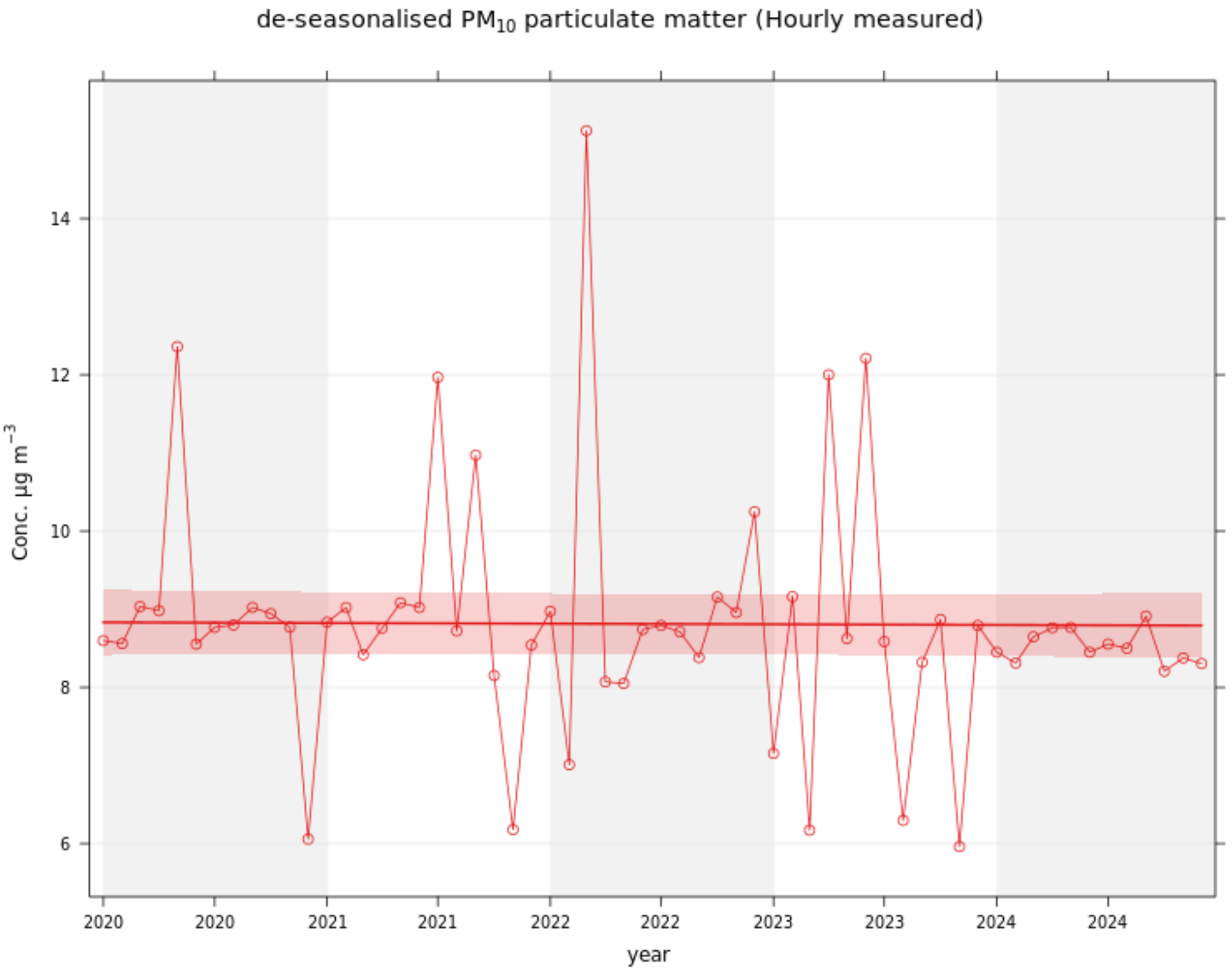


Figure 11 – A7 Falkirk West Bridge St Long Term PM_{10} (Hourly Measured) Concentrations

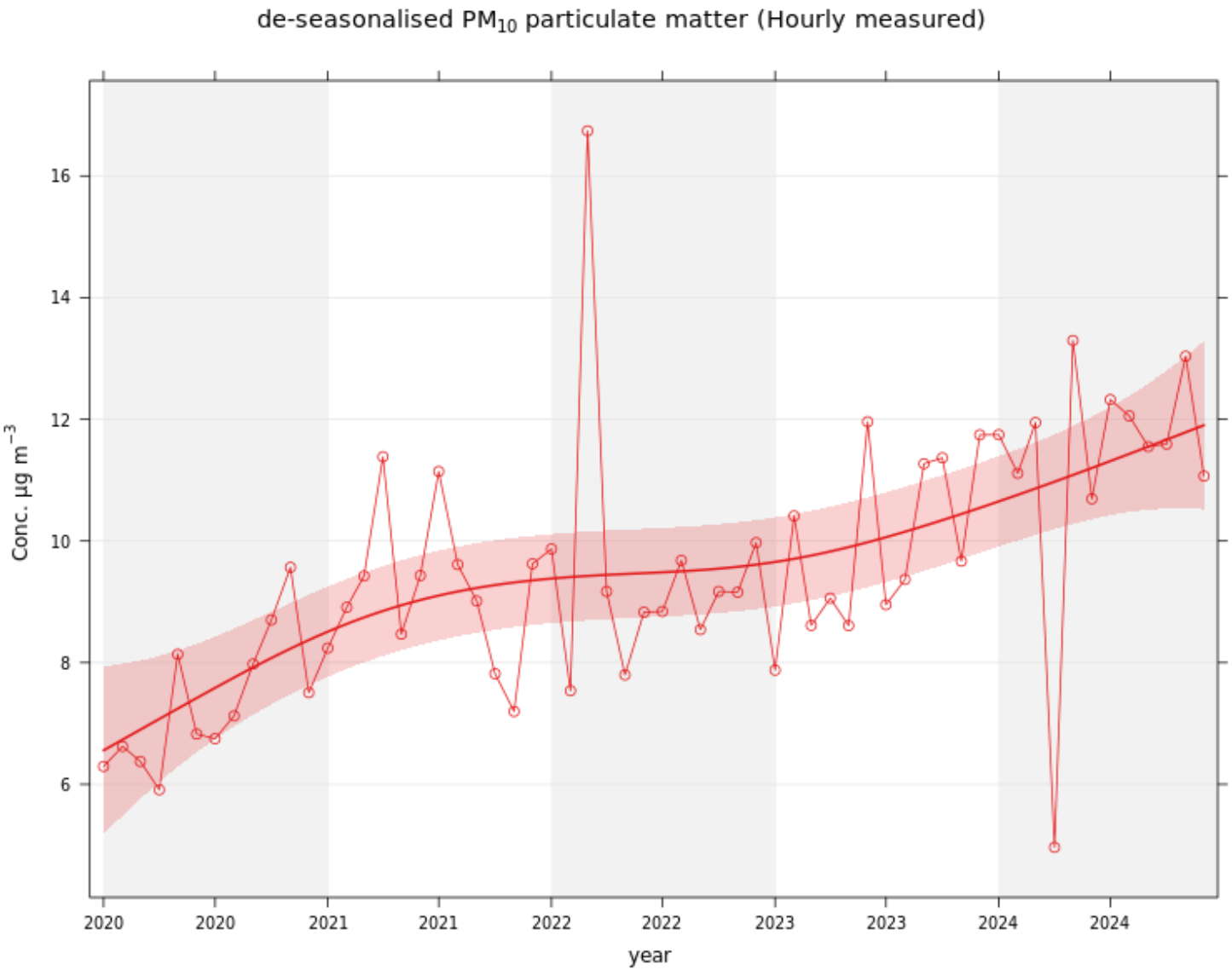


Figure 12 – A8 Grangemouth AURN Long Term PM_{10} (Hourly Measured) Concentrations

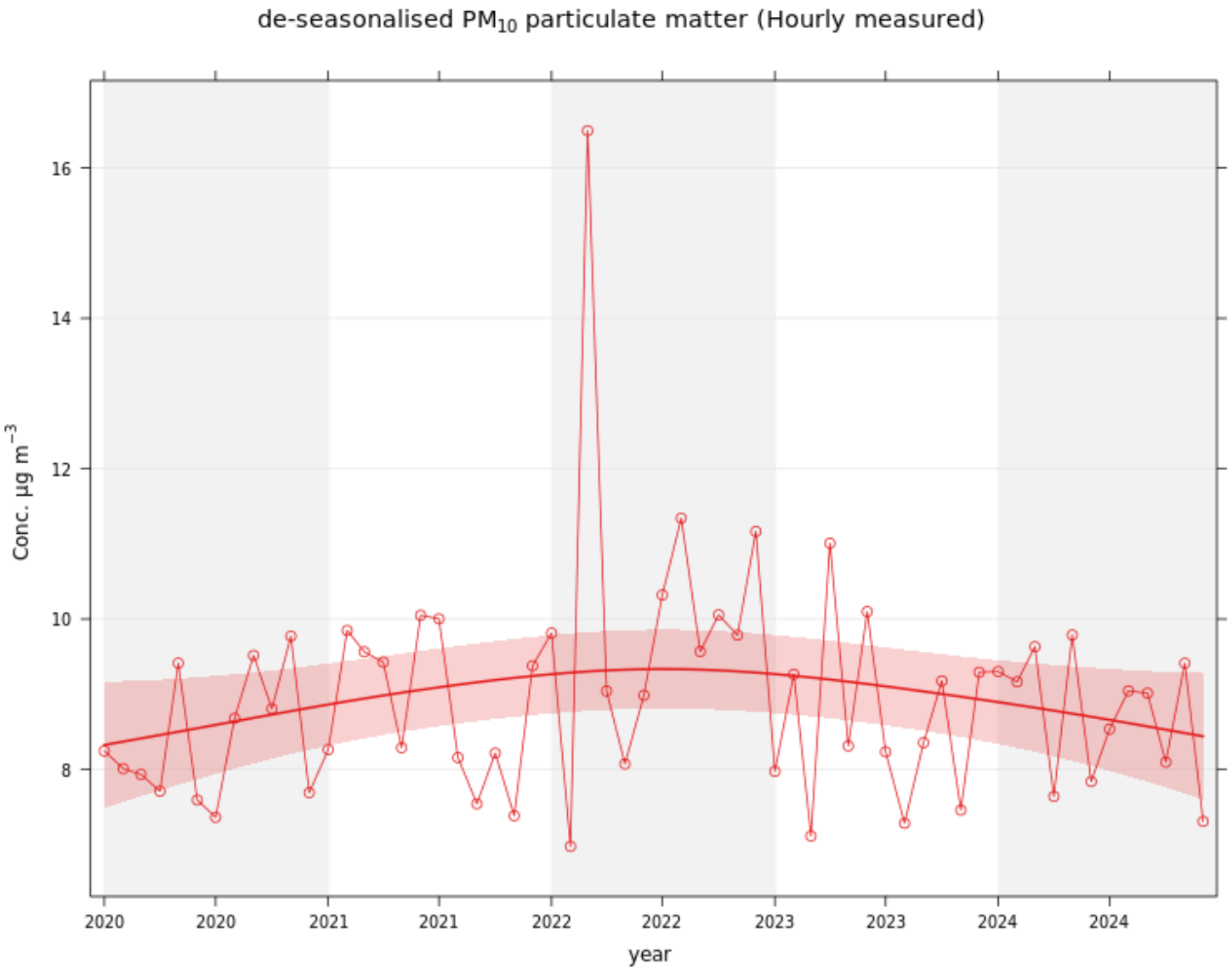


Figure 13 – A10 Grangemouth Municipal Chambers Long Term PM_{10} (Hourly Measured) Concentrations

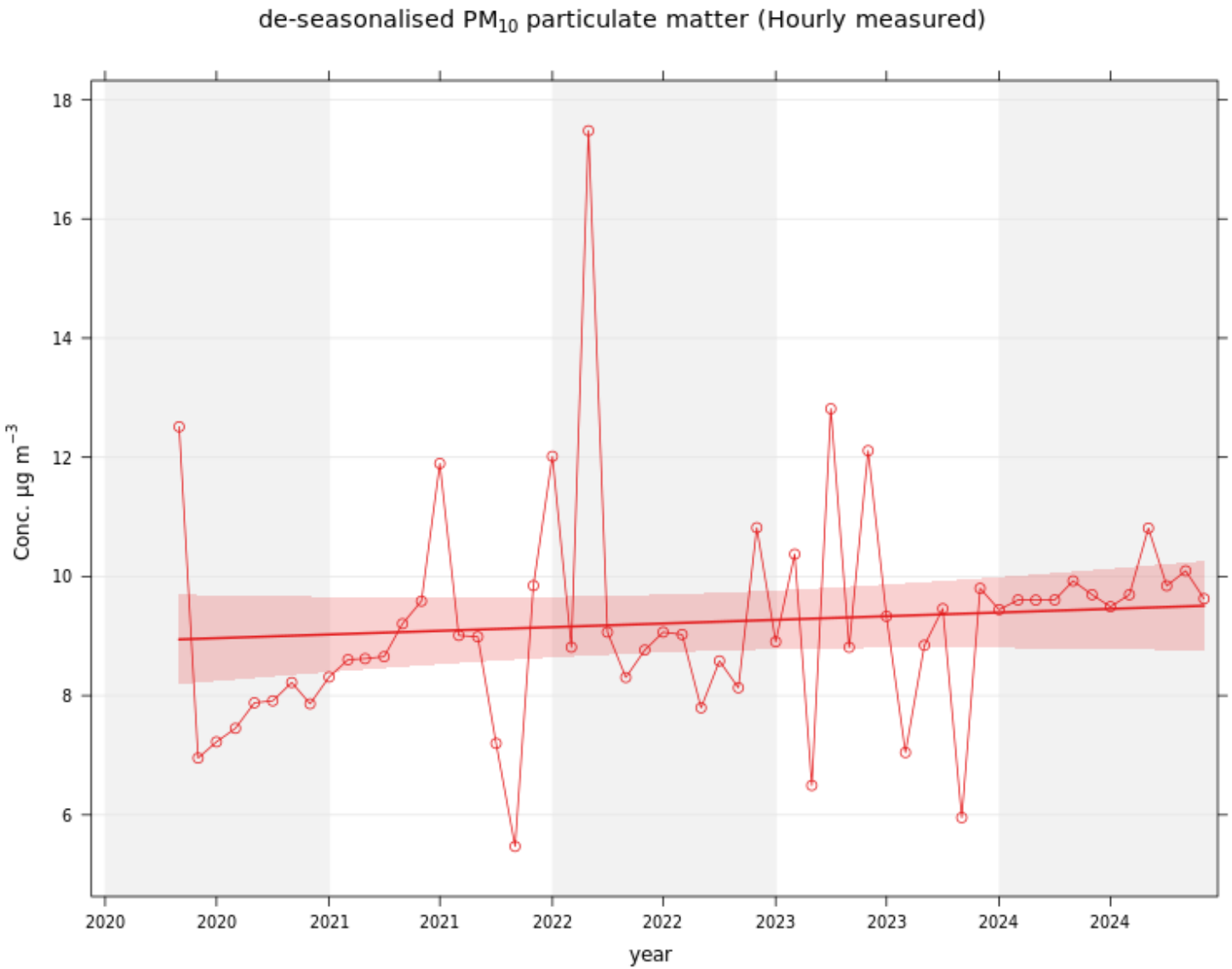


Figure 14 – A11 Grangemouth Zetland Park Long Term PM_{10} (Hourly Measured) Concentrations

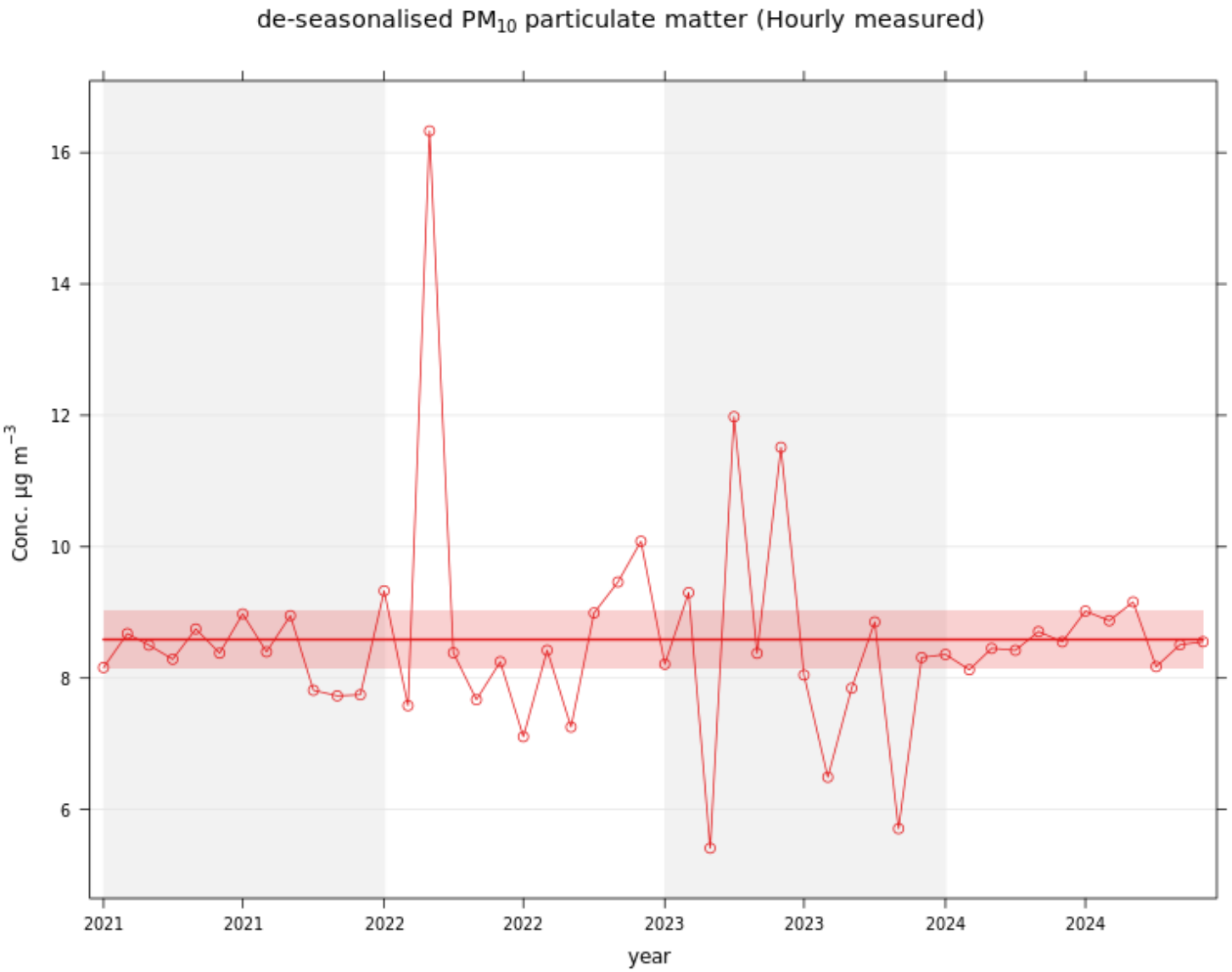


Figure 15 – A15 Main St, Bainsford Long Term PM_{10} (Hourly Measured) Concentrations

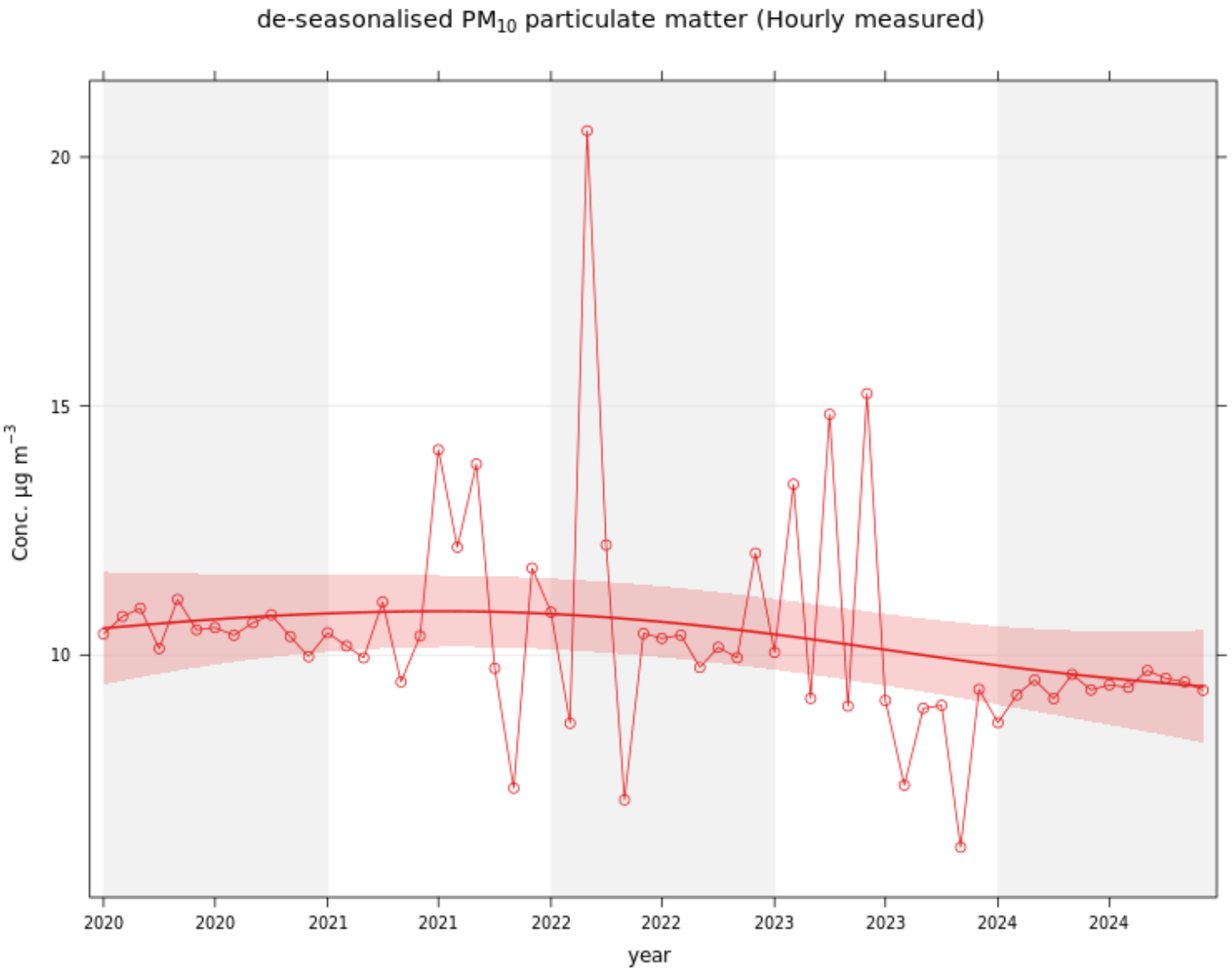


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
A4	Falkirk Haggs (Uncorrected)	100	100	5.3	5.7	6.1	5.3	5
	Falkirk Haggs (Mean Corrected – Fidas)(3)			5.6	6.1	6.4	5.6	5.3
A5	Falkirk Hope St (Uncorrected)	100	100	5.1	5	5.3	4.8	5
	Falkirk Hope St (MC – Fidas)(3)				5.3	5.6	5.1	5.3
A7	Falkirk West Bridge St (Uncorrected)	93	93	4.4	4.9	5.2	5.3	7
	Falkirk West Bridge St (MC – Fidas)(3)			4.7	5.2	5.5	5.6	7.4
A8	Grangemouth AURN	98	98	6	5.4	8	5.1	9
A9	Grangemouth Moray (Uncorrected)	20	20					6
	Grangemouth Moray (MC – Fidas)							6.4
A10	Grangemouth Municipal Chambers (Uncorrected)	100	100	4.3	4.7	5.4	5	6
	Grangemouth Municipal Chambers (MC – Fidas)(3)			4.5	5	5.8	5.3	6.4
A11	Grangemouth Zetland Park (Uncorrected)	100	100		5.2	5.5	4.9	5
	Grangemouth Zetland Park (MC – Fidas) (3)				5.5	5.8	5.2	5.3
A15	Main St, Bainsford (Uncorrected)	99	99	6.2	6.1	6.2	5.4	5
	Main St, Bainsford (MC – Fidas) (3)				6.4	6.5	5.7	5.3

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%).

Figure 16 – A4 Falkirk Haggs Long Term $PM_{2.5}$ Concentrations

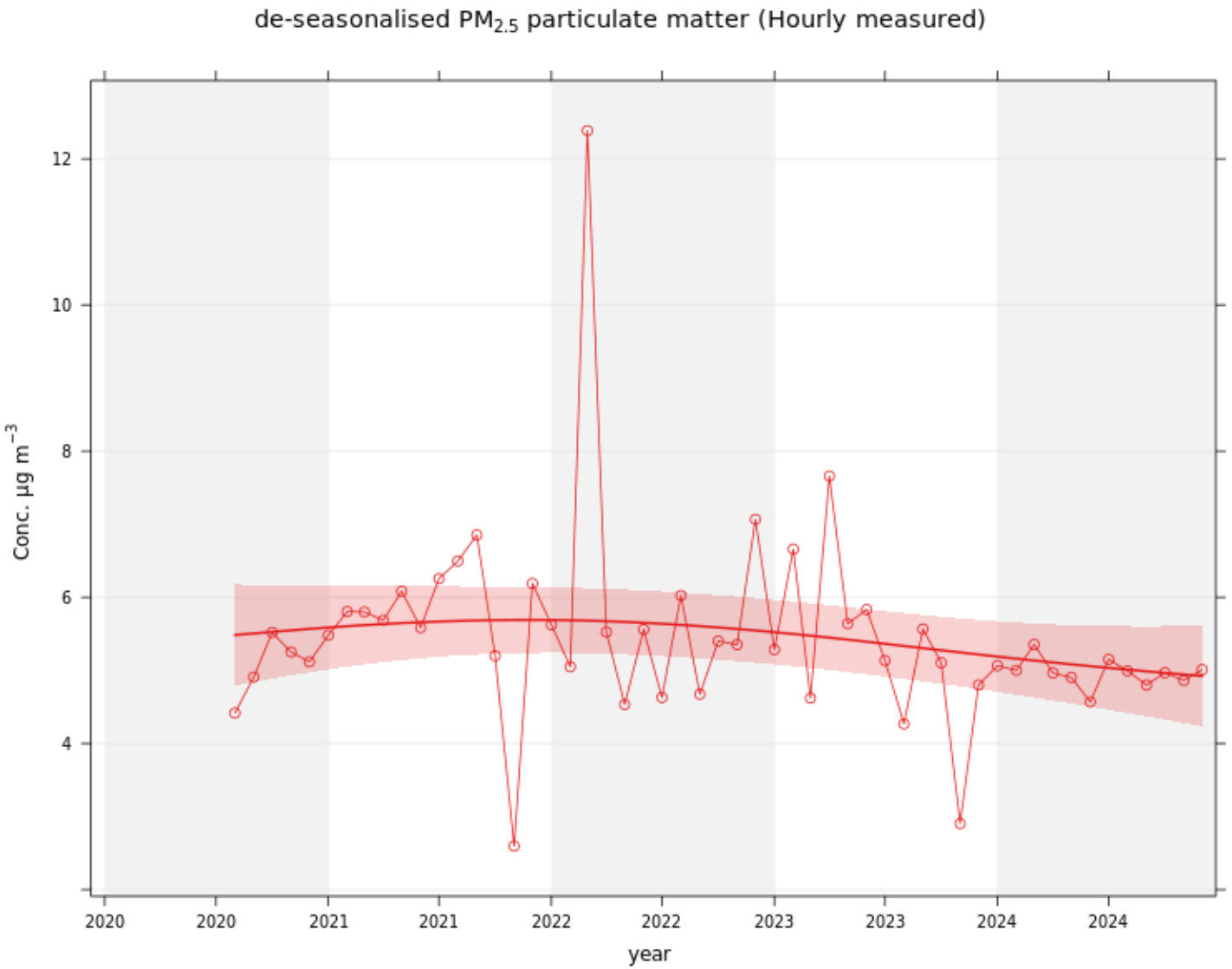


Figure 17 – A7 Falkirk West Bridge St Long Term $PM_{2.5}$ Concentrations

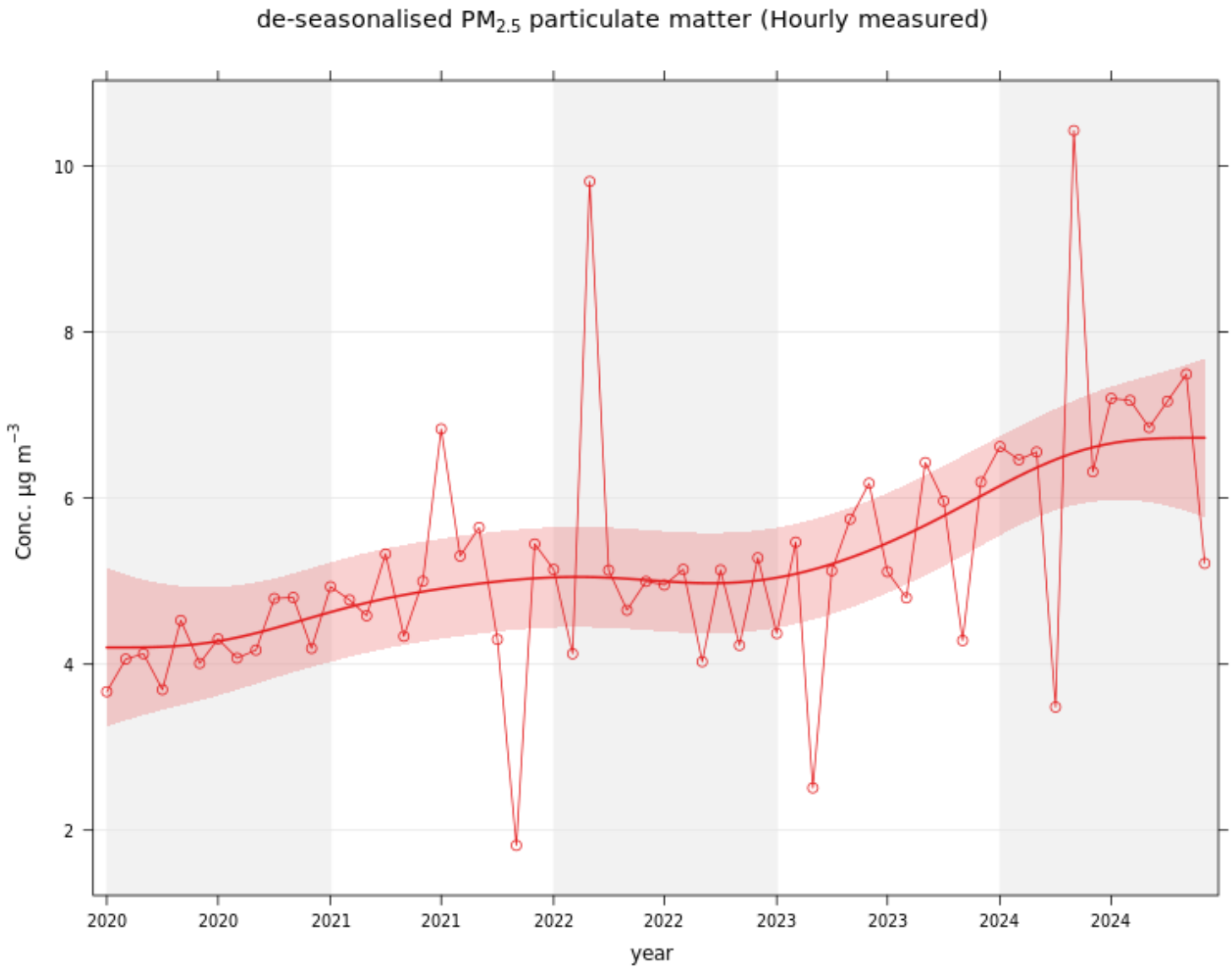


Figure 18 – A8 Grangemouth AURN Long Term $PM_{2.5}$ Concentrations

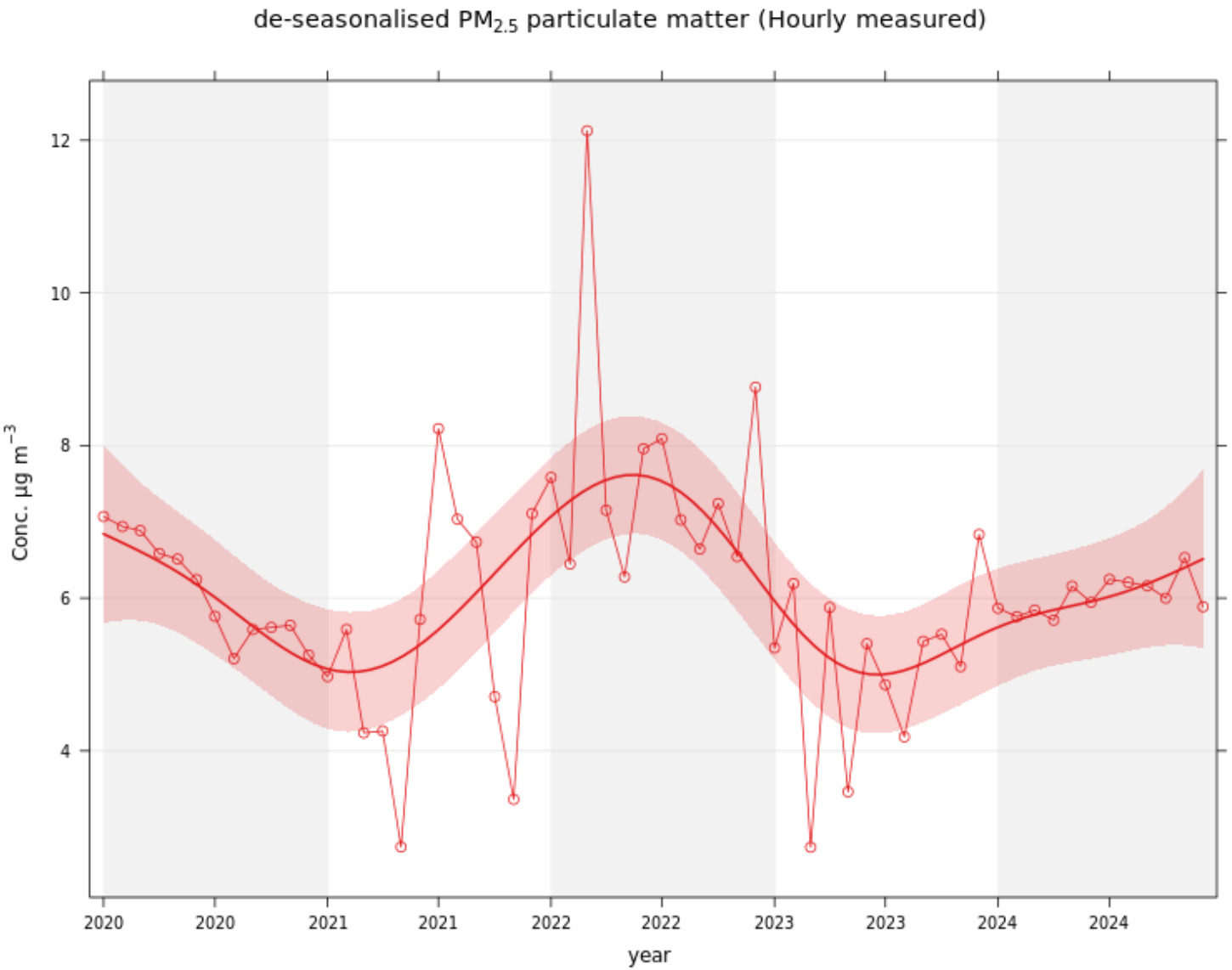


Figure 19 – A10 Grangemouth MC Long Term $PM_{2.5}$ Concentrations

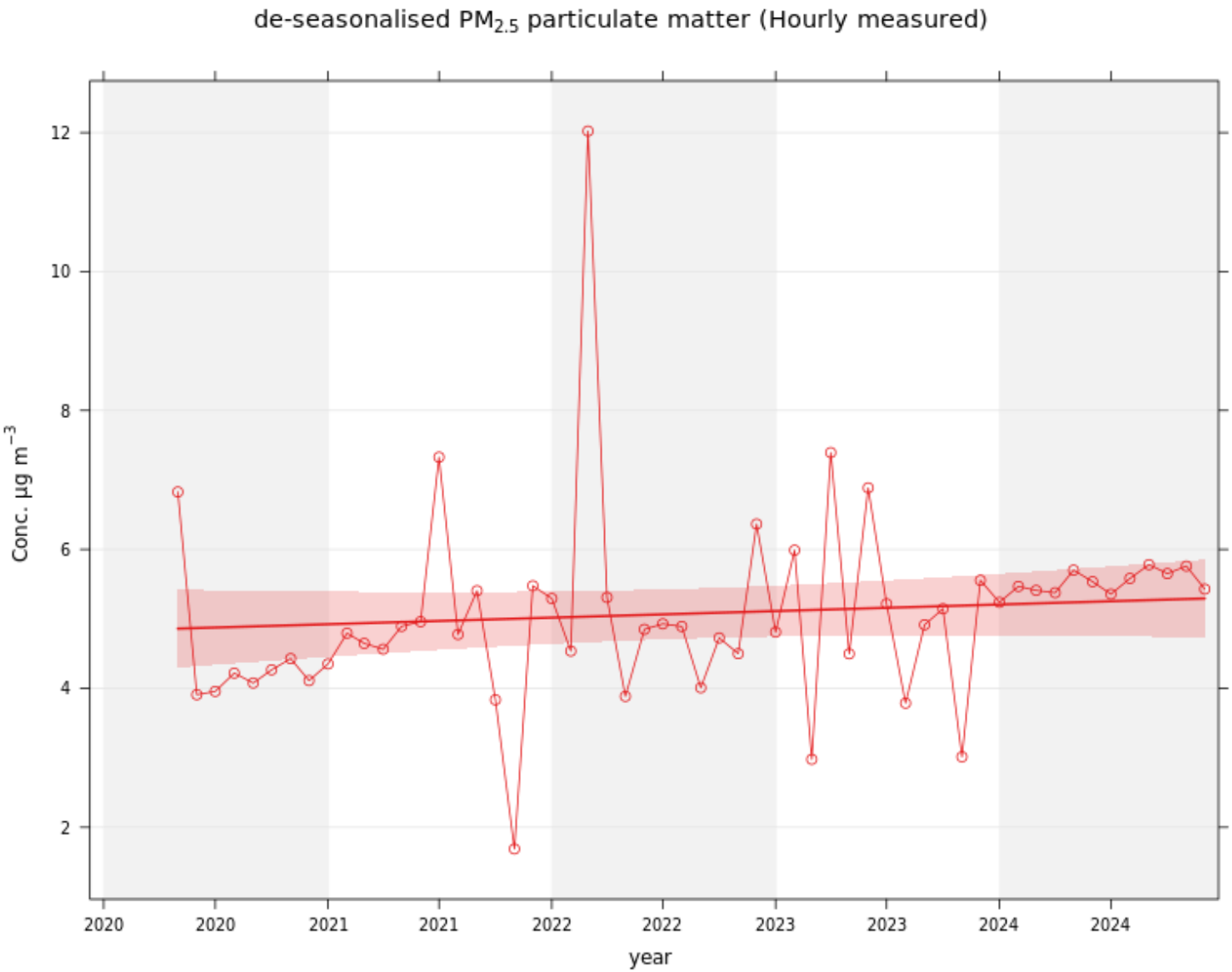


Figure 20 – A11 Grangemouth Zetland Park Long Term $PM_{2.5}$ Concentrations

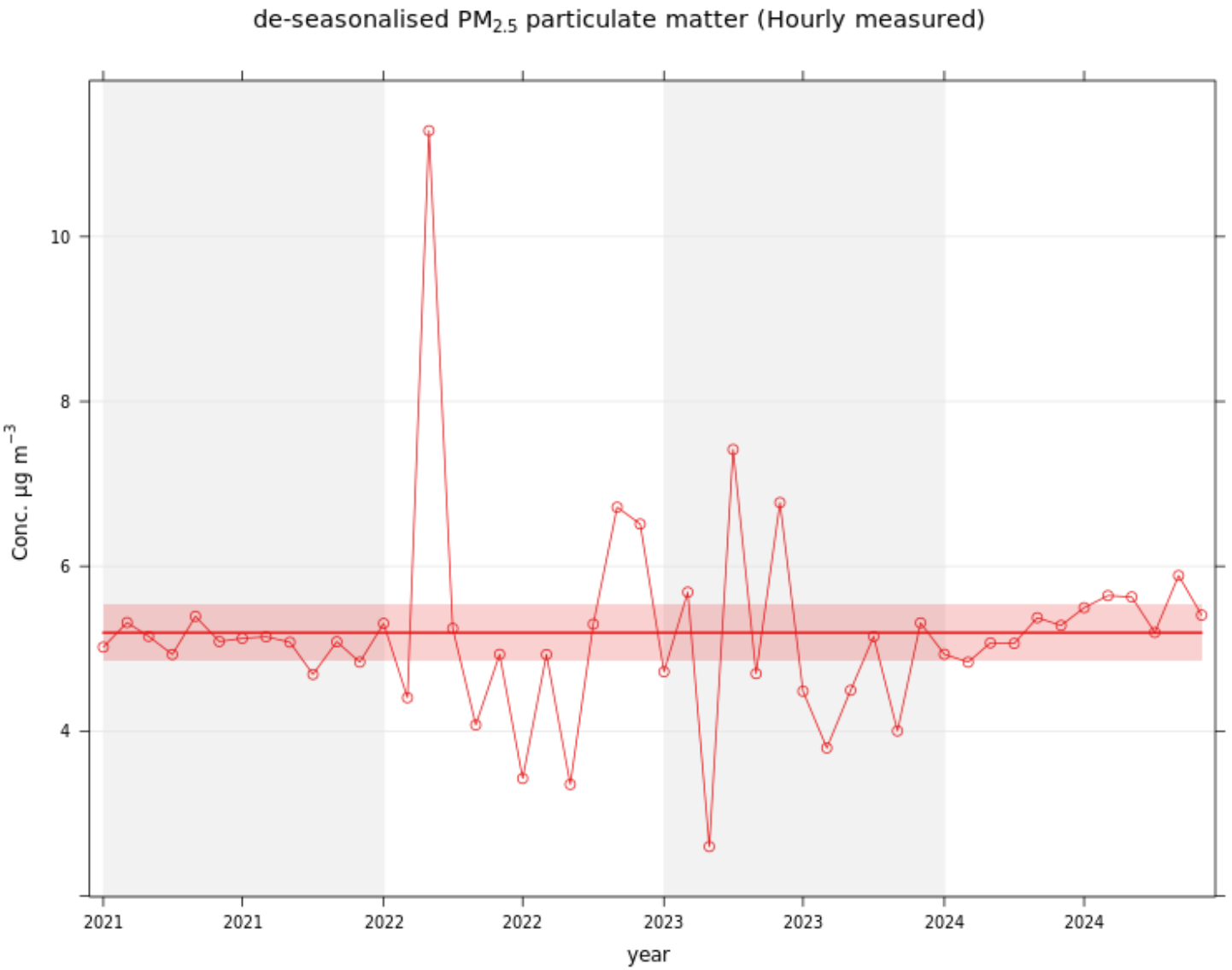


Figure 21 – A15 Main Street, Bainsford Long Term $PM_{2.5}$ Concentrations

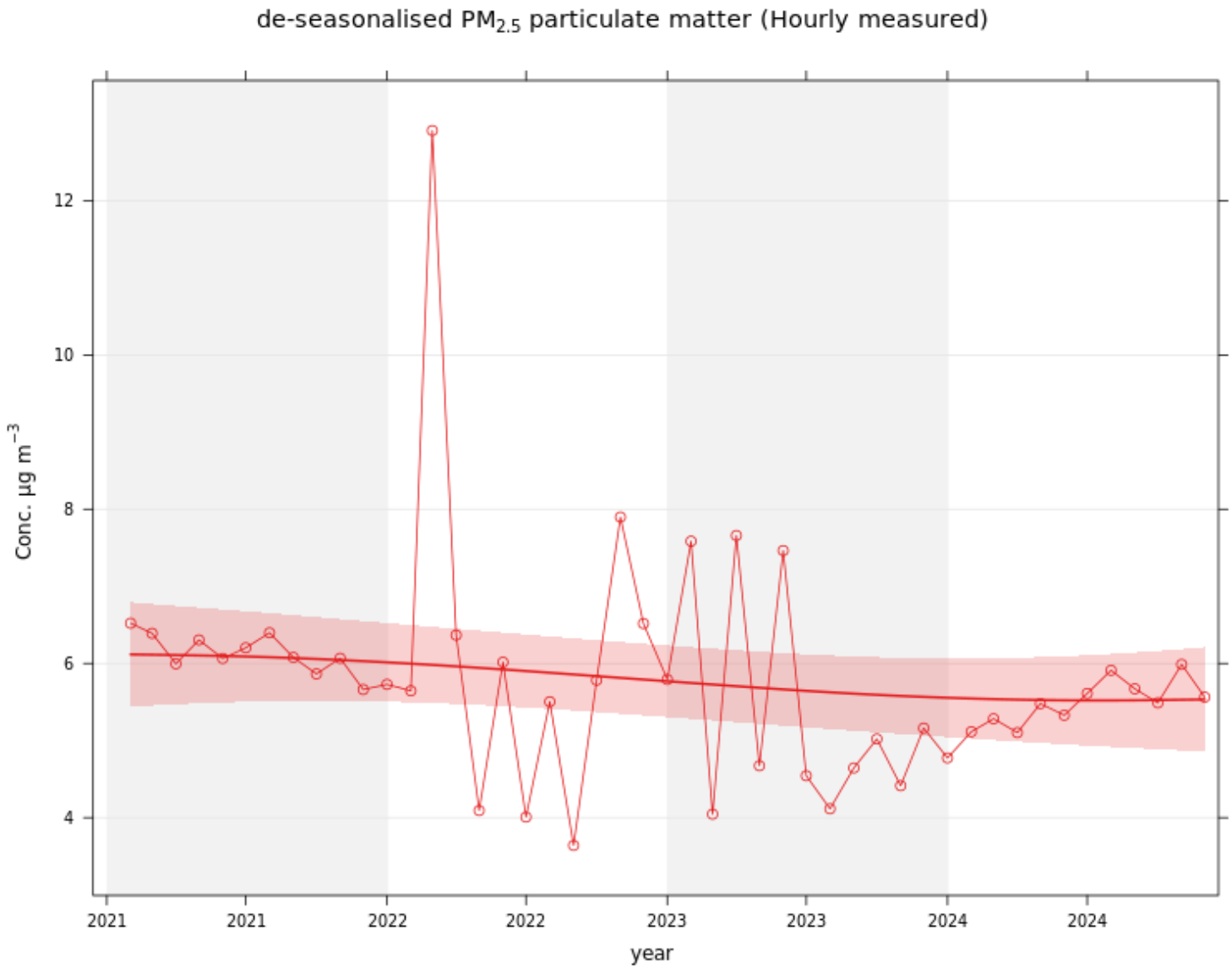


Table A.9 – SO_2 2024 Monitoring Results, Number of Relevant Instances

Site ID	Site Type	Valid Data Capture for monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	Number of 15-minute Means > 266 µg/m	Number of 1-hour Means > 350 µg/m	Number of 24-hour Means > 125 µg/m
A3	Bo'ness	98	98	15	0	0
A5	Falkirk Hope St	98	98	25	5	1
A8	Grangemouth AURN	95	95	32	5	1
A9	Grangemouth Moray	97	97	19	0	0
A10	Grangemouth Municipal Chambers	97	97	33	3	0
A11	Grangemouth Zetland Park	99	99	0	0	0

Notes:

Exceedances of the SO_2 objectives are shown in bold (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year)

If the period of valid data is less than 85%, the relevant percentiles are provided in brackets (15-Minute means: 99.9th percentile, 1-hour means: 99.7th percentile, 24-hour means: 99.2nd percentile).

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

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure 22 – A3 Bo'ness Long Term SO_2 Concentrations

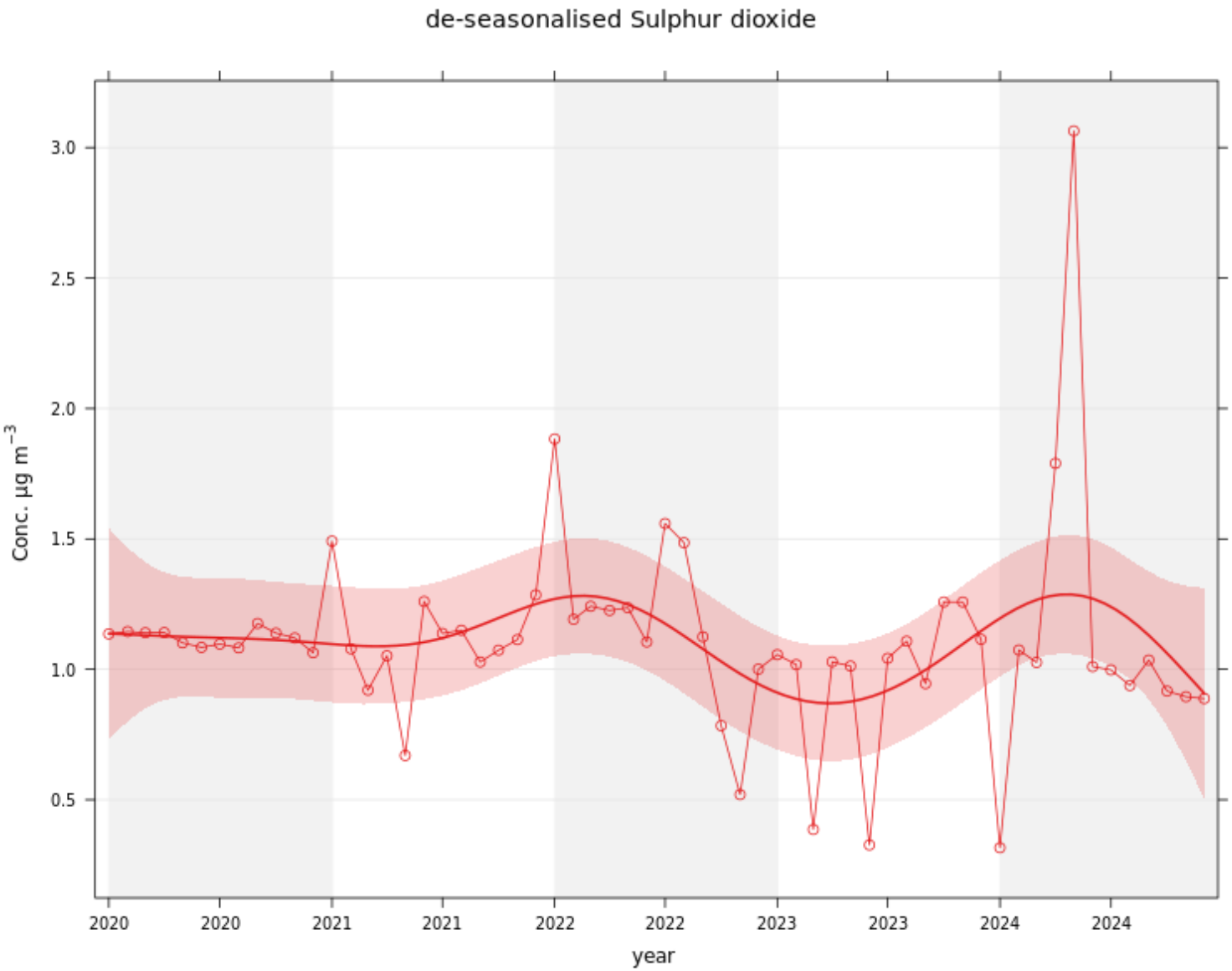


Figure 23 – A5 Falkirk Hope Street Long Term SO_2 Concentrations

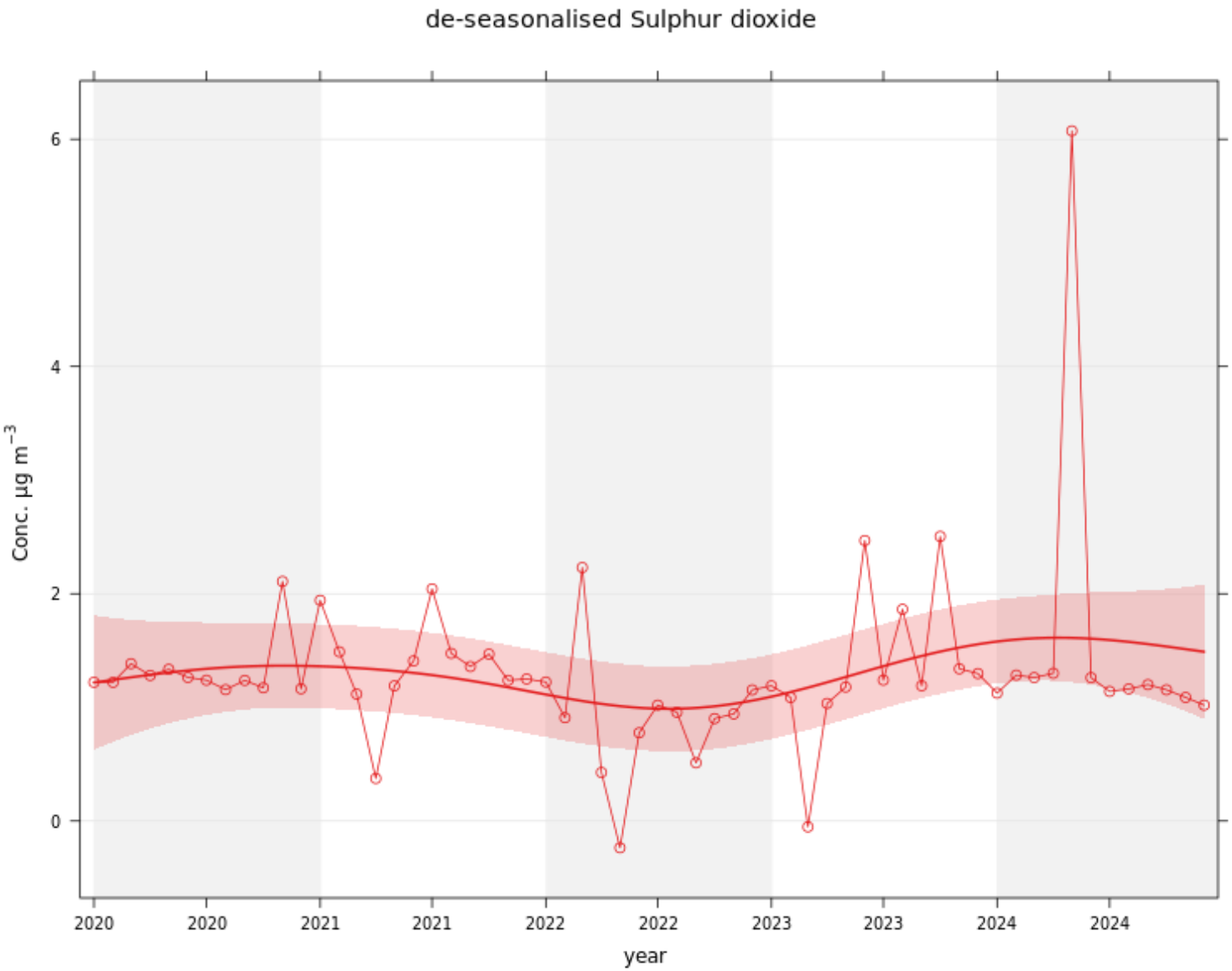


Figure 24 – A8 Grangemouth AURN Long Term SO_2 Concentrations

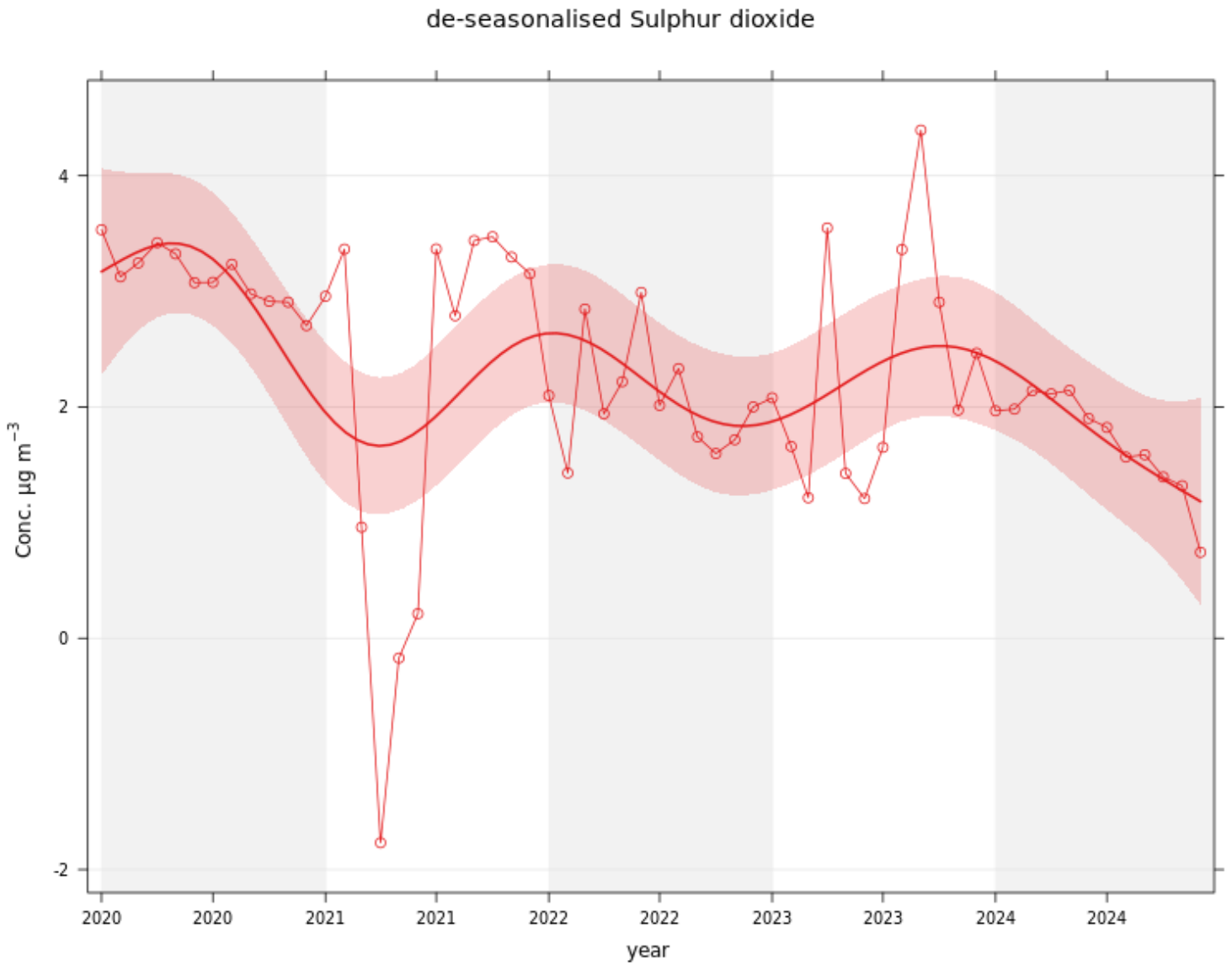


Figure 25 – A9 Grangemouth Moray Long Term SO_2 Concentrations

Figure 26 – A10 Grangemouth Municipal Chambers Long Term SO_2 Concentrations

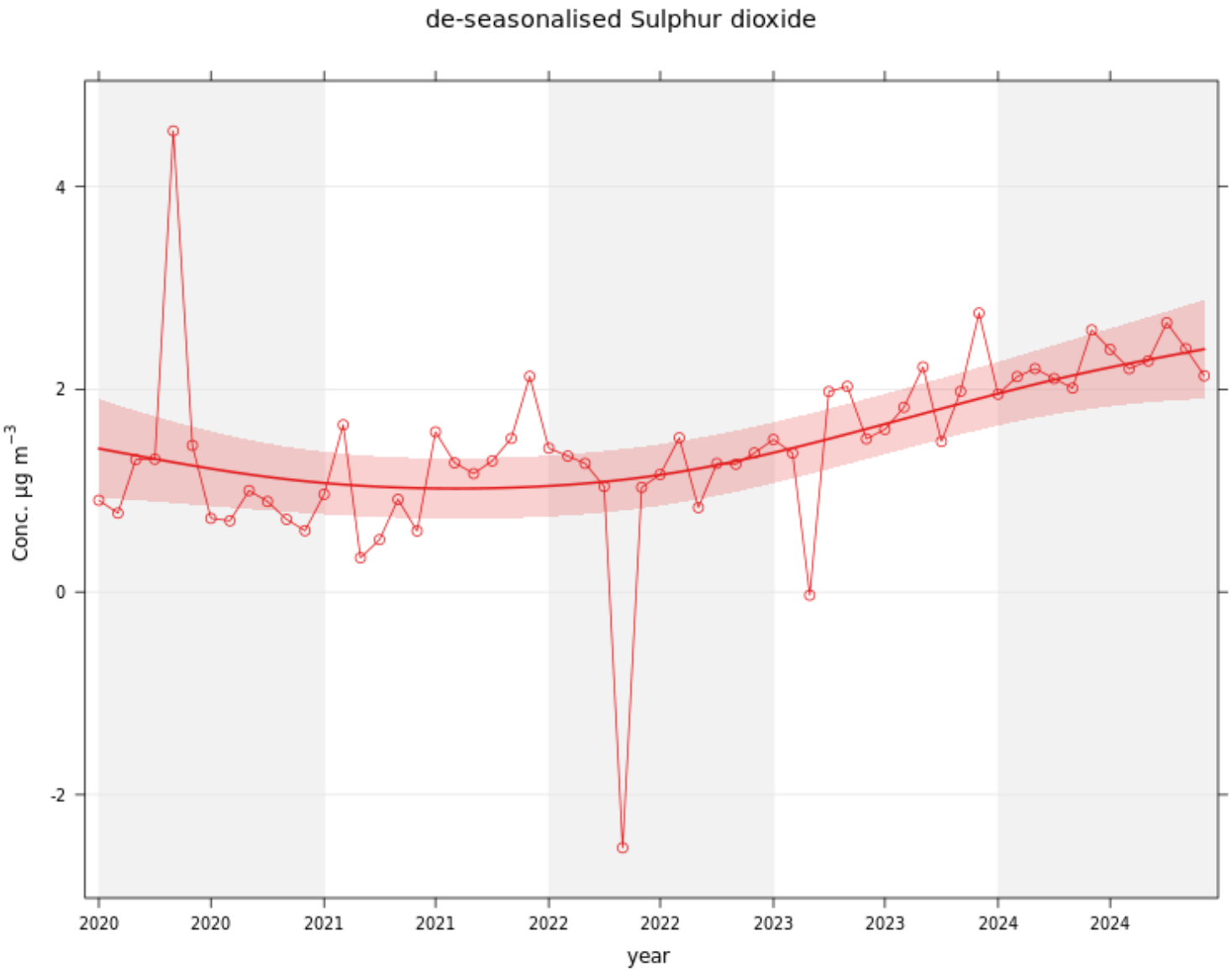


Figure 27 – A11 Grangemouth Zetland Park Long Term SO_2 Concentrations

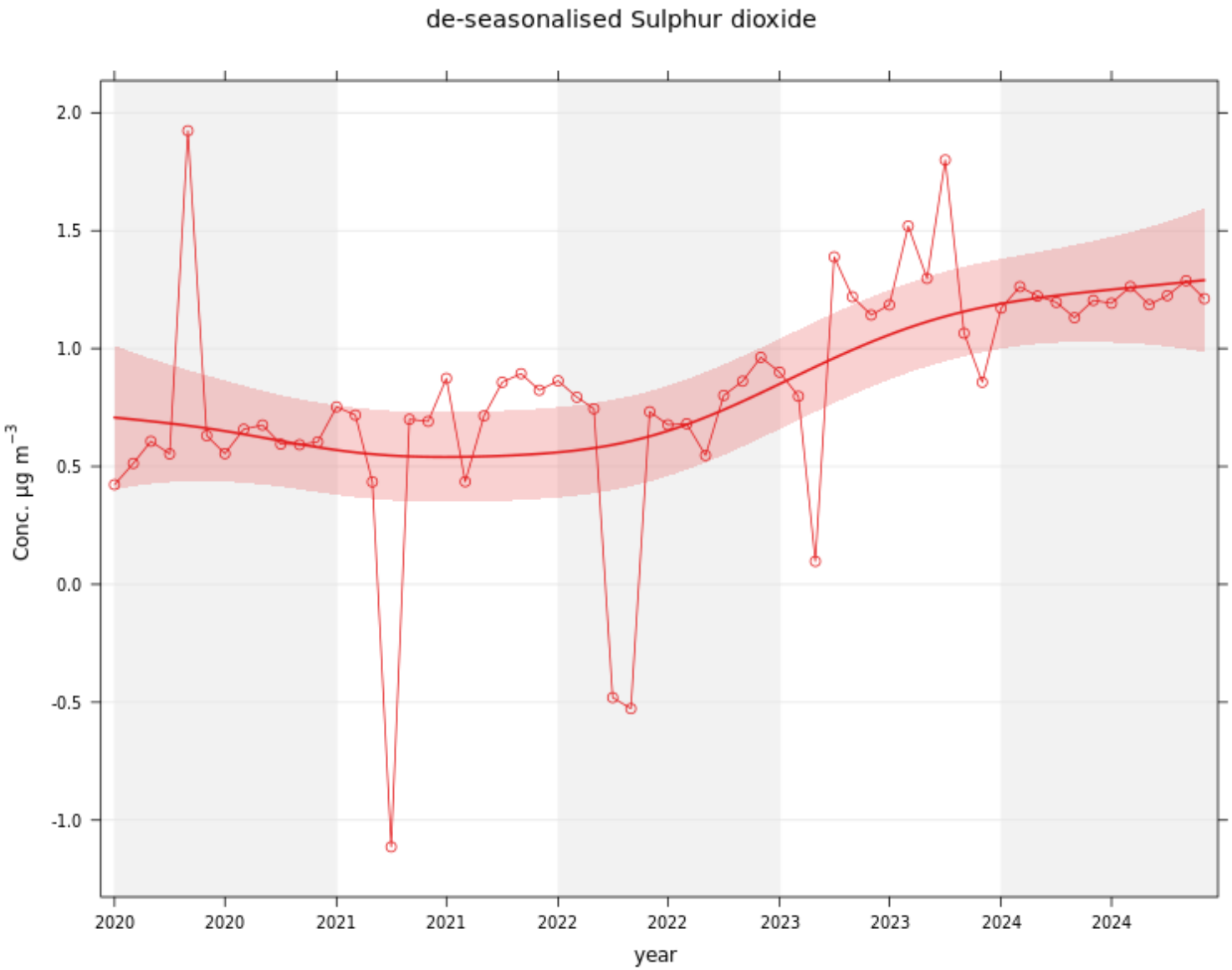
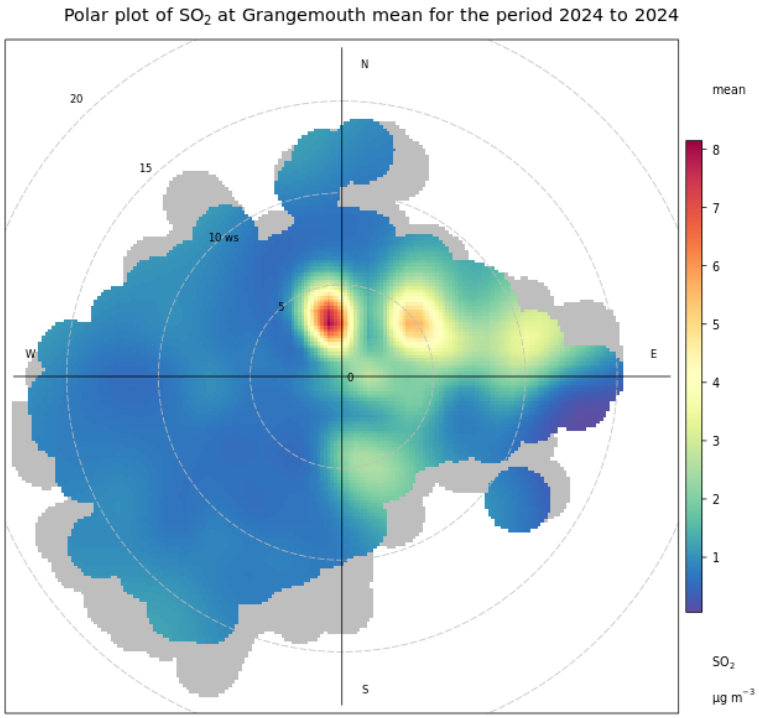
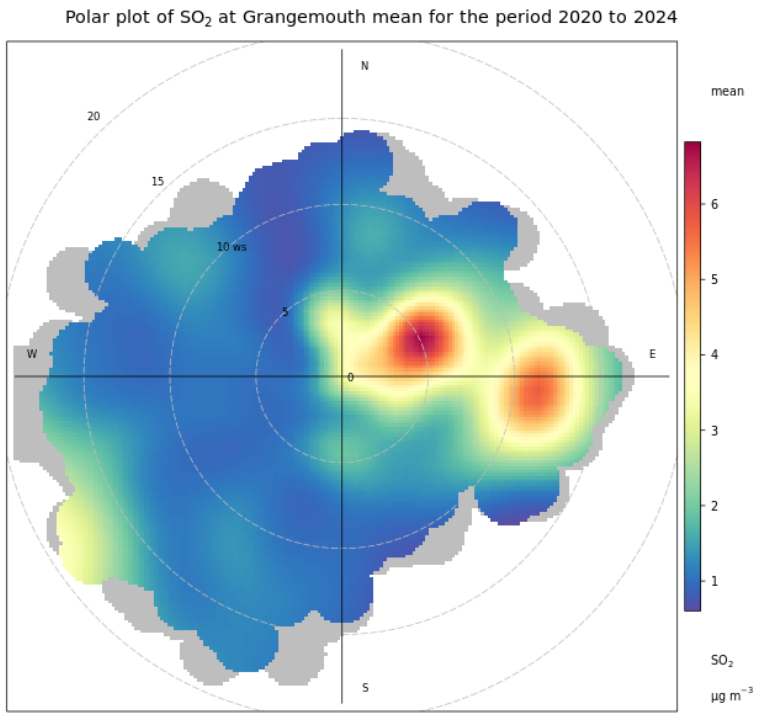


Figure 28 – Polar Plots of Average SO_2 Concentrations Recorded at the Grangemouth Sites

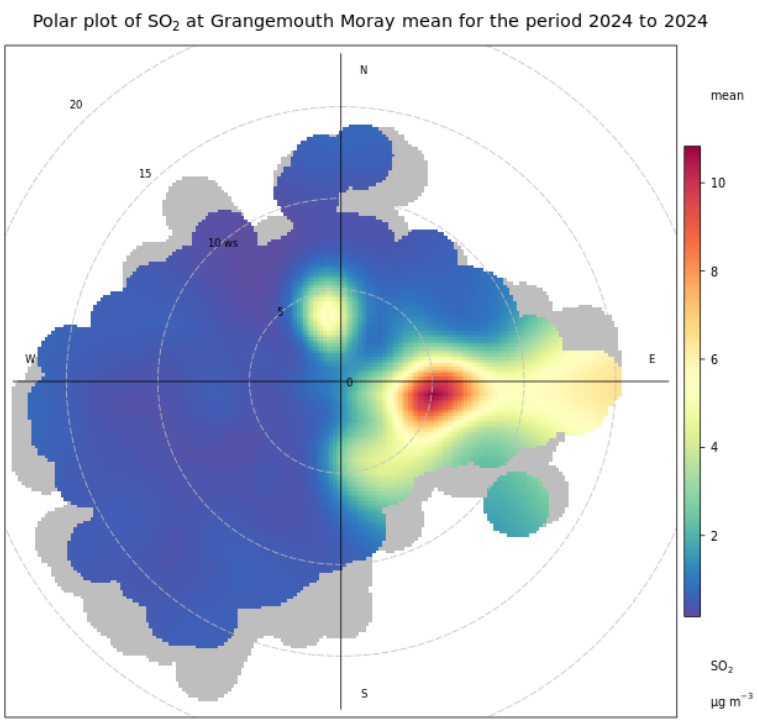
A) Grangemouth AURN: 2024



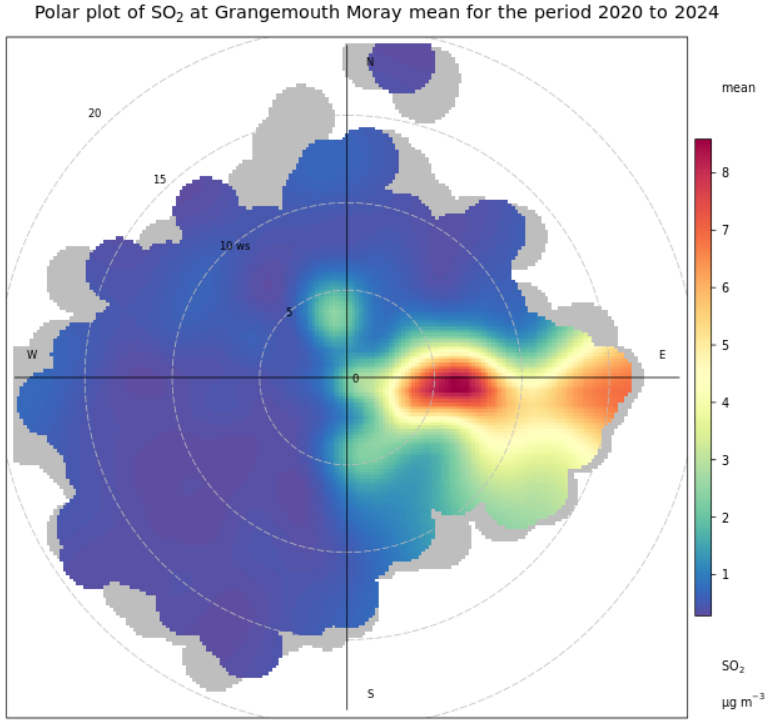
B) Grangemouth AURN: 2020 – 2024



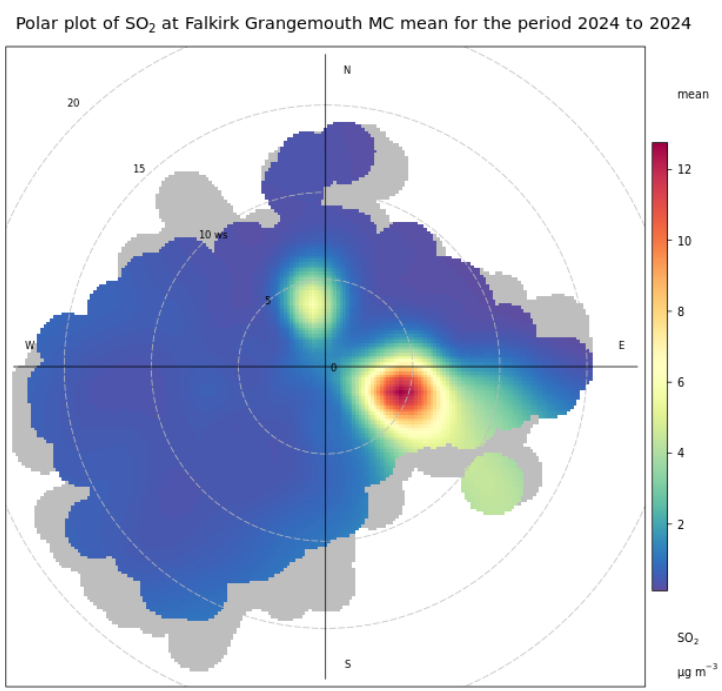
C) Grangemouth Moray: 2024



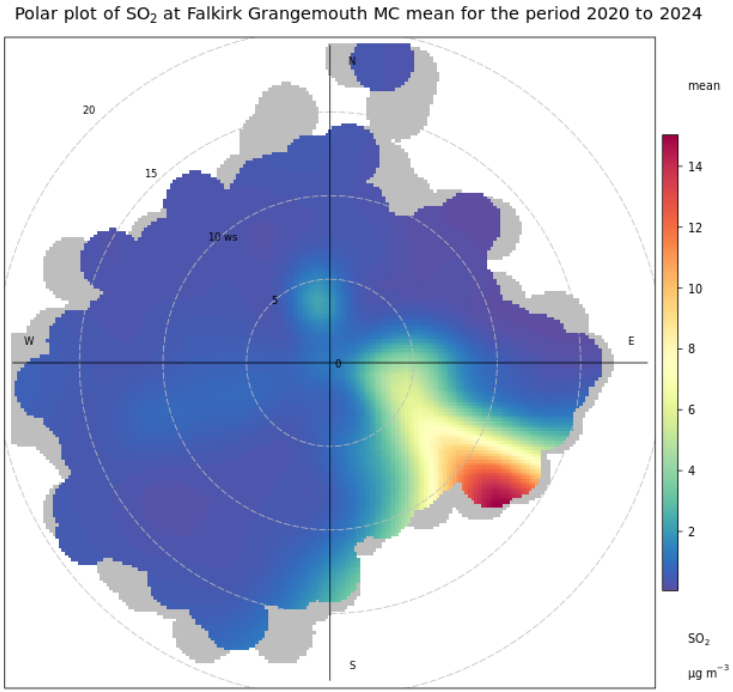
D) Grangemouth Moray 2020 – 2024



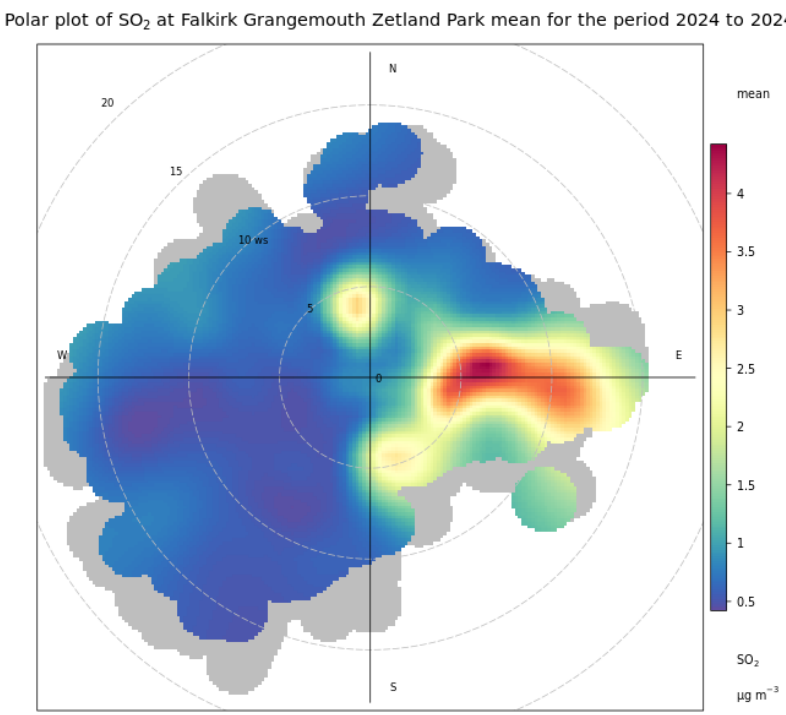
E) Grangemouth Municipal Chambers: 2024



F) Grangemouth Municipal Chambers: 2020 – 2024



G) Grangemouth Zetland Park: 2024



H) Grangemouth Zetland Park: 2020 – 2024

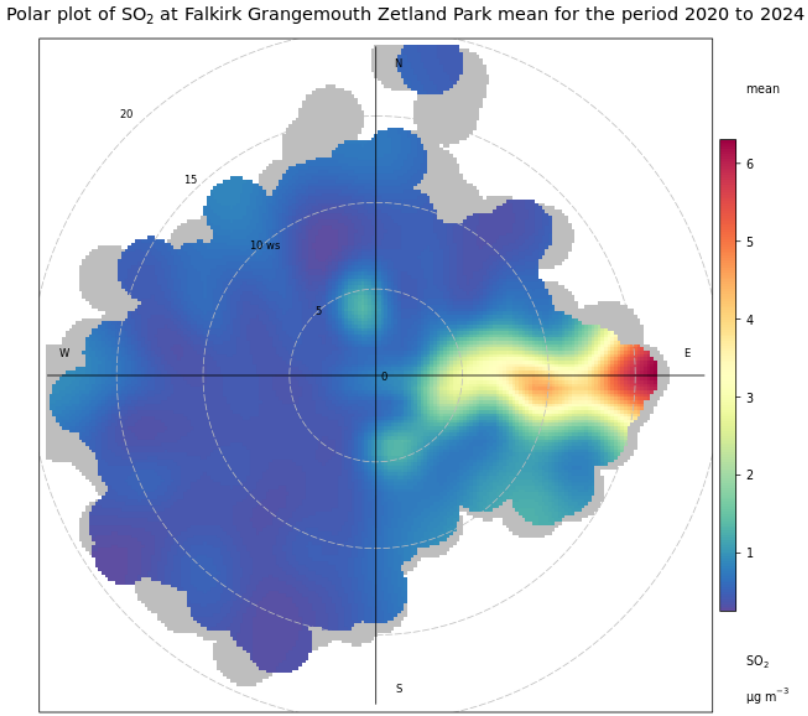


Figure 29 – Exceedances of the 15 Minute SO_2 NAQS Objective Concentration at the Grangemouth Sites 2014 – 2024

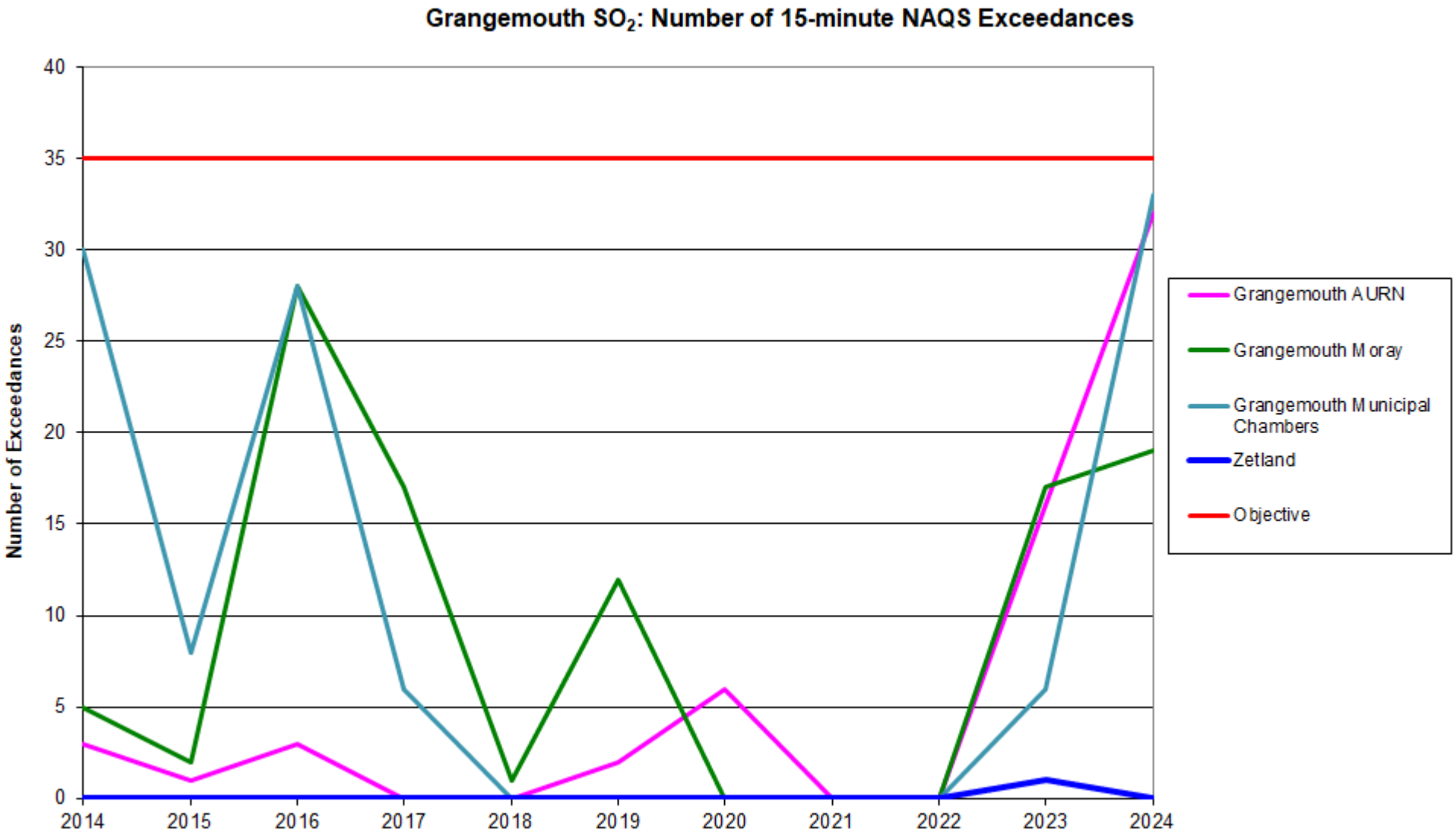


Table A.10 – 1, 3 Butadiene Annual Mean Diffusion Tube Results for 2024

Site ID	Location	Data Capture (%) in 2024	Annual Mean Concentrations (µg/m^3)				
			2020	2021	2022	2023	2024
NA41	Seaview Place, Bo'ness	100	0.05	0.05	0.05	0.05	0.05
NA55	Inchyra Station, Grangemouth	100	0.06	0.05	0.06	0.06	0.05
NA104	Powdrake Road, Grangemouth	100	0.05	0.05	0.05	0.05	0.05

Note: Exceedances of the 1,3 Butadiene running annual mean objective of 2.25µg/m^3 are shown in bold.

Table A.11 – Benzene Annual Mean Diffusion Tube Results for 2024

Site ID	Location	Within AQMA?	Data Capture (%) in 2024	Annual Mean Concentrations (µg/m^3)				
				2020	2021	2022	2023	2024
NA3	Tinto Drive, Grangemouth	N	100	0.48	0.51	0.58	0.54	0.44
NA21	Grangemouth Road, Falkirk College	N	100	0.43	0.37	0.57	0.51	0.51
NA27	West Bridge Street, Falkirk	N	100	0.61	0.54	0.60	0.62	0.64
NA37	Denny Town House	N	100	0.43	0.39	0.51	0.54	0.51
NA38	Larbert Village Primary School	N	100	0.45	0.39	0.45	0.39	0.40
NA41	Seaview Place, Bo'ness	N	100	0.63	0.61	0.74	0.65	0.68
NA42	Municipal Chambers, Grangemouth	N	100	0.45	0.51	0.57	0.96	0.55
NA44	Harvey Avenue, Polmont	N	100	0.38	0.41	0.42	0.45	0.42
NA55	Inchyra AQ Station, Grangemouth	N	100	0.49	0.52	0.58	0.62	0.53
NA77	Kinnaird Village	N	100	0.41	0.38	0.44	0.43	0.43
NA80	Cow Wynd, Falkirk	N	100	0.46	0.45	0.49	0.53	0.47
NA81	Grahams Road, Falkirk	N	100	0.62	0.61	0.74	0.76	0.68
NA94	A905 (Glensburgh Rd), Grangemouth	N	100	0.46	0.49	0.66	0.71	0.54
NA105	West of Shieldhill	N	100	0.25	0.28	0.33	0.32	0.29
NA116	Kersiebank Avenue, Grangemouth	Y	100	0.46	0.45	0.52	0.52	0.47
NA117	Oswald Avenue (East), Grangemouth	Y	100	0.53	0.55	0.64	0.71	0.61

Table A.12 – Pumped Benzene Annual Mean Results for 2024

Site ID	Location	Within AQMA?	Data Capture (%) in 2024	Annual Mean Concentrations (µg/m^3)				
				2020	2021	2022	2023	2024
A8	Grangemouth AURN	Y	100	0.53	0.68	0.66	0.79	0.69

Note: Exceedances of the Benzene running annual mean objective of 3.25µg/m^3 are shown in bold.

Figure 30 – Map of the AQMA Boundary in the Falkirk Council Area

A) Falkirk Town Centre AQMA (NO_2 Annual Mean, PM_{10} annual and 24-hour mean) with relevant diffusion tube locations, declared March 2010

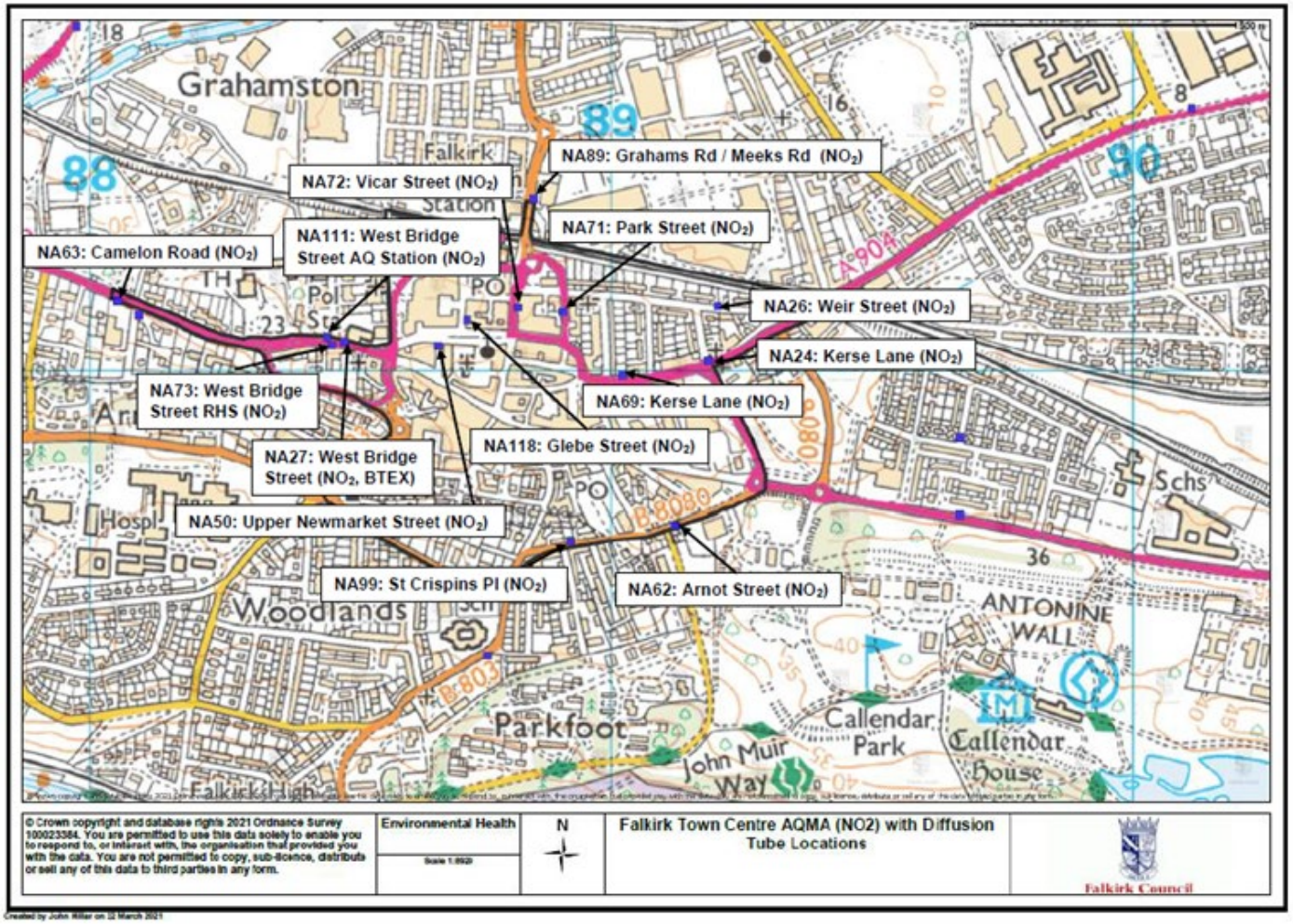
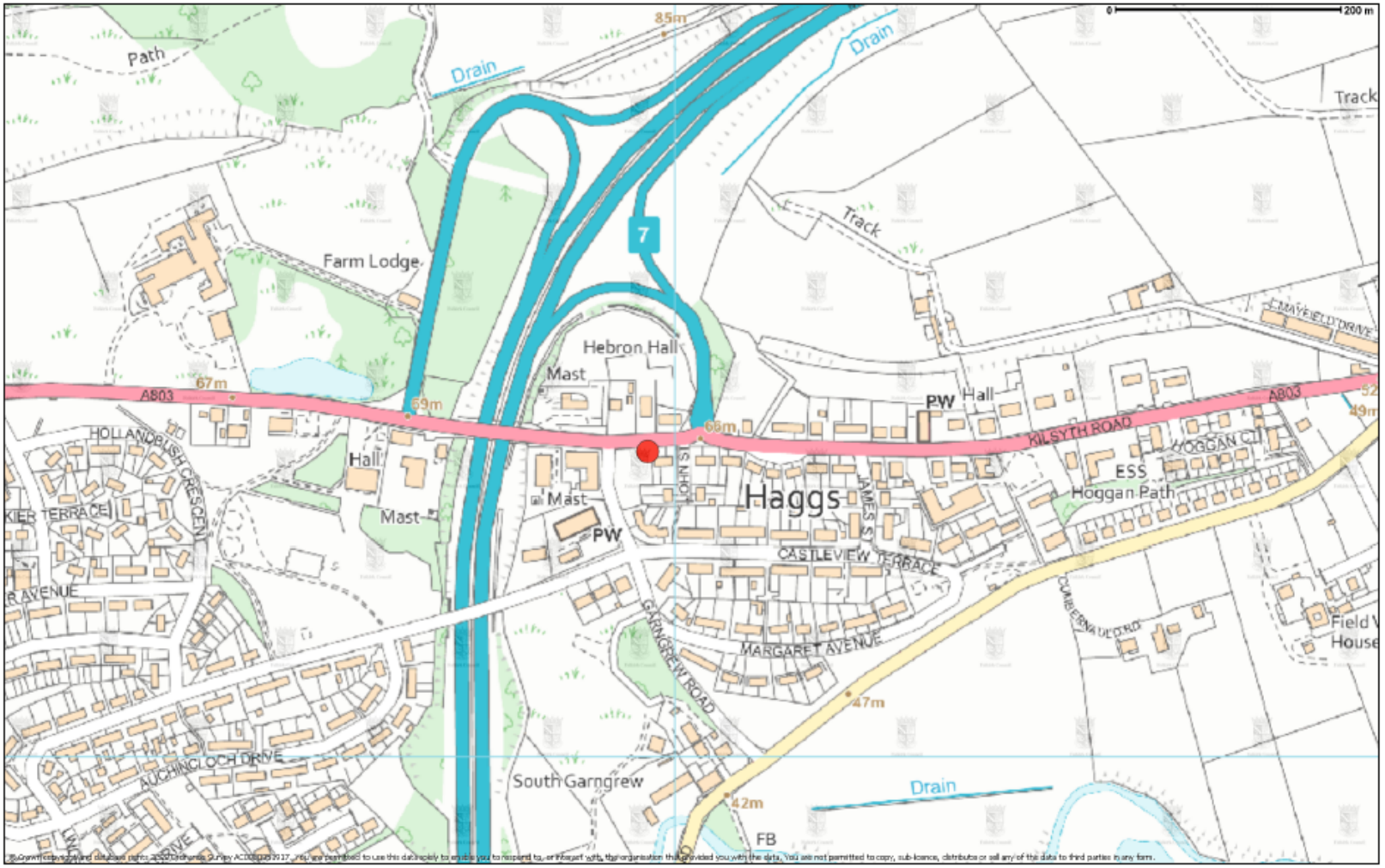


Figure 31 – Maps Showing Automatic Monitoring Locations

A) A3 Bo'ness

B) A4 Haggs


Path
Drain
85m
Drain
Track
Track
Farm Lodge
7
Hebron Hall
Mast
A803
67m
69m
66m
PW
Hall
A803
KILSYTH ROAD
HOLLANDBUSH CRESCENT
Hall
Mast
Mast
PW
Haggs
JAMES ST
CASTLEVIEW TERRACE
Hoggan Path
ESS
MARGARET AVENUE
GARNGREW ROAD
47m
South Garngrew
42m
Drain
FB
AUCHINCLOCH DRIVE
Field
House
0
200 m
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Falkirk Council
Environmental Health
Scale 1:4536
N
A4 Haggs Automatic AQ Station Location
Falkirk Council

C) A5 Falkirk Hope Street

Falkirk Council Environmental Health

Scale 1:4536

N

A5 Falkirk Hope St Automatic AQ Station Location

Falkirk Council

D) A7 Falkirk West Bridge Street

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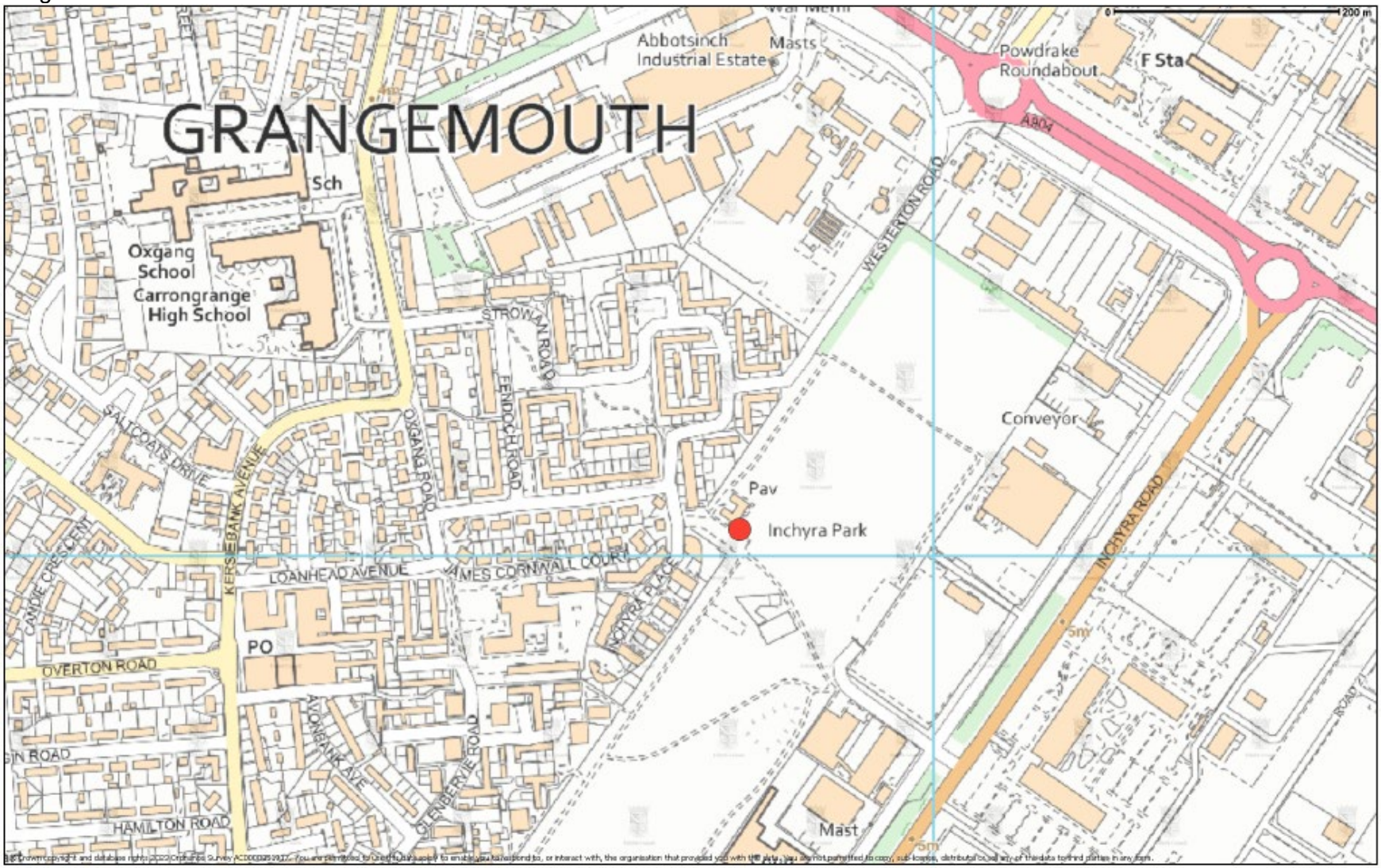
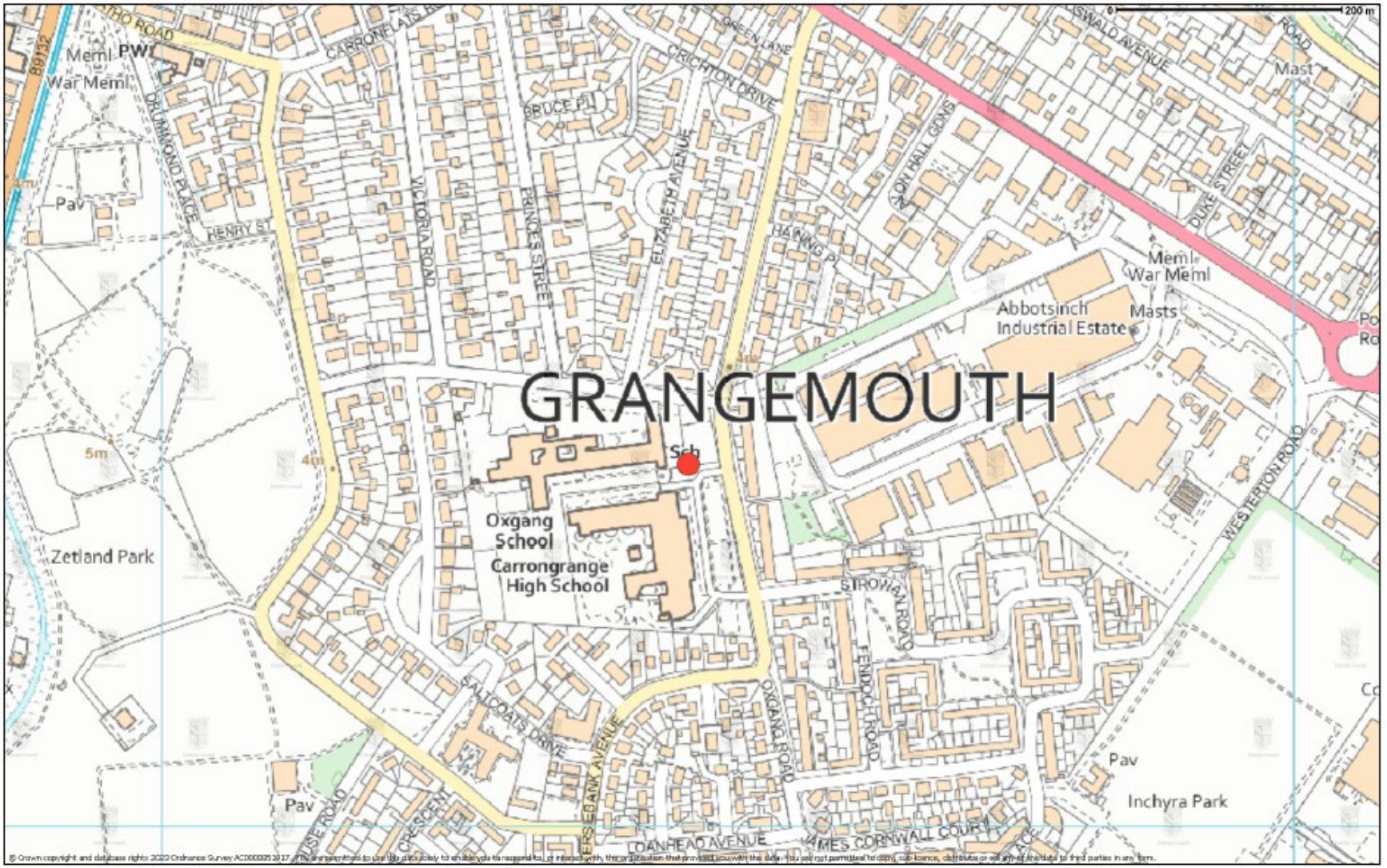
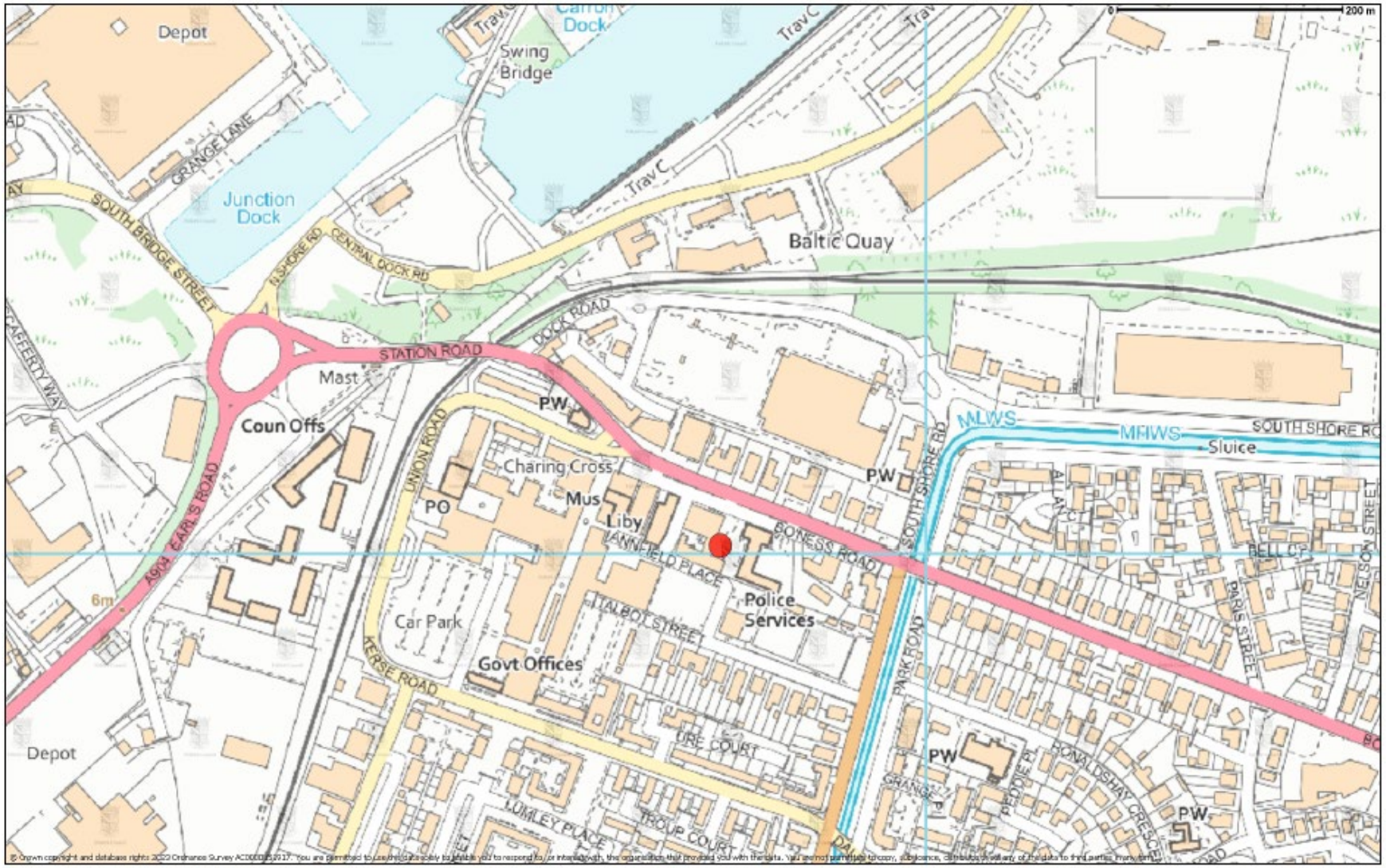
E) A8 Grangemouth AURN



F) A9 Grangemouth Moray



G) A10 Grangemouth Municipal Chambers



Falkirk Council Environmental Health

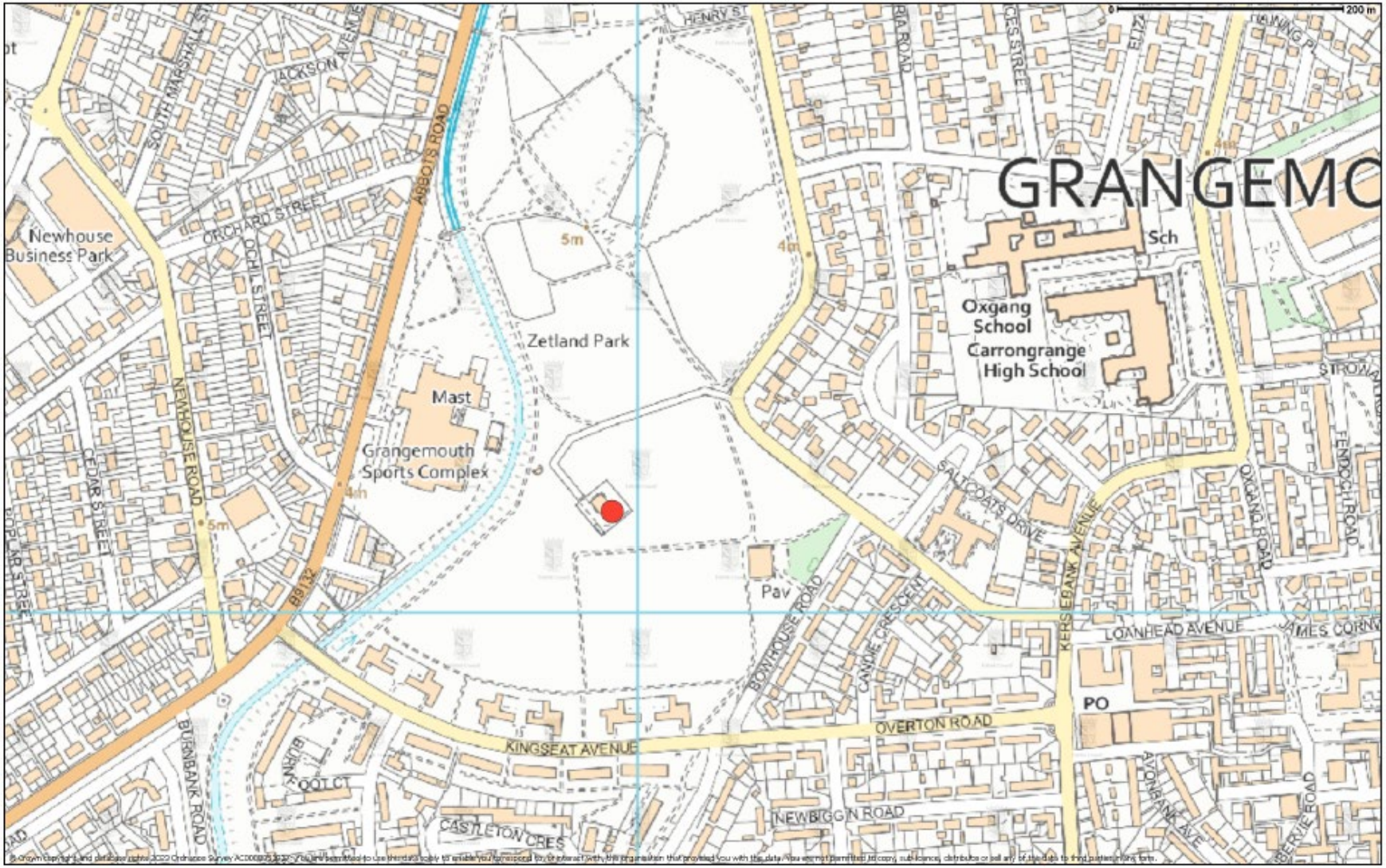
Scale 1:4536

N

A10 Grangemouth Municipal Chambers Automatic AQ Station Location

Falkirk Council

H) A11 Grangemouth Zetland Park



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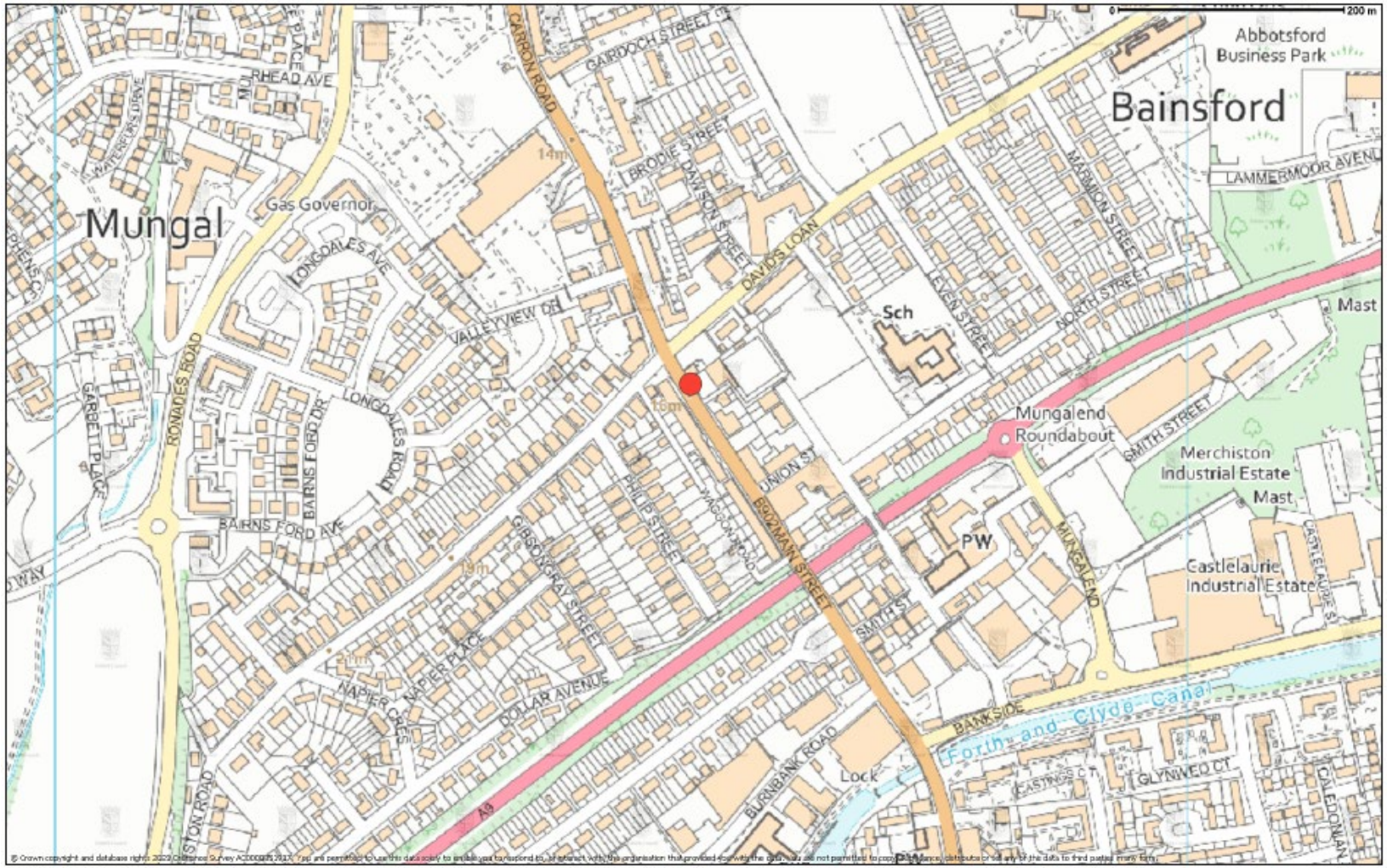
I) A15 Main Street, Bainsford



Falkirk Council Environmental Health

Scale 1:4536

N

A15 Main St, Bainsford Automatic AQ Station Location

Falkirk Council

Appendix B: Full Monthly Diffusion Tube Results for 2024

Table B.1 – NO_2 2024 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 (0.84)	Comment
3	293427	680386	21.34	16.49	12.16	10.54	11.20	7.80	8.27	8.11	13.53	15.58	24.47	14.89	14	12	
5	287332	680333	25.87	20.38	16.22	16.48	16.89	13.08	14.91	15.03	17.92	21.41	29.11	22.59	19	16	
9	286048	683542	25.66	19.01	14.35	14.20	14.94	11.76	12.88	12.46	15.75	19.22	27.42	20.70	17	15	
19	278779	679301	25.21	22.63	21.38	18.45	20.71	10.85	12.26	12.50	19.25	18.59	27.89	18.76	19	16	
20	278957	679169	23.58	-	13.40	13.04	13.37	9.89	11.04	9.76	14.46	16.33	21.38	16.43	15	12	
21	290112	680500	26.75	22.78	22.88	15.40	20.26	12.20	14.36	14.63	16.60	20.20	25.52	18.71	19	16	
24	289189	680018	34.75	25.77	26.11	21.22	25.76	-	19.72	21.16	22.77	22.39	36.22	27.58	26	22	
26	289207	680123	15.80	13.51	12.47	10.09	12.39	6.41	8.35	8.48	12.96	12.97	21.01	14.65	12	10	
27	288490	680055	42.80	38.10	44.41	36.79	41.31	25.55	30.47	-	40.64	37.35	50.20	34.17	38	32	

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 (0.84)	Comment
29	288465	680220	18.14	13.13	16.39	10.05	12.45	5.84	7.45	7.65	12.08	12.71	17.61	13.88	12	10	
36	278985	679273	34.13	24.44	24.06	20.18	-	19.13	21.99	18.78	23.38	24.61	34.36	28.66	25	21	
37	281226	682526	17.01	12.45	11.34	10.11	11.45	5.90	6.63	7.45	9.99	12.94	14.09	12.46	11	9	
38	285930	682318	18.11	15.18	12.16	9.97	11.52	11.75	-	7.70	9.68	13.01	23.57	16.90	14	11	
41	299722	681594	19.11	17.79	18.90	12.10	16.28	11.36	13.29	10.38	13.04	15.75	25.86	17.10	16	13	
42	292817	682000	17.64	14.28	12.20	10.93	12.69	6.96	8.40	9.03	11.74	12.41	21.93	11.55	13	11	
42	292817	682000	20.89	13.44	11.63	10.68	12.74	6.90	8.28	8.23	10.96	13.91	19.29	14.7	13	11	
42	292817	682000	18.51	16.10	13.37	9.02	12.61	7.07	7.54	9.05	10.47	13.70	23.48	16.52	13	11	
44	293436	678938	18.43	14.27	14.19	11.51	12.12	8.64	8.32	9.03	10.56	12.12	19.39	13.76	13	11	
48	289200	681580	22.12	15.87	14.66	11.18	14.69	7.19	7.58	8.19	14.54	13.20	22.01	12.89	14	11	
50	288671	680047	23.25	23.37	30.34	21.48	32.10	14.07	-	11.04	-	19.44	21.66	-	22	18	
51	290965	679490	25.57	23.47	15.72	15.52	16.68	12.02	13.76	13.27	14.51	18.67	25.49	21.17	18	15	

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 (0.84)	Comment
52	285866	682356	23.95	20.00	15.72	14.56	15.81	6.10	12.12	14.02	14.95	20.59	23.61	19.34	17	14	
53	281211	682727	-	12.38	13.85	11.36	12.93	6.56	7.04	-	11.57	11.90	17.28	11.92	12	10	
58	289667	679724	18.59	16.71	15.97	12.89	15.34	8.39	8.74	10.19	15.92	13.22	22.93	14.57	14	12	
59	288392	681931	-	22.77	17.83	19.86	21.71	15.81	16.34	-	17.67	21.92	30.56	23.28	21	17	
60	288133	681587	23.62	20.66	17.44	13.21	-	11.33	13.25	13.12	16.58	19.12	27.52	19.00	18	15	
61	287976	680656	22.20	16.84	15.55	15.02	16.75	9.89	12.04	12.37	14.35	16.02	22.05	18.17	16	13	
62	289125	679705	32.95	30.03	29.89	25.25	26.33	17.69	18.86	22.55	22.99	25.37	28.58	30.01	26	22	
63	288055	680134	35.28	30.91	24.07	26.62	30.15	20.11	22.89	21.46	29.50	30.01	37.41	23.44	28	23	
64	288807	678422	15.53	12.36	13.19	9.21	12.19	6.57	7.15	6.34	11.79	10.50	17.22	11.33	11	9	
65	291356	678644	22.26	17.50	16.44	15.23	17.17	12.76	13.49	11.58	16.48	17.84	24.08	3.01	16	13	
67	289430	680433	26.39	23.51	23.19	18.65	22.11	17.03	17.70	18.89	20.74	20.75	31.04	25.73	22	19	
69	289025	679991	30.04	26.72	27.05	22.87	24.50	17.46	21.61	18.03	25.84	23.37	29.63	19.38	24	20	

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 (0.84)	Comment
71	288910	680112	37.26	29.81	25.16	21.76	25.63	19.00	-	20.16	21.27	30.38	29.59	25.00	26	22	
72	288824	680120	28.73	23.05	21.60	18.35	22.94	13.47	15.91	15.12	20.95	21.31	31.84	22.17	21	18	
73	288467	680048	28.36	23.73	30.40	19.70	28.03	14.91	16.99	16.74	21.36	22.21	29.63	22.95	23	19	
76	286851	683229	22.65	14.51	12.04	8.60	13.30	8.87	9.42	9.78	10.67	12.40	23.52	17.89	14	11	
77	286490	683775	23.90	18.76	14.67	13.00	15.34	10.00	10.13	11.94	14.03	16.25	21.44	17.49	16	13	
78	288525	678991	19.07	20.82	21.17	17.48	20.66	14.99	14.95	13.84	21.76	19.33	19.92	20.09	19	16	
80	288765	679456	29.89	25.05	20.15	15.51	18.40	15.05	15.07	18.09	17.68	20.44	25.76	23.10	20	17	
81	288834	680898	29.16	24.09	24.70	20.45	25.97	15.19	16.30	13.24	22.45	23.16	29.24	22.68	22	19	
82	288858	681036	20.67	14.97	13.23	-	12.83	7.88	7.58	8.52	9.66	14.79	22.48	14.89	13	11	
83	288614	681415	31.37	26.72	22.86	22.86	26.07	21.32	11.75	20.16	23.69	25.99	33.85	29.54	25	21	
85	278752	679049	23.60	17.41	24.09	14.39	18.09	7.08	9.19	8.83	18.00	18.21	-	17.17	16	13	
86	289667	679871	16.12	12.22	11.83	8.02	9.34	5.03	6.60	5.60	10.29	12.20	19.02	13.19	11	9	

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 (0.84)	Comment
87	279017	679305	25.61	6.63	15.40	15.35	18.97	11.45	13.80	15.41	15.75	19.60	27.11	18.25	17	14	
88	282444	681074	28.14	23.01	17.79	16.33	21.08	14.66	16.22	15.38	20.88	18.12	22.83	18.90	19	16	
89	288853	680328	29.43	24.13	20.84	19.45	21.94	15.05	16.18	17.13	18.96	23.87	30.83	22.41	22	18	
94	291213	681927	28.73	21.80	17.20	16.11	18.04	14.64	15.27	15.35	14.76	20.08	30.20	22.56	20	16	
98	288095	680105	21.26	16.85	-	11.53	16.25	8.13	9.77	8.48	15.97	14.12	22.28	17.40	15	12	
99	288924	679675	14.32	22.94	22.79	-	21.76	14.29	14.27	16.05	21.70	21.99	29.64	23.54	20	17	
101	291127	682007	22.06	17.13	15.85	21.66	18.11	8.52	10.03	9.61	-	16.28	24.65	17.63	17	14	
105	288292	676889	7.35	5.89	4.95	3.99	5.82	2.40	3.73	3.46	4.95	6.60	7.27	6.62	5	4	
107	288640	681396	24.15	19.18	15.79	14.88	15.45	12.28	19.35	10.65	14.97	19.43	26.71	21.01	18	15	
111	288457	680064	34.63	30.48	33.50	20.87	37.25	23.11	25.34	21.73	36.34	31.47	38.17	28.32	30	25	
111	288457	680064	37.41	32.12	37.99	29.66	36.86	21.55	22.40	20.36	34.11	28.18	34.80	24.80	30	25	
111	288457	680064	36.22	30.51	34.99	31.18	38.55	23.25	22.66	19.59	32.79	30.23	35.96	23.40	30	25	

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 (0.84)	Comment
114	286624	680577	22.88	16.12	17.24	15.88	19.65	10.85	10.26	-	20.43	17.26	24.18	16.38	17	15	
115	286761	680413	18.29	12.25	14.31	8.47	14.53	6.04	7.49	-	11.65	13.20	17.51	13.85	13	11	
116	293671	680347	21.91	16.82	16.03	12.18	12.94	7.94	8.91	9.12	12.18	13.84	21.58	15.33	14	12	
117	294101	681532	20.55	15.23	11.02	11.02	12.66	8.19	7.96	8.85	11.18	13.30	22.09	16.46	13	11	
118	288726	680096	27.45	23.60	26.97	19.64	23.22	13.55	15.42	13.68	24.43	22.01	27.85	22.41	22	18	
119	288728	681383	21.34	19.18	18.88	12.84	16.25	10.52	10.59	11.47	13.45	18.08	21.85	17.43	16	13	
120	294097	681488	22.77	17.80	13.78	12.98	16.35	8.72	10.38	10.55	12.26	16.51	22.80	14.05	15	13	
121	291956	680522	27.62	17.78	28.02	19.12	22.01	10.36	13.45	11.79	21.03	20.88	26.36	19.26	20	17	

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1 (confirm by selecting in box).**

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22 (confirm by selecting in box).**

☒ **Local bias adjustment factor used (confirm by selecting in box).**

☐ **National bias adjustment factor used (confirm by selecting in box).**

☐ **Where applicable, data has been distance corrected for relevant exposure in the final column (confirm by selecting in box).**

☐ **Falkirk Council confirm that all 2024 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System (confirm by selecting in box).**

Notes:

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

NO_2 annual means exceeding 60 µg/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.

Table B.2 – 1,3 Butadiene Monthly Diffusion Tube Results for 2024

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data (ppb)	Annual Mean: Raw Data (µg/m^3)
41	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05
55	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05
104	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05

Table B.3 – Benzene Monthly Diffusion Tube Results for 2024

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data (ppb)	Annual Mean: Raw Data (µg/m^3)
3	0.22	0.17	0.16	0.11	0.12	0.10	0.09	0.09	0.19	0.14	0.07	0.15	0.13	0.44
21	0.26	0.18	0.10	0.12	0.11	0.09	0.14	0.12	0.16	0.14	0.28	0.18	0.16	0.51
27	0.34	0.22	0.23	0.16	0.15	0.09	0.12	0.13	0.21	0.18	0.34	0.19	0.20	0.64
37	0.25	0.15	0.17	0.10	0.13	0.10	0.13	0.15	0.16	0.16	0.23	0.14	0.16	0.51
38	0.07	0.17	0.21	0.10	0.11	0.07	0.07	0.08	0.11	0.15	0.20	0.14	0.12	0.40
41	0.33	0.23	0.23	0.17	0.11	0.12	0.13	0.14	0.20	0.20	0.38	0.27	0.21	0.68
42	0.26	0.22	0.28	0.18	0.09	0.09	0.09	0.10	0.17	0.18	0.22	0.15	0.17	0.55
44	0.17	0.13	0.13	0.09	0.09	0.07	0.09	0.09	0.15	0.14	0.24	0.16	0.13	0.42
55	0.26	0.18	0.22	0.12	0.15	0.10	0.15	0.12	0.18	0.15	0.18	0.14	0.16	0.53
77	0.19	0.16	0.17	0.12	0.11	0.07	0.08	0.08	0.12	0.13	0.20	0.14	0.13	0.43
80	0.21	0.17	0.20	0.11	0.10	0.08	0.11	0.10	0.15	0.15	0.20	0.16	0.15	0.47
81	0.32	0.25	0.22	0.14	0.20	0.13	0.14	0.15	0.19	0.18	0.36	0.23	0.21	0.68
94	0.20	0.20	0.47	0.17	0.16	0.10	0.10	0.11	0.10	0.16	0.07	0.17	0.17	0.54
105	0.15	0.09	0.10	0.08	0.08	0.07	0.07	0.06	0.10	0.08	0.07	0.11	0.09	0.29
116	0.25	0.16	0.19	0.11	0.12	0.07	0.08	0.11	0.07	0.17	0.26	0.16	0.15	0.47
120	0.26	0.27	0.24	0.14	0.28	0.12	0.15	0.13	0.27	0.18	0.07	0.15	0.19	0.61

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

New or Changed Sources Identified Within Falkirk Council During 2024

Falkirk Council has not identified any new sources relating to air quality within the reporting year of 2024.

Additional Air Quality Works Undertaken by Falkirk Council During 2024

Falkirk Council Air Quality Strategy 2025-2029

2024 Grangemouth Emissions Study

2024 Grangemouth AQMA Detailed Assessment

QA/QC of Diffusion Tube Monitoring

In 2024, the nitrogen dioxide (NO_2), benzene and 1, 3-butadiene ambient air diffusion tubes deployed by Falkirk Council were supplied and analysed by Gradko International Ltd. The analysis method used for the NO_2 tubes was 50% tri-ethanolamine (TEA) and 50% acetone. The benzene tube type was Carbograph 1TD (thermal desorption / gas chromatography) and for 1, 3-butadiene the tube type was Carbopack X (ATD) with analysis using TD-GCMS. The diffusion tube monitoring has been completed in adherence with the DEFRA 2024 Diffusion Tube Calendar and with all monitoring data and additional bias / annualisation information entered into the latest DEFRA Diffusion Tube Data Processing Tool.

Nitrogen Dioxide Diffusion Tubes

In 2024, the NO_2 diffusion tube analysis was completed by Gradko International Ltd. Gradko adheres to the DEFRA guidance for the preparation and analysis of the NO_2 diffusion tubes. All the results relating to the concentration of NO_2 present on the diffusion tube are within the scope of Gradko's United Kingdom Accreditation Service (UKAS) accreditation.

The full set of monthly NO_2 diffusion tube results are shown in Table B.1 in Appendix B.

1, 3-Butadiene Diffusion Tubes

Gradko International Ltd. Performed the quantitative analysis of 1, 3-butadiene on diffusion tubes by TD-GCMS. Analysis has been completed in accordance with in-house method 'GLM 13-6' under UKAS fixed scope accreditation.

The full set of monthly 1, 3-butadiene diffusion tube results are shown in Table B.2 in Appendix B.

Benzene Diffusion Tubes

Gradko International Ltd. analysed Falkirk Council's benzene diffusion tubes by ATD-GC-MS. Analysis has been completed in accordance with Gradko's in-house method 'GLM 4' under UKAS fixed scope accreditation. The full set of monthly Benzene diffusion tube results are shown in Table B.3 in Appendix B.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Falkirk Council recorded data capture of 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

Falkirk Council have applied a local bias adjustment factor of **0.84** to the 2024 monitoring data. A summary of bias adjustment factors used by Falkirk Council over the past five years is presented in C.1.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2024	Local	-	0.84
2023	Local	-	0.88
2022	Local	-	0.84
2021	Local	-	0.84
2020	Local	-	0.94

NO_2 Diffusion Tube Bias Adjustment Factor (Local and National)

In accordance with LAQM TG22[Ref 2], a locally derived bias adjustment factor has been calculated for the 2024 NO_2 diffusion tube results based on the following two co-location sites: NA42 Grangemouth Municipal Chambers and NA111 Falkirk West Bridge Street. The local results have been submitted to the LAQM Helpdesk to contribute to the national bias factor.

The results of the locally derived bias adjustment factor spreadsheets are shown in Figure 27 A) and B).

The national diffusion tube bias adjustment factor spreadsheet is displayed in Figure 28 for comparison purposes. The overall national bias factor in 2024 was **0.88.**

A comparison in summary form of the local and national bias factor summary is shown in table C.2.

Table C.2 – Comparison of Local vs National Bias Factor Summary

Local NO_2 Bias Adjustment Factor	**0.84**
National NO_2 Bias Adjustment Factor	**0.88**
Difference	**0.04**

In accordance with LAQM TG22[Ref 2] Box 7.13–data quality checks of the local bias adjustment spreadsheet have been assessed as ‘good’ for the Falkirk West Bridge Street and Grangemouth Municipal Chambers site (Precision and Monitoring Data). Falkirk Council have a full years’ worth of co-location data at the representative locations (A7 West Bridge Street: roadside – traffic related, elevated NO_2 levels at typical daytime peak traffic periods and A10 Grangemouth Municipal Chambers: Urban background / Industrial – typical off-street urban location that is likely to measure traffic and industrial emissions).

Using the above reasons, it has been decided to apply the locally derived bias adjustment factor for the NO_2 diffusion tube results.

NO_2 Fall-off with Distance from the Road

No diffusion tube NO_2 monitoring locations within Falkirk Council required distance correction during 2024.

Figure 32 – NO_2 Locally Derived Bias Adjustment Factor Spreadsheets

A) A7 Falkirk West Bridge St

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	03/01/2024	31/01/2024	34.6	37.4	36.2	36	1.4	4	3.5	33	99	Good	Good
2	31/01/2024	06/03/2024	30.5	32.1	30.5	31	0.9	3	2.3	15.5	21	Good	or Data Captu
3	06/03/2024	03/04/2024	33.5	38.0	35.0	35	2.3	6	5.7	32.8	100	Good	Good
4	03/04/2024	01/05/2024	20.9	29.7	31.2	27	5.6	20	13.8	23.8	99	Poor Precision	Good
5	01/05/2024	05/06/2024	37.3	36.9	38.6	38	0.9	2	2.2	30	23	Good	or Data Captu
6	05/06/2024	03/07/2024	23.1	21.6	23.3	23	0.9	4	2.3	17	64	Good	or Data Captu
7	03/07/2024	31/07/2024	25.3	22.4	22.7	23	1.6	7	4.0	18	98	Good	Good
8	31/07/2024	04/09/2024	21.7	20.4	19.6	21	1.1	5	2.7	15	85	Good	Good
9	04/09/2024	02/10/2024	36.3	34.1	32.8	34	1.8	5	4.5	28	92	Good	Good
10	02/10/2024	06/11/2024	31.5	28.2	30.2	30	1.7	6	4.1	24	86	Good	Good
11	06/11/2024	04/12/2024	38.2	34.8	36.0	36	1.7	5	4.3	0	0	Good	or Data Captu
12	04/12/2024	08/01/2025	28.3	24.8	23.4	26	2.5	10	6.3	13.3	50	Good	or Data Captu
										Overall survey -->		Good precision	Poor Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

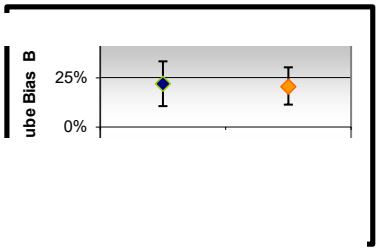
Site Name/ ID:	Falkirk WBS

Precision	11 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 6 periods of data	
Bias factor A	0.84 (0.77 - 0.93)
Bias B	19% (7% - 31%)
Diffusion Tubes Mean:	30 µgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	25 µgm^{-3}
Data Capture for periods used:	93%
Adjusted Tubes Mean:	25 (23 - 28) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 7 periods of data	
Bias factor A	0.85 (0.78 - 0.92)
Bias B	18% (9% - 28%)
Diffusion Tubes Mean:	30 µgm^{-3}
Mean CV (Precision):	8
Automatic Mean:	25 µgm^{-3}
Data Capture for periods used:	94%
Adjusted Tubes Mean:	25 (23 - 27) µgm^{-3}

Accuracy calculations)



Version 04 - February 2011

B) A10 Grangemouth Municipal Chambers

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	03/01/2024	31/01/2024	17.6	20.9	18.5	19	1.7	9	4.2	19.6	99	Good	Good
2	31/01/2024	06/03/2024	14.3	13.4	16.1	15	1.4	9	3.4	14.8	97	Good	Good
3	06/03/2024	03/04/2024	12.2	11.6	13.4	12	0.9	7	2.2	13.8	98	Good	Good
4	03/04/2024	01/05/2024	10.9	10.7	9.0	10	1.0	10	2.6	11.2	98	Good	Good
5	01/05/2024	05/06/2024	12.7	12.7	12.6	13	0.1	1	0.2	14	98	Good	Good
6	05/06/2024	03/07/2024	7.0	6.9	7.1	7	0.1	1	0.2	8	95	Good	Good
7	03/07/2024	31/07/2024	8.4	8.3	7.5	8	0.5	6	1.2	8	98	Good	Good
8	31/07/2024	04/09/2024	9.0	8.2	9.1	9	0.5	5	1.2	7	97	Good	Good
9	04/09/2024	02/10/2024	11.7	11.0	10.5	11	0.6	6	1.6	13	97	Good	Good
10	02/10/2024	06/11/2024	12.4	13.9	13.7	13	0.8	6	2.0	13	100	Good	Good
11	06/11/2024	04/12/2024	21.9	19.3	23.5	22	2.1	10	5.3	23.4	97	Good	Good
12	04/12/2024	08/01/2025	11.6	14.7	16.5	14	2.5	18	6.2	14	95	Good	Good
13													

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey --> Good precision | Good Overall DC

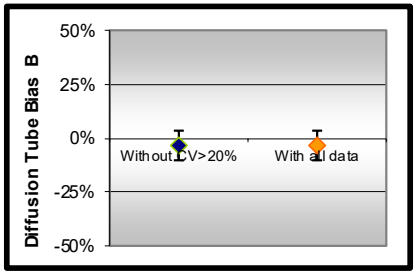
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	1.05 (0.97 - 1.13)
Bias B	-4% (-11% - 3%)
Diffusion Tubes Mean:	13 μgm^{-3}
Mean CV (Precision):	7
Automatic Mean:	13 μgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	13 (12 - 14) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	1.05 (0.97 - 1.13)
Bias B	-4% (-11% - 3%)
Diffusion Tubes Mean:	13 μgm^{-3}
Mean CV (Precision):	7
Automatic Mean:	13 μgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	13 (12 - 14) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Table C.2 – Local Bias Adjustment Calculations

A) Calculation of Two Colocation Results: A7 Falkirk West Bridge St and A10 Grangemouth Municipal Chambers

	Local Bias Adjustment Input 1 (Site: FWBS)	Local Bias Adjustment Input 2 (Site: GMC)
Periods used to calculate bias	12	12
Bias Factor A	**0.85 (0.78 – 0.92)**	**1.05 (0.97 – 1.13)**
Bias Factor B	18% (9% - 28%)	-4% (-11% - 3%)
Diffusion Tube Mean (µg/m^3)	30	13
Mean CV (Precision)	8%	7%
Automatic Mean (µg/m^3)	25	13
Data Capture	94%	97%
Adjusted Tube Mean (µg/m^3)	25 (23 – 27)	13 (12 – 14)

	FWBS (%)	GMC (%)	Average (%)	2 Locations Factor	Inverse to give Bias Adjustment factor
Bias Factor B	**18**	**-4**	**7**	**1.195**	**0.84**

Notes: A combined local bias adjustment factor of **0.84** (0.85 – 1.05) has been used to bias adjust the 2024 diffusion tube results.

Automatic Monitoring Annualisation

All automatic monitoring locations within Falkirk Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

QA/QC of Automatic Monitoring

Table C. 5 – Details of the QA / QC at the Automatic Monitoring Stations in 2024

QA / QC in 2024		
Site	**Analyser**	**Network**
A3. Bo'ness	SO_2	SAQN
	$PM_{10+2.5}$ (Fidas)	
A4. Falkirk Haggs	NO_x	SAQN
	$PM_{10+2.5}$ (Fidas)	
A5. Falkirk Hope St	NO_x	SAQN
	SO_2	
	$PM_{10+2.5}$ (Fidas)	
A7. Falkirk West Bridge St	NO_x	SAQN
	$PM_{10+2.5}$ (Fidas)	
A8. Grangemouth AURN (Inchyra)	NO_x	AURN
	PM_{10} (BAM)	
	$PM_{2.5}$ (BAM)	
	SO_2	
A9. Grangemouth Moray	NO_x	AURN

	SO_2	SAQN
	$PM_{10+2.5}$ (Fidas)	
A10. Grangemouth Municipal Chambers	NO_x	SAQN
	$PM_{10+2.5}$ (Fidas)	
	SO_2	
A11. Grangemouth Zetland Park	SO_2	SAQN
	$PM_{10+2.5}$ (Fidas)	
A15 Main St Bainsford	NO_x	SAQN
	$PM_{10+2.5}$ (Fidas)	SAQN

Local sites:

- Analyser data is downloaded, and a flow check is completed on a fortnightly basis.

- A filter change is completed on an approximate four weekly basis, although this is dependent on the weather and filter loading. The filters are retained for analysis.

- As with the other sites all LSO site visits are completed by Falkirk Council staffs that are audited to AURN standards.

AURN and Scottish AQ network sites:

- All NO_x and SO_2 analysers receive fortnightly zero and span checks and filter changes.

- BAM PM_{10} and $PM_{2.5}$ nozzles are cleaned and tapes are changed every eight weeks.

- All LSO site visits are carried out by Falkirk Council staffs that are audited to AURN standards.

- Analysers are covered by an emergency callout contract and receive a service every six months.

- QA / QC are conducted to AURN / 'national' standards.

- All air quality data presented within this APR are fully ratified. Ratified data is collected from the Air Quality in Scotland website. Full details of the data QA / QC ratification process are detailed here: https://www.scottishairquality.scot/data/verification-ratification

- Live air quality data from all Falkirk Council sites are presented on the Air Quality in Scotland website.

- Falkirk Council also checks the data on its internal systems and is in regular communication with Ricardo to ensure the best data quality is collected / presented. Unscaled data is supplied by Falkirk Council to Ricardo for the Scottish AQ Network sites on a six-monthly basis to improve data capture.

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

In accordance with the Scottish Government Guidance Note: Measurement of Ambient Particulate Matter (PM) and the LAQM Reporting of Measured Concentrations, May 2024[Ref 3]. Corrected and uncorrected results (greyed out) are displayed in Table A.6 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$) and Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$) for PM concentrations with Palas Fidas 200 analysers in operation.

NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within Falkirk Council required distance correction during 2024.

Appendix D - Additional Air Quality Works Undertaken by Falkirk Council During 2024

Falkirk Council Air Quality Strategy 2025-2029

2024 Grangemouth Emissions Study

2024 Grangemouth AQMA Detailed Assessment

Glossary of Terms

Abbreviation	Description
AADT	Annual Average Daily Traffic – total volume of vehicle traffic on a highway or road for a year divided by 365 days.
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
AQIA	Air Quality Impact Assessment
APR	Annual Progress Report in relation to air quality
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
BAM	Beta Attenuation Monitor
CAFS	Cleaner Air for Scotland
DEFRA	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
ECSVEP	East Central Scotland Vehicle Emissions Partnership
EfW	Energy from Waste
EIA	Environmental Impact Assessment
EPUK	Environmental Protection UK
EU	European Union
FEL	Forth Environment Link
FDMS	Filter Dynamics Measurement System
FPS	Flood Prevention Scheme
GCMS	Gas Chromatography–Mass Spectrometry - analysis method
HDV	Heavy Duty Vehicle

IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
MCPD	Medium Combustion Plant Directive
NAQS	National Air Quality Strategy
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
PDU	Public Display Unit
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
PV	Photovoltaic (in relation to solar energy)
QA/QC	Quality Assurance and Quality Control
SEA	Supporting Environmental Appraisal
SEPA	Scottish Environment Protection Agency
SO_2	Sulphur Dioxide
TD	Thermal Desorption – Analysis Method
TEOM	Tapered Element Oscillating Microbalance
TGT	Tail Gas Treatment

References

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3.https://www.scottishairquality.scot/technical-reports/equivalence-study-investigate-particulate-matter-monitoring-scotland-using-fidas "Equivalence Study to Investigate Particulate Matter Monitoring in Scotland Using The Fidas 200", Ricardo for The Scottish Government, Ref: ED11195, Issue 1, Published: 10/05/2023

4.. Civil Aviation Authority, UK Airport Statistics, CAA, Accessed June 2025.