# **Annual Progress Report (APR)**



2024 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 2024

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## **Executive Summary: Air Quality in Our Area**

## Air Quality in Falkirk Council

In 2023, 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 2023.

The Falkirk Council air quality monitoring results have shown an overall decrease in NAQS objective exceedances from 2019 for all pollutants measured by automatic monitoring stations.

Falkirk Council endeavour 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 2023, Falkirk Council made significant progress in implementing these measures. To illustrate, there are now one-hundred and seventy-four 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 2024. This action helps to promote alternative / sustainable modes of travel and to achieve measures included in Falkirk Council's Climate Change and Sustainability Policies.

The Falkirk Stadium Vehicle Charging Hub was opened in 2020 and became operational accepting electric vehicles to park and charge-up. The £1.4m facility has charging capacity for twenty-six electric vehicles - 30% more than the second largest EV facility in Scotland which supports the Scottish Government's ambition to phase-out the need for new petrol and diesel vehicles by 2032 as outlined in the Scottish Government's <u>Renewable and Low</u> <u>Carbon Energy Policy</u>. The Falkirk Stadium Vehicle Charging hub is an integral part of Transport Scotland's "Electric A9" project with the overall aim of improving the electric vehicle charging infrastructure throughout Scotland.

Falkirk Council's vehicle fleet was enhanced and expanded in 2023 which now includes one hundred and fifty-three fully electric vehicles (EV) including minibuses, vans and cars.

Falkirk Council has taken delivery of twenty-six new electric vans, boosting its green fleet and ability to operate more sustainably into the future.

Part of a Council-wide <u>Green Fleet Initiative</u> to achieve a zero emission fleet, the newly added EVs in 2023 will replace ageing diesel counterparts currently used by Building Maintenance. Further information on the Council's new electric fleet can be found using the following Falkirk Council <u>weblink</u>.

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 <u>Scotland's Net Zero</u> targets.

The Council also promoted a variety of active and sustainable travel measures such <u>Take</u> <u>the Right Route</u> and <u>Falkirk Council Active Travel Strategy</u> in 2023/24 to help reduce overall local 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<sub>2</sub>)

The 2023 air quality monitoring results (as displayed in Appendix A 'Table A.3" and "Table A.5") show that all seven automatic nitrogen dioxide (NO<sub>2</sub>) analysers in Falkirk Council's air monitoring network achieved both NO<sub>2</sub> NAQS (1hr and annual mean) objectives.

## Particulate Matter (PM<sub>10</sub>)

Falkirk Council measured particulate matter (PM<sub>10</sub>) concentrations at seven site locations during 2023 (as displayed in Appendix A 'Tables A.6' and 'A.7'). The relevant Scottish NAQS objectives for PM<sub>10</sub> (24-hr and annual mean) were achieved at all seven site locations. The PM<sub>10</sub> 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<sub>10</sub> and PM<sub>2.5</sub> Monitoring Adjustment (Palas Fidas 200 Analyser)' on page 125.

The sites with the highest recorded annual mean  $PM_{10}$  concentrations in 2023 (but within the Scottish NAQS  $PM_{10}$  objective) were: A4 Haggs, A7 Falkirk West Bridge Street and A15 Main Street, Bainsford (all sites recorded:  $11.1\mu g/m^3$ ).

The site with the lowest  $PM_{10}$  (annual mean) concentration was the A8 Grangemouth AURN (8.7µg/m<sup>3</sup>).

Good overall data capture (>90%) was recorded at six sites in 2023. One site: A4 Falkirk Haggs recorded a slightly lower concentration of 88%.

Over a five year period (from 2019 to 2023), six sites have recorded  $PM_{10}$  (annual mean) concentration reductions, these were: A4 Falkirk Haggs, A5 Falkirk Hope Street, A7 Falkirk West Bridge Street, A8 Grangemouth AURN, A10 Grangemouth Municipal Chambers and A15 Main Street, Bainsford. The A11 Grangemouth Zetland Park site has been in operation for three years and has recorded a slight decrease in 2023 ( $9.1\mu g/m^3$ ) from 2021's result ( $9.5\mu g/m^3$ ).

There were no PM<sub>10</sub> daily NAQS exceedances recorded in 2023.

## Particulate Matter (PM<sub>2.5</sub>)

Falkirk Council measured particulate matter (PM<sub>2.5</sub>) concentrations at seven site locations during 2023. The relevant Scottish NAQS (annual mean) objective for PM<sub>2.5</sub> was achieved

at all seven site locations. The PM<sub>2.5</sub> 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<sub>10</sub> and PM<sub>2.5</sub> Monitoring Adjustment (Palas Fidas 200 Analyser)' on page 125.

The site with the highest recorded PM<sub>2.5</sub> (annual mean) concentration of  $5.7\mu$ g/m<sup>3</sup> in 2023 (but within the Scottish NAQS PM<sub>2.5</sub> annual mean objective) was the A15 Main Street, Bainsford. The site's with the lowest PM<sub>2.5</sub> (annual mean) concentrations in 2023 were A8 Grangemouth AURN ( $5.1\mu$ g/m<sup>3</sup>) and Falkirk Hope Street ( $5.1\mu$ g/m<sup>3</sup>).

Over a five year period (from 2019 to 2023) two sites (A7 Falkirk West Bridge Street, A8 and A8 Grangemouth AURN) have recorded PM<sub>2.5</sub> (annual mean) concentration reductions.

The PM<sub>2.5</sub> concentrations at the Grangemouth AURN site have, in general, remained at the same level of approx.  $7\mu g/m^3$ . 2022 saw a marginal concentration increase to  $8\mu g/m^3$  however, in 2023 this has decreased again to  $5.1\mu g/m^3$  - these concentrations remain reasonably low and within the Scottish PM<sub>2.5</sub> NAQS (annual mean) NAQS 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<sub>2</sub> concentrations have reduced within the Grangemouth AQMA. As sulphate species are known to contribute towards the formation of secondary PM<sub>2.5</sub>, a reduction in SO<sub>2</sub> could also impact local PM<sub>2.5</sub> concentrations.

#### Sulphur Dioxide (SO<sub>2</sub>)

In 2023, Falkirk Council monitored SO<sub>2</sub> at six site locations. Four of the monitoring sites are located within the Grangemouth AQMA (declared for 15-minute SO<sub>2</sub> NAQS objective) and two of the sites are located outwith this AQMA.

There were no overall exceedances of the SO<sub>2</sub> NAQS objectives (15min, hourly or daily) recorded at any of the Falkirk Council monitoring locations during 2023. There was however, an increase in the number of 15-min mean counts above 266µg/m<sup>3</sup>, with the highest being recorded at Grangemouth AURN (16 count) and Grangemouth Moray (16). These increases are likely to be attributed to nearby industrial flaring coupled with onshore winds at certain periods throughout the year. Extensive operator maintenance was undertaken in the industrial area in 2023 which is likely to have caused an increase in flaring and subsequently SO<sub>2</sub> concentrations in the local area.

There has been over nine years where the SO<sub>2</sub> (annual mean) results at all Grangemouth AQMA automatic monitoring locations (Grangemouth AURN, Moray, Municipal Chambers and Zetland Park) have complied with the SO<sub>2</sub> NAQS (15min mean) objective of 266µg/m<sup>3</sup>, not to be exceeded more than thirty-five times a year (at each monitoring site).

#### Benzene and 1,3-Butadiene

The benzene and 1, 3-butadiene diffusion tube monitoring completed by Falkirk Council in 2023 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 2023.

## Upgrade of Three Horiba APSA 370 Sulphur Dioxide Analysers to Teledyne API T100s

Falkirk Council (using Scottish Government provided Local Air Quality Management funding) upgraded three Horiba APSA 370 SO<sub>2</sub> reference method, continuous analysers to new Teledyne API versions – this upgrade will ensure that the analysers will continue to be serviceable, have manufacturer parts available and provide reference method / consistent / high quality air quality monitoring data into the future. The new API analysers will also provide better data capture with fewer anticipated breakdowns in the long term. The sites that have received these analyser upgrades in 2023 were: A3 Bo'ness, A10 Grangemouth Municipal Chambers and A11 Grangemouth Zetland Park.

Photo 1: New Teledyne T100 API SO2 Analyser at Grangemouth MC Air Quality Station



## New Air Conditioning System at Falkirk West Bridge Street Air Quality Station

A new air conditioning system was installed within the A7 Falkirk West Bridge Street roadside air quality station to replace the older system that was unsuitable for providing heating / cooling within the site throughout the year.

Photo 2: New Air Conditioning System at Falkirk West Bridge Street Air Quality Station





Photo 3: New Air Conditioning System at Falkirk West Bridge Street Air Quality Station

## Falkirk Hope Street - Weather Instruments (WS / WD)

New wind speed (WS) and direction (WD) weather equipment were installed at the Falkirk Hope Street site to compliment the continuously monitored air quality data (SO<sub>2</sub>, NO<sub>x</sub> and PM<sub>10+2.5</sub>) to assist in identifying pollution event sources in the Falkirk town centre area. Similar equipment was initially installed within the Grangemouth Moray as a trial in 2022 and since then it has proven successful in the quality and consistency of weather data produced. A request to display Falkirk Hope Street's live weather data on the Scottish Air Quality website has been sent to Ricardo consultants who manage this website.

#### Photo 4: Weather Instruments Roof Mounted at Falkirk Hope Street



Upgrade of Skyview Weather Instruments at Grangemouth Zetland Park AQ Station

Weather instruments are currently located at the Grangemouth Zetland Park air quality station and monitor continuous, local weather conditions such as wind speed / direction, atmospheric pressure, humidity, temperature amongst other parameters. Due to the age of the previously installed equipment and the compatibility of the onsite router, it was decided that the equipment was upgraded to a 4G-enabled system. This will enable effective, consistent and high-quality weather monitoring data into the future.

Live localised weather data is polled here: https://skylink-pro.com/index.php

Photo 5: Upgraded Weather Equipment at Grangemouth Zetland Park - Control Unit



Photo 6: Upgraded Weather Equipment at Grangemouth Zetland Park – Roof Mounted Instruments



## Upgrade of All Monitoring Site Gas Equipment Regulators

All onsite gas regulators have been upgraded for all the fixed Falkirk Council air quality monitoring stations in 2023. Previously, the gas regulators were a mix of two stage and dial type regulators of varying quality and age. All new regulators were upgraded to dial type regulators which provide safe, consistent, high quality gas flow for span and zero gases serving their respective air quality analysers. An example of a new dial type regulator is displayed below. These regulators have now been registered and are all on an expiry / replacement system.

Photo 7: New Dial Type Special Gas Regulator



## **Local Priorities and Challenges**

In 2024, 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 <u>Clean Air Day Scotland</u> 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 being planned and operated in the four major Scottish cities: Glasgow, Edinburgh, Aberdeen and Dundee over the next few years. 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 <u>2020 APR</u> in accordance with the Scottish Government's <u>National Low Emissions Framework</u> to inform this process.

## How to Get Involved

To obtain further information on air quality within the Falkirk Council area, please visit our air quality policy webpage:

## http://www.falkirk.gov.uk/services/environment/environmental-policy/air-quality/

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 Scottish Air Quality website at:

## https://www.scottishairquality.scot/latest/summary

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:

https://www.ecostars-uk.com/

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# 1 Local Air Quality Management

This report provides an overview of air quality in Falkirk Council during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether 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.

Pollutant	Air Quality Objective Concentration	Air Quality Objective Measured as	Date to be Achieved by
Nitrogen dioxide (NO <sub>2</sub> )	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
Nitrogen dioxide (NO <sub>2</sub> )	40 µg/m <sup>3</sup>	Annual mean	31.12.2005
Particulate Matter (PM <sub>10</sub> )	50 µg/m <sup>3</sup> , not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
Particulate Matter (PM <sub>10</sub> )	18 µg/m³	Annual mean	31.12.2010
Particulate Matter (PM <sub>2.5</sub> )	10 µg/m³	Annual mean	31.12.2021
Sulphur dioxide (SO <sub>2</sub> )	350 μg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
Sulphur dioxide (SO <sub>2</sub> )	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
Sulphur dioxide (SO <sub>2</sub> )	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 μg/m <sup>3</sup>	Running annual mean	31.12.2010
1,3 Butadiene	2.25 μg/m <sup>3</sup>	Running annual mean	31.12.2003

Table 1.1 – Summary	of Air Quality	<sup>v</sup> Objectives in	Scotland
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Pollutant	Pollutant Air Quality Objective Concentration		Date to be Achieved by
Carbon 10.0 mg/m <sup>3</sup>		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 action plan itself should have a timescale for completion and for revocation of the AQMA. Where measures to reduce air pollution may require a longer timescale an action plan shall be reviewed and republished within five years of initial publication and then five-yearly thereafter.

The AQMAs that are currently active within the Falkirk Council area are:

## 1. Falkirk Town Centre AQMA - Declared on 31<sup>st</sup> January 2013 for NO<sub>2</sub> (annual mean)

The Falkirk town centre NO<sub>2</sub> (annual mean) AQMA remains justified as although there were no exceedances of the NAQS objective recorded in 2023, 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<sup>Ref1</sup>.

It is anticipated that the Falkirk town centre AQMA (NO<sub>2</sub> annual mean) will be revoked by Summer / Autumn 2024 if recent (automatic and non-automatic) AQ monitoring results continue to comply with the relevant NAQS objective.

## 2. Grangemouth AQMA - Declared on 1st November 2005 SO2 (15min mean)

There have been over ten years where the SO<sub>2</sub> (annual mean) results at all Grangemouth AQMA automatic monitoring locations (Grangemouth AURN, Moray, Municipal Chambers and Zetland Park) have complied with the SO<sub>2</sub> NAQS (15min mean) objective of 266µg/m<sup>3</sup>, 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 for SO<sub>2</sub> (15min mean). This follows on from the initial Falkirk Council <u>Grangemouth Emissions Study</u> completed by consultants Sweco in 2020.

In 2023, Falkirk Council developed and published the <u>Proposal for the Revocation of the</u> <u>Grangemouth AQMA</u>, as shown in Appendix D. In addition to the Proposal Report, Falkirk Council collaborated with consultants Sweco to produce a comprehensive Grangemouth AQMA Detailed Assessment (which will be published after multi-organisational approval in June 2024). These two documents will form the evidence required to progress the revocation of the Grangemouth AQMA Revocation. Due to delays with collecting relevant and accurate emissions data from the major point sources within the industrial area, the Detailed Assessment publication has been delayed and will be published later than expected. This has caused a delay to the overall revocation of the Grangemouth AQMA.

## It is anticipated that the Grangemouth AQMA (SO<sub>2</sub> 15min mean) will be revoked in the Summer 2024 if relevant AQ results continue to comply with the NAQS objective.

The Falkirk Council AQMAs that have been revoked in recent years are:

# <u>1. Falkirk Town Centre AQMA - Declared on 25<sup>th</sup> January 2013 for PM<sub>10</sub> (24-hr and annual mean), Revoked on 23<sup>rd</sup> March 2023</u>

There had been over five-years where PM<sub>10</sub> (24-hr and annual mean) results at both Falkirk Town Centre AQMA automatic monitoring locations (Falkirk Hope Street and Falkirk West Bridge Street) have complied with the PM<sub>10</sub> NAQS (Scottish annual mean) objective of 18µg/m<sup>3</sup>. 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 23<sup>rd</sup> March 2023. Please see the relevant report for details: Proposal for the Revocation of the Falkirk Town Centre AQMA for Particulate <u>Matter (PM<sub>10</sub>)</u>.

# 2. Haggs - Declared on 18<sup>th</sup> March 2010 for NO<sub>2</sub> (annual mean), Revoked on 5<sup>th</sup> October 2021)

The Haggs AQMA was declared on the 18<sup>th</sup> March 2010 following NAQS exceedances for NO<sub>2</sub> (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<sub>2</sub> have complied with the NAQS objectives consistently since 2015. Falkirk Council undertook extensive public consultation in accordance with LAQM guidance and revoked the AQMA on 5<sup>th</sup> October 2021. Please see the relevant report for details: <u>Proposal for the Revocation of Haggs AQMA</u>.

# 3. Banknock - Declared on 18<sup>th</sup> August 2011 for PM<sub>10</sub> (24-hr and annual means), Revoked on 7<sup>th</sup> January 2021

The Banknock AQMA was declared on the 18<sup>th</sup> August 2011 following NAQS exceedances for PM<sub>10</sub> (24-hr and annual means) 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<sub>10</sub> 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 7<sup>th</sup> January 2021. Please see the relevant report for details: <u>Proposal for the Revocation of Banknock AQMA</u>

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

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 Air Quality webpage.

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
Falkirk Town Centre	NO2 annual mean	Falkirk	An area encompassing an area of Falkirk Town Centre	AQAP (Falkirk Town Centre and Haggs) 2015 <u>Air Quality</u> <u>Management Action</u> <u>Plan (Falkirk Town</u> <u>Centre and Haggs)</u> June 2015
Grangemouth	SO <sub>2</sub> 15-min mean	Grangem outh	An area encompassing the Grangemouth industry areas, shipping port and adjacent residential areas	Air Quality Action Plan Update (Grangemouth) 2009 Available on request

 Table 2.1 – Declared Air Quality Management Areas

## 2.2 Cleaner Air for Scotland 2

<u>Cleaner Air for Scotland 2 – Towards a Better Place for Everyone (CAFS2)</u> 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 <u>Cleaner Air for Scotland – The Road to a Healthier Future (CAFS)</u>, 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 (LDP2)

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 7<sup>th</sup> 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

### Falkirk Council Energy Policy Information

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.

#### Falkirk Council Greenspace Strategy

Through its delivery, the strategy will connect areas of natural, semi-natural and manmade open spaces within our towns and villages and create links into the wider countryside. The development of a high quality, multi-functional green network will provide a range of benefits for people, businesses and wildlife across our area. Air quality is considered throughout this strategy, specifically within Section 1.4 'Towards A New Greenspace Strategy':

"In particular the green network will provide:

• A framework for landscape and regeneration place-making initiatives.

• Urban open spaces including parks, play spaces, sports areas, green corridors, and natural and semi-natural open spaces for community, educational and visitor use.

• An important opportunity for facilitating climate change adaptation through sustainable flood management and woodland planting, and by enabling species migration.

• Spaces for recreation and active travel through creating safer, more pleasant walking and cycling routes.

• Habitat and biodiversity value by providing and enhancing areas where flora and fauna can thrive.

• Sustainable water and soil management and help reduce air and water pollution."

A new policy which has recently been published is The Active Travel Strategy published in 2023. <u>https://storymaps.arcgis.com/stories/8a63f2c4c366445eab2a66d6db8af1d8</u>

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

Sustainable Transport Policies, Strategies and Measures

Sustainable Falkirk

Historic Environment Strategy

Contaminated Land Inspection 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.

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

Take the Right Route

#### Green Travel Map

Low Emission Zones (LEZ) are currently being planned and operated in the four major Scottish cities: Glasgow, Edinburgh, Aberdeen and Dundee over the next few years. 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 <u>2020 APR</u> in accordance with the Scottish Government's <u>National Low Emissions Framework</u> 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 action plan during the current reporting year of 2023 in pursuit of improving local air quality and meeting the air quality objectives within the shortest possible time. Details of all measures completed, in progress or planned are set out in Table 2.1. More detail on these measures can be found in the air quality Action Plan relating to each AQMA.

Key completed measures in 2023 include:

- Measure 3 "AQ Monitoring Network Review": In 2023, Falkirk Council (using Scottish Government provided LAQM funding) upgraded three Horiba APSA 370 SO2 continuous reference method analysers to new Teledyne API T100 versions – this upgrade will ensure that the analysers will continue to be serviceable, have manufacturer parts available and provide reference method / consistent / high quality air quality monitoring data into the future. The sites that have received these analyser upgrades in 2023 were: A3 Bo'ness, A10 Grangemouth Municipal Chambers and A11 Grangemouth Zetland Park. A new air conditioning system was installed in the A7 Falkirk West Bridge Street roadside air quality station to replace the older system that was unsuitable for providing heating / cooling within the site throughout the year.
- Measure 4 "Electric Vehicles": Falkirk Council's vehicle fleet was enhanced and expanded in 2023 which now includes one hundred and seventy-four fully electric vehicles (EV) including minibuses, vans and cars. Part of a Council-wide "Green Fleet" initiative to achieve a zero-emission fleet, the newly added EVs in 2023 will replace ageing diesel counterparts.
- Measure 11 "TRL ECO Stars Fleet Recognition Scheme". In 2023, Falkirk Council has continued its to grow its membership of the TRL ECO Stars Fleet Recognition scheme. ECO Stars is a scheme which rates the environment performance of commercial vehicles. It gives commercial vehicle operators advice on how to improve their fuel efficiency and reduce their running costs.

 It also encourages them to help improve local air quality and other environmental issues by improving their fleet performance. In the Falkirk Council area (in 2023), there are currently 308 members of the fleet scheme with 9,823 registered vehicles. Taxi scheme has 9 members with 220 vehicles.

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

In 2023, Falkirk Council developed and published the Proposal for the Revocation of the Grangemouth AQMA, as shown in Appendix D. In addition to the Proposal Report, Falkirk Council collaborated with consultants Sweco to produce a comprehensive Grangemouth Detailed Assessment (which will be published after multi-organisational approval in June 2024). These two documents will form the evidence required to progress the revocation of the Grangemouth AQMA. Due to delays with collecting relevant and accurate emissions data from the major point sources within the industrial area, the Detailed Assessment publication has been published later than expected and therefore there will be delay to the overall revocation of the Grangemouth AQMA.

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

- It is anticipated that the Grangemouth AQMA (SO<sub>2</sub>, 15min mean) will be revoked in by Summer 2024 if relevant AQ results continue to comply with the NAQS objective.
- It is anticipated that the Falkirk town centre AQMA (NO<sub>2</sub>, annual mean) will be revoked by Summer / Autumn 2024 if relevant (automatic and non-automatic) AQ monitoring results continue to comply with the NAQS objective.
- A five-year Falkirk Council Air Quality Strategy will be drafted after the above revocation work is completed. This is expected to be published in 2024 following the above planned AQMA revocations.

 Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Expected/ Actual Completio n year	Measure Status	Funding Status	Key Milestones	Progress	Barriers to implementation
1	Improving SO <sub>2</sub> Data Access	Public information	Ongoing monthly and then reviewed after the potential AQMA revocation in Summer 2024 (NAQS objective compliance dependant)	Completed monthly	Not LAQM or AQAP funding – reporting completed by Falkirk Council	The SO <sub>2</sub> (annual mean) results at all Grangemouth AQMA automatic monitoring locations have complied with the SO <sub>2</sub> NAQS (15min mean) objective for over nine consecutive years.	Monthly SO <sub>2</sub> NAQS exceedances summary reports sent to many stakeholders / interested parties with ongoing totals and likely industrial (or otherwise) sources of exceedances.	None – monthly reporting to continue for the foreseeable future.
2	Text and Email Alerts for NAQS Exceedances	Public information	No end date identified – continuous service.	Completed within 1 hour of NAQS exceedance	Fully funded (Scot Gov LAQM Grant) for external AQ Data Collection system.	NAQS exceedances continue to be sent by SMS / email to FC staff and key stakeholders for immediate investigation into likely cause.	Funding allocated to continue the AQ Data Collection system to work in tandem with SAQ website alerts developed by Ricardo	None – service to continue for the foreseeable future (Scot Gov LAQM Grant funding dependant)
3	AQ Monitoring Network Review	Public information	Ongoing	Annual review of network completed as part of LAQM process. Improved AQ data	Fully funded (Scot Gov LAQM Grant) for all AQ monitoring network equipment.	In 2023, Three Falkirlk Council monitoring sites had their SO <sub>2</sub> continuous reference method analysers upgraded and the AC was upgraded at FWBS.	All sites have had their communications equipment upgraded in recent years which has improved overall data accuracy and capture rates.	Future Scot Gov LAQM Grant funding could limit the expansion and improvement of network equipment.

				accuracy and capture				
4	Electric Vehicles	Promoting low emission transport	No end date identified – continuous service.	Annual increase in charging bays / facilities within Falkirk Council area	Scottish Government funded Falkirk Council Car Club (Scot Gov AQAP Grant Funded)	On the 10 <sup>th</sup> August 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 with the overall aim of improving the electric vehicle charging infrastructure throughout Scotland. More charging bays are being planned by Falkirk Council into	Falkirk Council's vehicle fleet was enhanced and expanded in 2023 which now includes one hundred and seventy-four fully electric vehicles (EV) including minibuses, vans and cars. Part of a Council-wide Green Fleet Initiative to achieve a zero-emission fleet, the newly added EVs in 2023 will replace ageing diesel counterparts.	Future external funding could limit the expansion and uptake of low emission transport.
5	Improvement of Traffic Light System at Bankside	Transport Planning and Infrastructure	Completed in 2014.	Reduction in NO <sub>2</sub> and PM <sub>10</sub> at the Bankside area in Falkirk	Local Authority funded	Traffic light system reduced overall road congestion in the Bankside area in 2014	Traffic light system reduced overall road congestion in the Bankside area in 2014	Similar traffic light improvements could be utilised at other traffic hotspots – dependant on public funding for FC Transport Planning
6	Falkirk Council Sustainable / Active Travel Scheme "Take the Right Route"	Promoting travel alternatives	Ongoing	Scheme uptake and participation statistics compiled by Sustainable Transport annually.	Scottish Government funded	TtRR continued success in 2023 with successful projects such as: Safer Street (Cycle / walking Infrastructure Improvements),	Improved public engagement statistics for 2023	If grant funding were reduced or not provided then the active travel scheme could not make sufficient progress to promote and provide travel alternatives.

						Improved		
						advertising / public		
						awareness,		
						workplace travel		
						planning and		
						development of a		
						Falkirk Council		
						Employee Travel		
						Plan.		
7	Forth Bike Hire	Promoting	Ongoing	Anticipated	Scottish Government funded	Forth Bike (in	Completed. Forth Bike	If grant funding were
	Scheme	travel		reduction in		conjunction with	scheme established and	reduced or not
		alternatives		NO <sub>X</sub> and PM		Forth Environment	running in 2021. Expansion	provided then the
				emissions		Link) operates an	of the scheme expected in	active travel scheme
				due to an		electric bike hire	future years.	could not make
				increase in		scheme within the		sufficient progress to
				green travel		Falkirk and Stirling		promote and provide
				alternatives /		area The Forth Bike		travel alternatives.
				increased		system currently		
				accessibility		includes over one		
				with		hundred electric		
				improved		pedal assist		
				cycle paths		(Pedelec) bikes		
				across the		spread between		
				Forth Valley		their four local		
				area		stations: the Falkirk		
						Wheel, the Helix,		
						Forth Valley Royal		
						Hospital, and		
						University of		
						Stirling.		
8	Soft Measures e.g.	Promoting	Ongoing	Anticipated	Scottish Government funded	Development of LA	Formation of the following	If grant funding were
	travel planning (larger	travel		reduction in		Travel Plans,	FC plans completed:	reduced or not
	employers, schools),	alternatives		NO <sub>x</sub> and PM		Flexible Work	Flexible Working Policy	provided then the
	journey sharing,			emissions		Pattern Plans and	Local Transport Strategy	aforementioned plans
	changes to mileage,			due to an		Sustainable	Take the Right Route	could not make
	home and mobile			increase in		Transport	Green Travel Map	sufficient progress to
	working.			green travel		Alternatives /		promote and provide
	5			alternatives		solutions		travel alternatives.
9	Inclusion of Air Quality	Policy	Completed	Inclusion of	LA funded	See specific AQ	Inclusion of air quality	LA funded however
	in the Falkirk Council	guidance and	and	air quality		related statements	policy statements in local	would require some
	Local Development	development	ongoina	policy		within the current	development plan, addition	annual LA funding to
	Plan	control	5 5	statements		FC LDP in section	of more air quality policies	develop the FC LDP
				in local		2.1.1 "Placemaking		into the future.

				development		<ul> <li>Plans and Policy"</li> </ul>	as they are developed in	
				plan		in this APR	future.	
10	Improved AQ	Public	Completed	Consistent,	Fully funded (Scot Gov	Data capture has	Since the install of the	Scot Gov LAQM
	Monitoring within FC	information	and	good data	LAQM Grant ) for all AQ	gradually improved	Grangemouth AURN	funding has enabled
	AQMAs		ongoing	capture	monitoring network	in recent years due	communication equipment	comms improvements
				(>90%) from	equipment.	to better (future	in 2022/23 – all FC network	<ul> <li>– funding will require</li> </ul>
				all analysers		enabled)	sites have 4G routers,	to be provided to
				in FC		communication	dataloggers, displays,	enable this service
				AQMAs		equipment such as	keyboards to aid the	improvement
						4G routers,	increased improvements in	continues into the
						dataloggers and	data capture.	future
						improved data		
						polling methods		
11	Promotion of the	Vehicle fleet	Completed	The latest	Fully funded (Scot Gov	Improved ratings	Continued annual increase	Future Scot Gov
	EcoStars Fleet	efficiency	and	Falkirk Eco	AQAP Grant)	achieved for the	in signed up operators.	AQAP Grant funding
	Recognition Scheme		ongoing	Stars report		increased number	Regular liaison is achieved	could limit the
				shows that		of engaged	between TRL and FC on	expansion and
				recruitment		EcoStars operators	Fleet and Taxi operator	improvement of its
				in Falkirk		across the FC area.	progress.	EcoStars Fleet and
				has 308		Full details on Fleet		l axi operators.
				members		and Taxi operators		
				and is		and their ratings		
				steadily		can be found <u>here</u> .		
				increasing				
10	Marshar of the Foot of	Dramating Jaw	Oranina	each year.	Coattich Causemant fundad	A natio in a to d	The FeOV(FD continues to	If Coot Court funding
12	Member of the East of	Promoting low	Ongoing	Wernber of	Scottish Government runded	Anticipated	The EoSVEP continues to	If Scot Gov funding
	Scotland Venicle	emission		the		reduction in NOx	assist in promoting anti	were reduced or not
		transport		partnership		and PM emissions		provided then the
	(EUSVEP)			to help		through opti idling	area. Various idling	EUSVEP scheme
				vohicle		infough anti-fuling	investigated by the	
				idling to		Brovidos the public	nivesligated by the	promoto anti vohiclo
				roport idling		with a sonvice to	installed in a variety of EC	idling boln roduce
						report idling or	areas Improvements of the	nollution
				enforcing of		smoky vehicles	areas. Improvements of the	policitori
				fixed penalty		SHORY VEHICIES.	Breathe' website have	
				notices and			taken place along with	
				nrovision of			local advertising to raise	
				educational			awareness	
				resources for				
				the public				
# 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 2023. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at the <u>Air Quality in Scotland</u> website.

Maps showing the location of the monitoring sites are provided in Appendix A, Figure 29 A) to I). 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<sub>2</sub> at sixty-one sites during 2023. 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 three sites during 2023. Table A.9 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 sixteen sites during 2023. Table A.10 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 Air Pollutants from Wood Burning Stoves in Urban Areas"

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). Strathclyde University provided the remaining funding to enable the project to commence for its planned duration. PhD student: Imogen West has undertaken the project and is making good progress throughout 2023. Falkirk Council has been working continuously with Imogen, Dr Beverland and Dr Tara Beattie (Programme lead MSc Environmental Engineering) since 2021 to assist and support the successful completion of this 4-year project.

Imogen West presented the following poster shown in Figure 1 below at the <u>Annual</u> <u>Aerosol Science Conference</u> in 2023.

#### Figure 1 – Strathclyde University / Falkirk Council PhD Poster



Figure 1: Wood burning store, at household 5, with the door open to light the fire.

#### 2. Aim

To assess exposure to PM<sub>25</sub> 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<sub>2.5</sub> 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.

#### 4. Results

 Mean winter PM<sub>2.5</sub> concentrations were above the WHO 24-hour air quality guideline (AQG) [15 µg m<sup>-3</sup>] in household 1 and above the WHO annual AQG [5 µg m<sup>-3</sup>] (WHO, 2021b) in both houses (Table 1). There are no AQGs for black carbon.

10.000

Figure 2: Equipment in the living room of Household 1. Let: micro-sethalometer ins

a protective box with inlet tubing extending out. Right: PurpleAir attached to clamp star

se the sensor inlet

- Mean hourly concentrations of PM<sub>2.5</sub> 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<sub>2.8</sub> and black carbon concentrations in both rooms occurred each time the wood burning stove was lit or refuelled (Fig. 3). PM<sub>2.8</sub> concentrations also peaked in both rooms during cooking.
- Peak concentrations of PM<sub>2.5</sub> 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).





 $f(\mathsf{gurs} + \mathsf{The} \mathsf{series} of concentrations in household 1 during the white monitoring period. Cooking times are highlighted by the orange shaded regions. The times the wood burning sitive was used are included by the vertical disched lines.$ 

#### 5. Conclusions

This study observed that cooking and wood burning are important sources of indoor  $PM_{2.8}$  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

This research was funded by a University of Strathclyde John Anderson Research Award PhD studentship with support from Faikirk Council/Scottish Government.

#### References

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## **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<sub>2</sub>)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past five years with the air quality objective of 40  $\mu$ g/m<sup>3</sup>.

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

Table A.5 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past five years with the air quality objective of  $200\mu g/m^3$ , not to be exceeded more than 18 times per year.

#### NO2 Automatic Analyser Results

The 2023 monitoring results (as displayed in Appendix A, Tables A.3 and A.5) show that all seven automatic NO<sub>2</sub> analysers in the Falkirk Council's air monitoring network met both NO<sub>2</sub> NAQS objectives (1hr and annual mean). The highest NO<sub>2</sub> annual mean result in 2023 was recorded at the A7 Falkirk West Bridge Street site ( $28.5\mu g/m^3$ ) - this result has increased (by  $1.5\mu g/m^3$ ) from 2022's result ( $27\mu g/m^3$ ). The lowest result was recorded at the A9 Grangemouth Moray ( $10.9\mu g/m^3$ ) site showing a slight decrease from 2022's result ( $12\mu g/m^3$ ). The Grangemouth AURN NO<sub>2</sub> annual mean result has decreased from  $14\mu g/m^3$  in 2022 to  $13.3\mu g/m^3$  in 2023.

Over a five year period (from 2019 to 2023), all seven monitoring sites have recorded annual mean NO<sub>2</sub> concentration reductions. There have been minor fluctuations in results during this period but all remain within the NO<sub>2</sub> NAQS (1hr and annual mean) objectives.

Long term NO<sub>2</sub> trend graphs are shown in Appendix A, Figures 3 to 9. There is an overall downward trend in NO<sub>2</sub> (annual mean) concentrations at all monitoirng sites which is a positive trend.

Data capture rates were generally good (>90%) at all monitoirng sites apart from the Grangemouth AURN and Moray sites where analyser technical faults prevented them from

achieving better capture rates. These analyser technical faults were fully investigated and subsequently resolved.

Likely contributing factors to the reduction in NO<sub>2</sub> concentrations at the above sites include the Coronavirus (COVID-19) pandemic<sup>Ref 1</sup> 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 Falkirk town centre 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 electric vehicles and the increased availability of charging locations may also have contributed to the overall NO<sub>2</sub> reduction.

#### Annual NO2 Diffusion Tube Results

The 2023 annual NO<sub>2</sub> diffusion tube monitoring results (as displayed in Appendix A, Table A.4) shows that no (non-automatic) NO<sub>2</sub> tubes exceeded the NAQS (annual mean) NAQS objective limit of 40µg/m<sup>3</sup>. All sixty-one sites in Falkirk Council's network met the NO<sub>2</sub> NAQS (annual mean) objective.

The highest NO<sub>2</sub> annual mean diffusion tube concentration in 2023 was recorded at the NA27 Falkirk West Bridge Street roadside location (34.3µg/m<sup>3</sup>).

The lowest NO<sub>2</sub> annual mean diffusion tube concentration in 2023 was recorded at the NA105 West of Shieldhill  $(5.3\mu g/m^3)$  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<sub>2</sub> (chemiluminescence) reference analyser (as defined within the EU as the reference method)<sup>Ref 2</sup>. Due to this, NO<sub>2</sub> concentrations recorded using diffusion tubes are typically of lower accuracy than that recorded by the reference method using automatic (chemiluminescence) NO<sub>2</sub> analysers.

#### 3.2.2 Particulate Matter (PM<sub>10</sub>)

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

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

Falkirk Council measured PM<sub>10</sub> concentrations at seven locations during 2023. The relevant Scottish NAQS objectives for PM<sub>10</sub> 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  $2023^{\text{Ref4}}$ . Corrected and uncorrected results (greyed out) are displayed in "Table A.6 – Annual Mean PM<sub>10</sub> Monitoring Results ( $\mu$ g/m<sup>3</sup>)" and "Table A.8 – Annual Mean PM<sub>2.5</sub> Monitoring Results ( $\mu$ g/m<sup>3</sup>)" for PM concentrations with Palas Fidas 200 analysers in operation.

The sites with the highest recorded annual mean  $PM_{10}$  concentrations in 2023 (but within the Scottish NAQS  $PM_{10}$  objective) were: A4 Haggs (11.1µg/m<sup>3</sup>), A7 Falkirk West Bridge Street (11.1µg/m<sup>3</sup>) and A15 Main Street, Bainsford (11.1µg/m<sup>3</sup>).

The site with the lowest  $PM_{10}$  (annual mean) concentration was A8 Grangemouth AURN (8.7µg/m<sup>3</sup>).

Good overall data capture (>90%) was recorded at six sites in 2023. One site: A4 Falkirk Haggs recorded a slightly lower concentration of 88%.

Over a five year period (from 2019 to 2023), six sites have recorded  $PM_{10}$  (annual mean) concentration reductions, these were: A4 Falkirk Haggs, A5 Falkirk Hope Street, A7 Falkirk West Bridge Street, A8 Grangemouth AURN, A10 Grangemouth Municipal Chambers and A15 Main Street, Bainsford. The A11 Grangemouth Zetland Park site has been in operation for three years and has recorded a slight decrease in 2023 (9.1µg/m<sup>3</sup>) from 2021's result (9.5µg/m<sup>3</sup>).

There were no PM<sub>10</sub> daily exceedances recorded in 2023.

Over a five year period (from 2019 to 2023), all six sites have recorded a  $PM_{10}$  (24-hr mean >50µg/m<sup>3</sup>) count reduction. The A11 Grangemouth Zetland Park site has been in operation for three years and has remained the same (0 count, 24-hr mean >50µg/m<sup>3</sup>).

#### 3.2.3 Particulate Matter (PM<sub>2.5</sub>)

Table A.8 in Appendix A compares the ratified and adjusted monitored  $PM_{2.5}$  annual mean concentrations for the past five years with the air quality objective of  $10\mu g/m^3$ .

PM<sub>2.5</sub> is measured at seven locations within the Falkirk Council area, these are: A4 Haggs, A5 Falkirk Hope Street, A7 Falkirk West Bridge Street, A8 Grangemouth AURN, A10 Grangemouth Municipal Chambers, A11 Grangemouth Zetland Park and A15 Main Street, Bainsford. Five sites: A4 Haggs, A5 Falkirk Hope Street, A10 Grangemouth Municipal Chambers, A11 Grangemouth Zetland Park and A15 Main Street, Bainsford have PM<sub>2.5</sub> data available from 2020 onwards after the installation of Palas Fidas (measuring PM<sub>10+2.5</sub>) analysers.

In accordance with the Scottish Government Guidance Note "Measurement of Ambient Particulate Matter (PM) and the LAQM Reporting of Measured Concentrations" May  $2023^{\text{Ref4}}$ . Corrected and uncorrected results (greyed out) are displayed in "Table A.6 – Annual Mean PM<sub>10</sub> Monitoring Results ( $\mu$ g/m<sup>3</sup>)" and "Table A.8 – Annual Mean PM<sub>2.5</sub> Monitoring Results ( $\mu$ g/m<sup>3</sup>)" for PM concentrations with Palas Fidas 200 analysers in operation.

During 2023, there were no exceedances of the  $PM_{2.5}$  Scottish NAQS (annual mean) objective limit ( $10\mu g/m^3$ ) at any of the monitoring sites.

The site with the highest recorded  $PM_{2.5}$  (annual mean) concentration of 5.7µg/m<sup>3</sup> in 2023 (but within the Scottish NAQS  $PM_{2.5}$  annual mean objective) was A15 Main Street, Bainsford.

The sites with the lowest  $PM_{2.5}$  (annual mean) concentrations in 2023 were A8 Grangemouth AURN and Falkirk Hope Street (5.1µg/m<sup>3</sup> at each).

Over a five year period (from 2019 to 2023) two sites (A7 Falkirk West Bridge Street, A8 and A8 Grangemouth AURN) have recorded PM<sub>2.5</sub> (annual mean) concentration reductions.

The PM<sub>2.5</sub> concentrations at the Grangemouth AURN site have, in general, remained at the same level of approx.  $7\mu g/m^3$ . 2022 saw a marginal concentration increase to  $8\mu g/m^3$  however, in 2023 this has decreased again to  $5.1\mu g/m^3$  - these concentrations remain reasonably low and within the Scottish PM<sub>2.5</sub> NAQS (annual mean) NAQS 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<sub>2</sub> concentrations have reduced within the Grangemouth AQMA. As sulphate species are known to contribute towards the formation of secondary PM<sub>2.5</sub>, a reduction in SO<sub>2</sub> could also impact local PM<sub>2.5</sub> 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 17 - 20. In general terms, there has been no significant change in  $PM_{2.5}$  concentrations recorded at these monitoinrg sites since 2019.

Data captures rates are generally good (around 90% or greater) for all sites.

#### 3.2.4 Sulphur Dioxide (SO<sub>2</sub>)

Table A.9 in Appendix A compares the ratified continuous monitored SO<sub>2</sub> concentrations for year 2023 with the air quality objectives for SO<sub>2</sub>.

In 2023, Falkirk Council monitored SO<sub>2</sub> at six locations. Four of the sites are located within the Grangemouth AQMA (15-minute NAQS objective) and two of the sites are located outwith.

There were no overall exceedances of the SO<sub>2</sub> NAQS objectives (15min, hourly or daily) recorded at any of the Falkirk Council monitoring locations during 2023. There was however, an increase in the number of 15-min mean counts above 266µg/m<sup>3</sup>, with the highest being recorded at Grangemouth AURN (16 count) and Grangemouth Moray (16). These increases are likley to be attributed to nearby industrial flaring coupled with onshore winds at periods throughout the year. Extensive maintenance was undertaken in 2023 within the industrial area which is likely to have caused an increase in flaring and subsequently SO<sub>2</sub> concentrations in the local area.

There have been over nine years where the SO<sub>2</sub> (annual mean) results at all Grangemouth AQMA automatic monitoring locations (Grangemouth AURN, Moray, Municipal Chambers and Zetland Park) have complied with the SO<sub>2</sub> NAQS (15min mean) objective of 266µg/m<sup>3</sup>, not to be exceeded more than thirty-five times a year (at each monitoring site).

Long term  $SO_2$  concentration trend graphs are displayed in Appendix A Figures 21 - 26.

Polar roses displaying average SO<sub>2</sub> concentrations (in a directional format) for the Grangemouth sites are shown in Appendix A 'Figure 27, A) to H)'.

A long term SO<sub>2</sub> site exceedance graph is displayed in Appendix A Figure 28.

#### 3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

#### **Carbon Monoxide**

No monitoring undertaken.

#### Lead

No monitoring undertaken.

#### 1, 3-Butadiene

In 2023, 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 2023, 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 objectives. Ten tubes achieved 100% data capture (NA3, NA21, NA27, NA37, NA41, NA44, NA55, NA77, NA80, NA81, NA94, NA105, NA116 and NA117). Two tubes achieved 91% annual data capture (NA38 and NA42).

In 2023, the pumped diffusion tube at the A8 Grangemouth AURN site recorded an annual average concentration of  $0.79\mu g/m^3$ . The concentration recorded continues to be within the relevant annual mean NAQS objective (of  $3.25\mu g/m^3$ ) and has experienced an increase (of  $0.13\mu g/m^3$ ) compared to 2022's result ( $0.66\mu g/m^3$ ).

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

# 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<sub>2</sub> NAQS (1hr mean) and the NO<sub>2</sub> non-automatic diffusion tube NAQS objectives in 2023.

#### Roads with a High Flow or Buses and / or HGVs

Since the closure of the Falkirk town centre 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<sub>2</sub> (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 2023 within the Falkirk Council area.

#### New Roads Constructed or Proposed

#### **Denny Easter Access Road**

The new Denny Eastern Access Road (DEAR) was proposed in 2003 via the Falkirk Council Local Plan and work commenced on this major new road in August 2023. The DEAR has been designed to ease congestion in and around the Denny Cross area which

will lead to improvements in air quality, road safety and will better support the local economy with overall improved access. The route will also provide for more sustainable transport options in the area providing better walking and cycling opportunities. A dedicated website has been created to provide information on this new road:

#### https://dennyeasternaccessroad.co.uk/

The route of the of the road can be shown in Figure 2 below.

In addition to the DEAR, a new housing estate for 307 residential units was proposed as part of the overall development of this area. An air quality impact assessment was undertaken for the DEAR and the housing estate development in July 2013 by Atkins consultants (Report Ref: "Mydub, Denny Air Quality Assessment, 5106417.006"). Falkirk Council Environmental Health commented upon the AQIA in 2013:

"The air quality assessment has used the DMRB screening tool to assess the impact of the proposed development. The report concludes that the effect on air quality (nitrogen dioxide and particulate matter) of the proposed development will be negligible. The report is satisfactory.

Any development such as this does though reduce the headroom (the difference between the pollutant levels and the objectives) that any future developments will be able to work to. The result of such an air quality assessment is partly dependent on the predicted traffic flows. No comment can be made on whether those traffic figures are accurate or appropriate.

As requested the assessment does not consider the potential for emissions of dust from construction related activities. Any complaints about dust resulting from any construction related activities would be dealt with under the Environmental Protection Act 1990."

The road was formally opened, two months ahead of schedule on Monday 20<sup>th</sup> May 2024.

The official opening recording of the DEAR can be shown here: <u>https://youtu.be/6qnLw5O-as0</u>

#### Figure 2 – The Route of the DEAR



There were no other major new roads constructed or proposed during 2023 within the Falkirk Council area.

#### **Roads with Significantly Changed Traffic Flows**

There were no roads with significantly changed traffic flows in 2023 within the Falkirk Council area.

#### **Bus or Coach Stations**

The Falkirk town centre 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 2023 were 14,396,794<sup>Ref 3</sup> - this is an increase of 28% from 2022 (11,250,211). 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**

# Small-scale Gas Peaking Plant (Proposed Amendment to Onsite Stack Diameters) – Caledon Generation, Caledon Green, Grangemouth

In 2019, planning permission was approved for a gas peaking plant development at Caledon Green, Grangemouth (Planning Ref: P/18/0588/FUL). The proposed development comprised of ten containerised gas generators, with stack heights of 11m generating an electricity export capacity of less than 20 Megawatts (MW). The application was accompanied by an Air Quality Impact Assessment (AQIA) (Arcus report ref: v4 October 2020) which, following consultation with SEPA and Falkirk Council's Environmental Health Department was considered to be satisfactory. Falkirk Council were statutory consultees on the Pollution Prevention and Control (PPC) application process managed by SEPA.

Falkirk Council received an application from Clarke Energy in February 2023 seeking to propose an amendment to the design of the onsite emissions stacks. The developer was proposing to change to the stack diameter design from 800m to 600mm. All other parameters (stack height, temperatures etc.) will remain as per the 2020 Arcus Report.

The Metrica reports states "The smaller stack diameter will increase efflux velocity, so improving dispersion, and thereby reducing air quality impacts. As such, the 2020 Arcus Report submitted as part of the application assessed the worst case."

The pollutant assessed within the report is nitrogen dioxide (NO<sub>2</sub>) produced from gas combustion from the proposed development. Predicted concentrations of NO<sub>2</sub> with both long and short-term impacts on nearest local receptors have been satisfactorily assessed and stated in the AQIA with the following conclusion:

"Metrica has been requested to update air quality modelling of the Caledon Green Peaking

Plant following a reduction in flue diameter from 800 mm to 600 mm. Air quality impacts have remained the same or reduced at all receptors due to the smaller stack diameter. As such, air quality impacts due to the development remain not significant."

SEPA have approved the review of the AQIA by Metrica and will be the environmental regulators of the site for industrial sourced air emissions.

## **4.4 Commercial and Domestic Sources**

#### **Biomass Combustion Plants**

Falkirk Council did not receive any applications in 2023 for any proposed biomass combustion plants.

#### **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 2023, Falkirk Council had 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 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 now 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 Falkirk Council website at: <u>http://www.falkirk.gov.uk/services/environment/environmental-</u> policy/air-quality/smoke-control-areas.aspx

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/services/environment/environmental-policy/air-quality/solidfuel.aspx

#### **Combined Heat and Power (CHP) Plant**

#### New Energy from Waste Facility – Avondale Quarry, Polmont, Falkirk

Falkirk Council received an application from Avondale Holdings Ltd. in September 2023 seeking to develop an energy from waste (EfW) facility at Avondale Quarry in Polmont, Falkirk. Following the granting of planning permission (P/19/0727/FUL) in 2019 by Falkirk Council further information had been requested by Falkirk Council Environmental Health to the developers relating to management of dust during the construction, operation and decommissioning phases. Enzygo Limited (Ltd) was commissioned by Avondale Holdings Ltd to produce a Dust Management Plan (DMP) (Ref: CRM.0167.AQ.001.R.001) in support of this development

As such a DMP was prepared with following objectives:

- Employ appropriate methods, including monitoring and contingencies, to control and minimise fugitive dust releases;

- Prevent unacceptable dust emissions at all times; and

- Reduce the risk of fugitive dust releasing incidents or accidents by anticipating them and planning accordingly.

The DMP has been prepared in accordance with the advice provided by Institute of Air Quality Management (IAQM). The dust impact potential has been assessment and stated upon as follows:

#### Construction and Decommissioning Phases

"The assessment found that impacts are likely to be negligible and that further detailed assessment was not required. However, this DMP recommends the implementation of good practice construction dust measures to ensure that there are no adverse impacts during the construction and decommissioning phases."

#### **Operational Phase Impacts**

"Operational dust emission sources are also likely to be negligible. Deliveries arrive via the existing purpose-built track and deposited within the waste reception hall under negative pressure as air within the hall is drawn through the incineration process. Notwithstanding this, operational good practice measures and monitoring have been included within this DMP."

#### Vehicle Particle Impacts

"EPUK and IAQM guidance 'Land-Use Planning & Development Control: Planning for Air Quality' provides thresholds to determine whether vehicle emissions can be screened as not significant. The relevant criteria are proposals that will generate more the 500 Light Duty Vehicle (LDV) or 100 Heavy Duty Vehicles (HDV) flows per day. The construction phase is very unlikely to generate this number of HGVs and as stated within the accepted air quality ES chapter the operation phase is 'traffic neutral' and therefore no additional vehicles will be generated by the development. As such all particulate emissions can be considered as not significant and require no further assessment or mitigation."

It is unlikely that air quality / dust issues should arise if the good practice mitigation measures outlined in Section 2.0 "Dust Control Measures and Management Plan (DMP)" are fully implemented with regards to the construction and operational phases of the development.

All legislation, policies and guidance referenced within the report are current, applicable and correct.

The Enzygo (Ref: CRM.0167.001.AQ.001) Dust Management Plan for the proposed new Energy from Waste (EfW) development at Avondale Quarry, Polmont, Falkirk (P/19/0727/FUL) appeared to be satisfactory. The site will be managed under a relevant SEPA licence.

## **4.5 New Developments with Fugitive or Uncontrolled Sources** Odour Assessment - Grangemouth Deposit Return Scheme Counting Centre, 1-5 Abbotsinch Road, Grangemouth

Falkirk Council received an application from Biffa waste Services Ltd in January 2023 seeking to develop a Deposit Return Scheme (DRS) facility at 1-5 Abbotsinch Road, Grangemouth. Falkirk Council Environmental Health requested an odour assessment and an odour management plan (OMP) for the facility. WSP Golder consultants were commissioned by Biffa Waste Services Ltd to undertake an odour assessment and OMP (Ref: 70097953.635/A.0) in support of this development.

Likely odour effects at sensitive receptors from the planned development has been fully assessed in section 4 "Assessment", with impacts at nearest human receptors being stated as "moderate adverse" at the residential (high sensitivity) receptors, "slight adverse" at the commercial (medium sensitivity receptors) and "negligible" at the industrial receptors.

Overall, the potential risk of odour exposure to sensitive receptors surrounding the site as a worst-case scenario is likely to be "moderate adverse".

Odours should be minimised and managed using measures contained within Section 5 "Odour Management Plan and Mitigation Measures" such as material processing in Unit No. 1 only, effective building maintenance and infrastructure improvements.

All legislation, policies and guidance referenced within the report are current, applicable and correct at the time of the report being published.

The WSP Golder Odour Assessment (Ref: 70097953.635/A.0) for the proposed Grangemouth Deposit Return Scheme (DRS) Counting Centre at 1-5 Abbotsinch Road, Grangemouth is satisfactory.

Any odour issues arising from site operation should be minimised and managed via the appropriate SEPA Waste Management Licence with any odour complaints to be managed by SEPA.

# 5 Planning Applications

## Transport Assessment – Proposed Visitor Centre and Residential Development, Airth

Falkirk Council received an application from George Russell Construction Ltd. in November 2023 seeking to develop a visitor centre at the "Pineapple", on the north side of Airth with a residential development (of 82 dwellings) to the south of Airth Mains farm. Falkirk Council Environmental Health requested a transport assessment for the full development to ascertain whether an AQIA was necessary in accordance with relevant IAQM guidance. Andrew Carrie Traffic and Transportation Ltd. consultants were commissioned by George Russell Construction Ltd. to undertake this traffic assessment (Ref: July 2023) in support of this development.

Within Appendix H "TRICS Trop Generation Data: Residential" of the associated Transport Assessment states that the housing development total daily trips (AADT) of 410trips (for 82 dwellings) will be below the threshold for requesting an AQIA (500 or over IAQM threshold for progressing to an AQIA). So, on this basis Falkirk Council Environmental Health stated that no significant local air quality concerns associated with this application.

# 6 Conclusions and Proposed Actions

## 6.1 Conclusions from New Monitoring Data

In 2023, the air quality within the Falkirk Council area continued to be good from 2022.

# There were no NAQS objective exceedances recorded throughout Falkirk Council's air quality monitoring network in 2023.

The Falkirk Council air quality monitoring results have shown an overall decrease in NAQS objective exceedances from 2019 for all pollutants measured by automatic monitoring stations.

#### Nitrogen Dioxide (NO2)

The 2023 air quality monitoring results show that all seven automatic nitrogen dioxide (NO<sub>2</sub>) analysers in Falkirk Council's air monitoring network achieved both NO<sub>2</sub> NAQS (1hr and annual mean) objectives.

#### Particulate Matter (PM10)

Falkirk Council measured particulate matter (PM<sub>10</sub>) concentrations at seven site locations during 2023. The relevant Scottish NAQS objectives for PM<sub>10</sub> were achieved at all seven site locations.

### Particulate Matter (PM<sub>2.5</sub>)

Falkirk Council measured particulate matter (PM<sub>2.5</sub>) concentrations at seven site locations during 2023. The relevant Scottish NAQS objectives for PM<sub>2.5</sub> were achieved at all seven site locations.

### Sulphur Dioxide (SO<sub>2</sub>)

In 2023, Falkirk Council monitored SO<sub>2</sub> at six site locations. Four of the monitoring sites are located within the Grangemouth AQMA (declared for 15-minute SO<sub>2</sub> NAQS objective) and two of the sites are located outwith this AQMA.

There were no exceedances of the SO<sub>2</sub> NAQS objectives (15-minute, hourly or daily) recorded at any of the Falkirk Council monitoring site locations during 2023.

#### Benzene and 1,3-Butadiene

The benzene and 1, 3-butadiene diffusion tube monitoring completed by Falkirk Council in 2023 met the NAQS (annual running mean) objectives for each pollutant respectively.

The AQMAs that are currently active in the Falkirk Council area are:

#### 1. Falkirk Town Centre AQMA - Declared on 31st January 2013 for NO2 (annual mean)

The Falkirk town centre NO<sub>2</sub> (annual mean) AQMA remains justified as although there were no exceedances of the NAQS objective recorded in 2023, 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<sup>Ref1</sup>.

## It is anticipated that the Falkirk town centre AQMA (NO<sub>2</sub> annual mean) will be revoked in the Summer / Autumn 2024 if relevant (automatic and non-automatic) AQ monitoring results continue to comply with the NAQS objective.

#### 2. Grangemouth AQMA - Declared on 1st November 2005 SO<sub>2</sub> (15min mean)

There have been over ten years where the SO<sub>2</sub> (annual mean) results at all Grangemouth AQMA automatic monitoring locations (Grangemouth AURN, Moray, Municipal Chambers and Zetland Park) have complied with the SO<sub>2</sub> NAQS (15min mean) objective of 266µg/m<sup>3</sup>, 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 for SO<sub>2</sub> (15min mean). This follows on from the initial Falkirk Council <u>Grangemouth Emissions Study</u> completed by consultants Sweco in 2020.

In 2023, Falkirk Council developed and published the <u>Proposal for the Revocation of the</u> <u>Grangemouth AQMA</u>, as shown in Appendix D. In addition to the Proposal Report, Falkirk Council collaborated with consultants Sweco to produce a comprehensive Grangemouth Detailed Assessment (which will be published after approval in June 2024). These two documents will form the evidence required to progress the revocation of the Grangemouth AQMA Revocation. Due to delays with collecting relevant and accurate emissions data from the major point sources within the industrial area, the Detailed Assessment publication has been later than expected.

It is anticipated that the Grangemouth AQMA (SO<sub>2</sub> 15min mean) will be revoked in the Summer 2024 if relevant AQ results continue to comply with the 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 Assessments) 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 Grangemouth AQMA (SO<sub>2</sub> 15min mean) will be revoked in the Summer 2024 if relevant AQ results continue to comply with the NAQS objective.

It is anticipated that the Falkirk town centre AQMA (NO<sub>2</sub> annual mean) will be revoked in the Summer / Autumn 2024 if relevant (automatic and non-automatic) AQ monitoring results continue to comply with the NAQS objective.

A five-year Falkirk Council Air Quality Strategy will be drafted after the above revocation work is completed. This is expected in 2024 following the relevant AQMA revocations.

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 2024.

# **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) <sup>(1)</sup>	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
A3	Bo'ness	Urban Background / Industrial	299815	681481	SO <sub>2</sub>	Ν	SO <sub>2</sub> : API Teledyne T100, UV Fluorescence.	5	22	1.2
A4	Falkirk Haggs	Roadside	278977	679271	NO2, PM10, PM2.5	Y (NO2)	NO <sub>2</sub> : API Teledyne T200, Chemiluminescence. PM <sub>10+2.5</sub> : Palas Fidas 200 (Optical).	5	2	1.2
A5	Falkirk Hope Street	Roadside	288688	680218	SO2, NO2, PM10, PM2.5	Y (NO2 and PM <sub>10</sub> )	SO <sub>2</sub> : API Teledyne T100, UV Fluorescence. NO <sub>2</sub> : API Teledyne T200,, Chemiluminescence. PM <sub>10+2.5</sub> : Palas Fidas 200 (Optical).	1	5	1.5
A7	Falkirk West Bridge Street	Roadside	288457	680064	NO2, PM10, PM2.5	Y (NO <sub>2</sub> and PM <sub>10</sub> )	NO <sub>2</sub> : API Teledyne T200, Chemiluminescence. PM <sub>10+2.5</sub> : 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) <sup>(1)</sup>	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 <sub>2</sub> , NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub>	Y (SO2)	Benzene: Pumped absorption tube. SO <sub>2</sub> : API Teledyne T100, UV Fluorescence. NO <sub>2</sub> : API Teledyne T200, Chemiluminescence. PM <sub>10</sub> : Met One 1020 Beta Attenuation Monitor (BAM). PM <sub>2.5</sub> : Met One 1020 Beta Attenuation Monitor (BAM).	5	20	3.5
A9	Grangemouth Moray	Urban Background / Industrial	293469	681321	SO <sub>2</sub> , NO <sub>2</sub>	Y (SO <sub>2</sub> )	SO <sub>2</sub> : API Teledyne T100, UV Fluorescence. NO <sub>2</sub> : API Teledyne T200, Chemiluminescence.	1	25	3.5
A10	Grangemouth Municipal Chambers	Urban Background / Industrial	292816	682009	SO2, NO2, PM10, PM2.5	Y (SO2)	SO <sub>2</sub> : API Teledyne T100, UV Fluorescence. NO <sub>2</sub> : API Teledyne T200, Chemiluminescence. PM <sub>10+2.5</sub> : Palas Fidas 200 (Optical).	1	40	3.5
A11	Grangemouth Zetland Park	Urban Background / Industrial	292969	681106	SO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub>	Y (SO <sub>2</sub> )	SO <sub>2</sub> : API Teledyne T100, UV Fluorescence. PM <sub>10+2.5</sub> : Palas Fidas 200 (Optical).	1	135	3.5
A15	Main St, Bainsford	Roadside	288566	681508	NO <sub>2</sub> , PM <sub>10</sub>	N	NO <sub>2</sub> : API Teledyne T200, Chemiluminescence. PM <sub>10+2.5</sub> : Palas Fidas 200 (Optical).	1	2	1.2

## Notes:

(1) Om 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
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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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Tube Height (m)
NA3	Tinto Drive, Grangemouth	Urban Background	293427	680386	Benzene, NO <sub>2</sub>	N	<5	2.6	N	3
NA5	Copper Top pub, Camelon	Roadside	287332	680333	NO <sub>2</sub>	N	<2	0.6 (Traffic Island)	Ν	2.3
NA9	Bellsdyke Rd, Larbert	Roadside	286048	683542	NO <sub>2</sub>	Ν	<2	0.7	Ν	2.5
NA19	Kilsyth Rd, Banknock	Roadside	278779	679301	NO <sub>2</sub>	Ν	<2	2.2	Ν	1.9
NA20	Garngrew Rd, Haggs	Urban Background	278957	679172	NO <sub>2</sub>	Ν	<5	1.5	Ν	2.5
NA21	Grangemouth Rd, Falkirk College	Roadside	290112	680500	Benzene, NO <sub>2</sub>	Ν	<2	1.8	Ν	2.5
NA24	Kerse Lane, Falkirk	Roadside	289189	680018	NO <sub>2</sub>	Y, FTC AQMA	<2	3	Ν	2.5
NA26	Weir St, Falkirk	Urban Background	289207	680123	NO <sub>2</sub>	Y, FTC AQMA	<5	1.7	Ν	2.5
NA27	West Bridge St, Falkirk	Roadside	288490	680055	Benzene, NO <sub>2</sub>	Y, FTC AQMA	<2	0.5	Y	2.2
NA29	Wellside Place, Falkirk	Urban Background	288467	680220	NO <sub>2</sub>	Ν	<5	1.6	Ν	2.4
NA36	Kerr Crescent, Haggs	Roadside	278985	679273	NO <sub>2</sub>	N	<5	2.1	Ν	2.5
NA37	Denny Town House	Urban Centre	281226	682526	Benzene, NO <sub>2</sub>	N	<5	8.9	Ν	2.5
NA38	Larbert Village Primary School	Urban Background	285937	682309	Benzene, NO <sub>2</sub>	N	<5	2.3	Ν	2.4
NA41	Seaview Place, Bo'ness	Roadside	299722	681594	Benzene, 1,3 Butadiene, NO <sub>2</sub>	Ν	<2	0.1	Ν	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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Tube Height (m)
NA42	Municipal Chambers, Grangemouth	Urban Centre / Industrial	292817	682000	Benzene, NO <sub>2</sub>	N	<5	37.5	Y	3
NA44	Harvey Avenue, Polmont	Urban Background	293720	678911	Benzene, NO <sub>2</sub>	N	<5	1.6	N	2.4
NA48	Hayfield, Falkirk	Urban Background	289197	681564	NO <sub>2</sub>	N	<5	3.1	Ν	2.5
NA50	Upper Newmarket St, Falkirk	Urban Background	288671	680047	NO <sub>2</sub>	Y, FTC AQMA	<5	9	Ν	2.3
NA51	Mary St, Laurieston	Roadside	290965	679490	NO <sub>2</sub>	N	1	4.5	Ν	2.4
NA52	Main St, Larbert	Roadside	285866	682356	NO <sub>2</sub>	Ν	<2	4.4	Ν	2.6
NA53	Denny Cross	Roadside	281211	682727	NO <sub>2</sub>	N	<2	0.8	Ν	2.9
NA58	Callendar Rd, Falkirk	Roadside	290194	679624	NO <sub>2</sub>	N	<2	0.5	N	2.5
NA59	Carron Rd, Bainsford	Roadside	288392	681931	NO <sub>2</sub>	N	<2	1.2	Ν	2.4
NA60	Ronades Rd, Carron	Roadside	288133	681587	NO <sub>2</sub>	N	<2	1.6	Ν	2.3
NA61	Canal Rd, Falkirk	Roadside	287976	680656	NO <sub>2</sub>	Ν	<2	1.5	Ν	2.3
NA62	Arnot St, Falkirk	Roadside	289125	679705	NO <sub>2</sub>	Y, FTC AQMA	<2	1.2	N	2.1
NA63	Camelon Rd, Falkirk	Urban Background	288055	680134	NO <sub>2</sub>	On FTC AQMA boundary	<5	1.4	N	2.3
NA64	New Hallglen Rd, Falkirk	Roadside	288807	678422	NO <sub>2</sub>	N	<2	1.7	Ν	2.7
NA65	Redding Rd, Redding	Roadside	291356	678644	NO <sub>2</sub>	N	<2	0.6	N	2.4

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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Tube Height (m)
NA67	Queen St, Falkirk	Urban Background	289430	680433	NO <sub>2</sub>	Ν	<5	1.8	Ν	2.9
NA69	Kerse Lane, Falkirk	Roadside	289025	679991	NO <sub>2</sub>	Y, FTC AQMA	<2	2.3	Ν	2.7
NA71	Park St, Falkirk	Roadside	288910	680112	NO <sub>2</sub>	Y, FTC AQMA	<2	1.5	Ν	2.1
NA72	Vicar St, Falkirk	Roadside	288824	680120	NO <sub>2</sub>	Y, FTC AQMA	<2	1.5	Ν	2.5
NA73	West Bridge St RHS, Falkirk	Roadside	288467	680048	NO <sub>2</sub>	Y, FTC AQMA	<2	0.3	Ν	2.5
NA76	Tryst Rd, Stenhousemuir	Roadside	286851	683229	NO <sub>2</sub>	Ν	<2	1.8	Ν	2.4
NA77	Kinnaird Village	Roadside	286490	683775	Benzene, NO <sub>2</sub>	Ν	<2	3.9	Ν	2.5
NA78	Glen Brae, Falkirk	Roadside	288525	678991	NO <sub>2</sub>	Ν	<2	2.6	Ν	2.2
NA80	Cow Wynd, Falkirk	Roadside	288765	679456	Benzene, NO <sub>2</sub>	Ν	<2	1.8	Ν	2.5
NA81	Grahams Rd, Falkirk	Roadside	288817	680911	Benzene, NO <sub>2</sub>	Ν	<2	0.5	Ν	2.3
NA82	Castings Av, Falkirk	Roadside	288858	681036	NO <sub>2</sub>	Ν	<2	1	Ν	2.5
NA83	Main St, Bainsford	Roadside	288614	681415	NO <sub>2</sub>	Ν	<2	0.5	Ν	2.6
NA85	Auchincloch Dr, Banknock	Roadside	278752	679049	NO <sub>2</sub>	Ν	<2	0.8	Ν	2.5
NA86	Wolfe Rd, Falkirk	Urban Background	289667	679871	NO <sub>2</sub>	N	<2	2	N	2.5
NA87	M80 Slip South, Haggs	Roadside	279017	679305	NO <sub>2</sub>	Ν	<2	1.6	N	1.8
NA88	Ure Crescent, Bonnybridge	Roadside	282444	681074	NO <sub>2</sub>	N	<2	1.7 (16 to M876)	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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Tube Height (m)
NA89	Grahams Rd / Meeks Rd, Falkirk	Roadside	288856	680336	NO <sub>2</sub>	Y, FTC AQMA	<2	2.2	Ν	2.3
NA94	A905 (Glensburgh Road), Grangemouth	Roadside	291213	681074	NO <sub>2</sub>	Ν	7	5.4	Ν	2.4
NA98	Arnothill, Falkirk	Urban Background	288080	680073	NO <sub>2</sub>	Ν	23	1.6	Ν	2.2
NA99	St Crispins PI, Falkirk	Roadside	288924	679675	NO <sub>2</sub>	Y, FTC AQMA	7.6	2.7	Ν	2
NA101	Glensburgh Rd (2), Grangemouth	Roadside	291127	682007	NO <sub>2</sub>	Ν	7	0.9	Ν	2.2
NA105	West of Shieldhill	Rural	288279	676875	Benzene, NO <sub>2</sub>	Ν	Background Rural Site	1.7	Ν	1.6
NA107	Main St (East), Bainsford	Roadside	288640	681396	NO <sub>2</sub>	Ν	4	0.5	Ν	2.3
NA111	Falkirk West Bridge St, Air Quality Station	Urban Centre	288457	680064	NO <sub>2</sub>	Y, FTC AQMA	4.3	2.3	Y	1.8
NA114	Glasgow Rd, Camelon	Roadside	286624	680577	NO <sub>2</sub>	N	2	0.5	N	2.6
NA115	Brown St, Camelon	Urban Background	286761	680413	NO <sub>2</sub>	N	2	1.5	N	2.1
NA116	Kersiebank Avenue, Grangemouth	Urban Background / Industrial	293671	680347	Benzene, NO2	N	2	2.75	N	2.27
NA117	Oswald Avenue (East), Grangemouth	Urban Background / Industrial	294101	681532	Benzene, NO <sub>2</sub>	Y, GM AQMA	2.5	2.2	N	2.27
NA118	Glebe Street, Falkirk	Roadside	288726	680096	NO <sub>2</sub>	Y, FTC AQMA	2.5	1.6	Ν	2.27

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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Tube Height (m)
NA119	Hendry Street, Falkirk	Urban Background	288728	681383	NO <sub>2</sub>	N	3	1.3	N	2.3
NA120	Powdrake Road, Grangemouth	Roadside / Industrial	294097	681488	Benzene, NO <sub>2</sub> , 1,3 Butadiene	Y, GM AQMA	2.9	1.9	N	2.4
NA121	Beancross Roundabout, Grangemouth	Roadside	291956	680522	NO <sub>2</sub>	Y, GM AQMA	3	1.6	N	2.1

### Notes:

(1) Om 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.

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
A4 - Falkirk Haggs	Roadside	Automatic	95.6	95.6	27	18	21	18	17.5
A5 - Falkirk Hope St	Roadside	Automatic	94.5	94.5	20	14	15.5	14	17.1
A7 – Falkirk West Bridge St	Roadside	Automatic	98.6	98.6	38	27	31.4	27	28.5
A8 – Grangemouth AURN	Urban Background / Industrial	Automatic	87.9	87.9	15	11	13.1	14	13.3
A9 – Grangemouth Moray	Urban Background / Industrial	Automatic	77.8	77.8	15	12	13.8	12	10.9
A10 – Grangemouth Municipal Chambers	Urban Background / Industrial	Automatic	99.1	99.1	17	12	13.4	14	13.5
A15 – Main St, Bainsford	Roadside	Automatic	96.7	96.7	25	20.3	19.7	19	18

#### Table A.3 – Annual Mean NO<sub>2</sub> Monitoring Results: Automatic Monitoring (µg/m<sup>3</sup>)

#### Notes:

Exceedances of the NO<sub>2</sub> annual mean objective of  $40\mu g/m^3$  are shown in bold.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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%).

Diffusion	X OS Grid Ref (Easting)	Y OS Grid Ref	Site Type	Valid Data Capture for	Valid Data Capture	NO <sub>2</sub> Annual Mean Concentration (μg/m <sup>3</sup> )					
TUDE ID	(Easting)	(Northing)		Period (%)	2023 (%)	2019	2020	2021	2022	2023	
3	293427	680386	Urban Background	100.0	100.0	19.0	15.0	14.9	13.0	13.7	
5	287332	680333	Roadside	100.0	100.0	27.0	19.0	19.3	18.0	18.6	
9	286048	683542	Roadside	100.0	100.0	23.0	18.0	17.0	16.0	16.4	
19	278779	679301	Roadside	100.0	100.0	27.0	21.0	19.9	18.0	18.9	
20	278957	679169	Urban Background	92.3	92.3	22.0	18.0	16.6	17.0	16.0	
21	290112	680500	Roadside	100.0	100.0	26.0	21.0	19.7	18.0	19.3	
24	289189	680018	Roadside	82.7	82.7	33.0	25.0	24.0	24.0	24.5	

26	289234	680121	Urban Background	100.0	100.0	18.0	13.0	13.6	12.0	12.6
27	288490	680055	Roadside	82.7	82.7	47.0	35.0	34.8	30.0	34.3
29	288467	680220	Urban Background	100.0	100.0	17.0	13.0	12.0	12.0	12.8
36	278985	679273	Roadside	100.0	100.0	35.0	27.0	25.2	24.0	24.6
37	281226	682526	Urban Centre	100.0	100.0	17.0	14.0	12.6	12.0	11.8
38	285937	682309	Urban Background	90.4	90.4	16.0	13.0	12.1	11.0	10.8
41	299722	681594	Roadside	100.0	100.0	23.0	19.0	17.4	16.0	16.1
42a, 42b, 42c	292817	682000	Urban Centre	100.0	100.0	19.0	15.0	14.1	13.0	12.8
44	293720	678911	Urban Background	100.0	100.0	18.0	14.0	13.1	12.0	13.0
48	289197	681564	Urban Background	100.0	100.0	19.0	15.0	15.7	13.0	14.1
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50	288671	680047	Urban Background	92.3	92.3	24.0	18.0	18.2	15.0	14.9
51	290965	679490	Roadside	100.0	100.0	24.0	18.0	16.8	17.0	17.6
52	285866	682356	Roadside	100.0	100.0	22.0	20.0	18.0	17.0	16.7
53	281211	682727	Roadside	82.7	82.7	27.0	21.0	19.9	18.0	18.2
58	290194	679624	Roadside	92.3	92.3	21.0	16.0	14.5	14.0	14.4
59	288392	681931	Roadside	100.0	100.0	29.0	23.0	21.8	21.0	20.3
60	288133	681587	Roadside	92.3	92.3	25.0	21.0	19.8	22.0	18.7
61	287976	680656	Roadside	100.0	100.0	23.0	19.0	17.9	16.0	17.1
62	289125	679705	Roadside	92.3	92.3	34.0	27.0	23.6	25.0	25.8
63	288055	680134	Roadside	100.0	100.0	34.0	27.0	27.0	24.0	26.6

64	288807	678422	Roadside	100.0	100.0	17.0	11.0	11.4	10.0	11.3
65	291356	678644	Roadside	100.0	100.0	24.0	19.0	18.1	15.0	15.9
67	289430	680433	Urban Background	67.3	67.3	26.0	22.0	21.7	20.0	22.2
69	289025	679991	Roadside	100.0	100.0	30.0	23.0	23.3	21.0	24.3
71	288910	680112	Roadside	100.0	100.0	30.0	25.0	24.4	22.0	23.4
72	288824	680120	Roadside	100.0	100.0	27.0	22.0	20.8	18.0	19.4
73	288467	680048	Roadside	100.0	100.0	31.0	24.0	23.4	21.0	22.6
76	286851	683229	Urban Background	100.0	100.0	20.0	16.0	15.0	14.0	13.6
77	286490	683775	Roadside	100.0	100.0	23.0	18.0	17.3	16.0	15.6
78	288525	678991	Roadside	100.0	100.0	28.0	21.0	19.7	19.0	18.7
80	288765	679456	Roadside	100.0	100.0	30.0	25.0	19.8	20.0	19.3

81	288817	680911	Kerbside	100.0	100.0	32.0	24.0	22.1	21.0	21.9
82	288858	681036	Urban Background	100.0	100.0	18.0	15.0	13.3	13.0	13.2
83	288614	681415	Roadside	100.0	100.0	34.0	25.0	25.1	24.0	25.3
85	278752	679049	Urban Background	92.3	92.3	20.0	14.0	13.9	14.0	16.0
86	289667	679871	Urban Background	100.0	100.0	16.0	12.0	11.3	10.0	10.6
87	279017	679305	Roadside	100.0	100.0	31.0	21.0	21.0	19.0	19.4
88	282444	681074	Roadside	92.3	92.3	27.0	20.0	20.1	19.0	18.9
89	288856	680336	Roadside	100.0	100.0	30.0	23.0	21.8	20.0	21.0
94	291213	681927	Roadside	100.0	100.0	30.0	24.0	22.4	21.0	20.1
98	288095	680105	Urban Background	100.0	100.0	13.0	16.0	15.4	14.0	14.0

99	288924	679675	Roadside	100.0	100.0	25.0	20.0	18.2	18.0	18.1
101	291127	682007	Roadside	100.0	100.0	23.0	17.0	16.3	15.0	15.9
105	288292	676889	Rural	100.0	100.0	8.0	6.0	5.8	5.0	5.3
107	288640	681396	Roadside	100.0	100.0	30.0	23.0	18.9	17.0	16.4
111a, 111b, 111c	288457	680064	Urban Centre	100.0	100.0	38.0	31.0	29.4	27.0	28.9
114	286624	680577	Roadside	92.3	92.3	41.0	31.0	28.9	25.0	17.1
115	286761	680413	Urban Background	92.3	92.3	19.0	13.0	13.2	11.0	12.6
116	293671	680347	Industrial	100.0	100.0	20.0	15.0	15.1	14.0	14.6
117	294101	681532	Industrial	100.0	100.0	20.0	15.0	13.6	12.0	12.9
118	288726	680096	Roadside	82.7	82.7	23.0	18.0	17.3	15.0	18.7
119	288728	681383	Urban Background	100.0	100.0	22.0	18.0	17.4	15.0	16.2

120	294097	681488	Industrial	100.0	100.0		14.0	15.5
121	291956	680522	Roadside	100.0	100.0		19.0	18.2

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<sub>2</sub> annual mean objective of  $40\mu g/m^3$  are shown in bold.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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%).

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
A4 Falkirk Haggs	Roadside	Automatic	95.6	95.6	0	0	0	0	0
A5 Falkirk Hope St	Urban Background	Automatic	94.5	94.5	0	0 (81)	0	0	0
A7 Falkirk West Bridge St	Roadside	Automatic	98.6	98.6	0	0	0	0	0
A8 Grangemouth AURN	Urban Background / Industrial	Automatic	87.9	87.9	0	0	0 (71.7)	0	0
A9 Grangemouth Moray	Urban Background / Industrial	Automatic	77.8	77.8	0	0 (70)	0	0	0
A10 Grangemouth Municipal Chambers	Urban Background / Industrial	Automatic	99.1	99.1	0	0	0	0	0
A15 Main St, Bainsford	Roadside	Automatic	96.7	96.7	0	0 (88)	0	0	0

#### Table A.5 – 1-Hour Mean NO<sub>2</sub> Monitoring Results, Number of 1-Hour Means > 200µg/m<sup>3</sup>

#### Notes:

Exceedances of the NO<sub>2</sub> 1-hour mean objective (200 µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in bold.

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

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

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

# Figure 3 – A4 Falkirk Haggs Long Term NO<sub>2</sub> Concentrations



# Figure 4 – A5 Falkirk Hope St Long Term NO<sub>2</sub> Concentrations



# Figure 5 – A7 Falkirk West Bridge St Long Term NO<sub>2</sub> Concentrations



# Figure 6 – A8 Grangemouth AURN Long Term NO<sub>2</sub> Concentrations



# Figure 7 – A9 Grangemouth Moray Long Term NO<sub>2</sub> Concentrations



### Figure 8 – A10 Grangemouth Municipal Chambers Long Term NO<sub>2</sub> Concentrations



# Figure 9 – A15 Main St, Bainsford Long Term NO<sub>2</sub> Concentrations



#### Table A.6 – Annual Mean PM<sub>10</sub> Monitoring Results (µg/m<sup>3</sup>)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
	Falkirk Haggs (Uncorrected)				10	10.4	11	10.1
A4	Falkirk Haggs (Mean Corrected – Fidas) <sup>(3)</sup>	88	88	14.1	10.5	11.5	12.1	11.1
۸.5	Falkirk Hope St (Uncorrected)	00	00	12.4	0	9	9.3	8.6
AS	Falkirk Hope St (MC – Fidas) <sup>(3)</sup>	99	99	13.4	9	9.9	10.2	9.5
	Falkirk West Bridge St (Uncorrected)			10.5	7.4	9.2	9.6	10.1
A7	Falkirk West Bridge Street (MC – Fidas) <sup>(3)</sup>	93	93	11.5	8.1	10.1	10.6	11.1
A8	Grangemouth AURN	97	97	13	9	9.3	10	8.7
A10	Grangemouth Municipal Chambers (Uncorrected)	100	100	12.0	7.7	8.6	9.1	9.1
AIU	Grangemouth Municipal Chambers (MC – Fidas) <sup>(3)</sup>	100	100	13.9	8.5	9.5	10	10
A 1 1	Grangemouth Zetland Park (Uncorrected)	00	00			8.6	9.8	8.3
A11 -	Grangemouth Zetland Park (MC - Fidas) <sup>(3)</sup>	33	99			9.5	10.8	9.1
A15	Main St, Bainsford (Uncorrected) Main St, Bainsford (MC – Fidas) <sup>(3)</sup>	99	99	14.4	10.6	11.1 12.2	11.2 12.3	10.1 11.1

#### Notes:

Exceedances of the PM<sub>10</sub> annual mean objective of 18  $\mu$ g/m<sup>3</sup> 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%).

(3) In accordance with the Scottish Government Guidance Note "Measurement of Ambient Particulate Matter (PM) and the LAQM Reporting of Measured Concentrations" May 2023<sup>1</sup> - Corrected and uncorrected results (greyed out) are displayed for PM concentration with Fidas analysers in operation.

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
A4	Falkirk Haggs	88	88	4	0 (21)	0	0	0
A5	Falkirk Hope St	99	99	1	0	0	0	0
A7	Falkirk West Bridge St	93	93	1	0 (18)	0	0	0
A8	Grangemouth AURN	97	97	2	0	0	0	0
A10	Grangemouth Municipal Chambers	100	100	2	0 (17)	0	0	0
A11	Grangemouth Zetland Park	99	99			0	0	0
A15	Main St, Bainsford	99	99	5	0	0 (25)	0	0

Table A.7 – 24-Hour Mean PM<sub>10</sub> Monitoring Results, Number of PM<sub>10</sub> 24-Hour Means > 50µg/m<sup>3</sup>

#### Notes:

Exceedances of the PM<sub>10</sub> 24-hour mean objective (50 µg/m<sup>3</sup> 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 10 – A4 Haggs Long Term PM<sub>10</sub> (Hourly Measured) Concentrations



de-seasonalised PM<sub>10</sub> particulate matter (Hourly measured)

### Figure 11 – A5 Falkirk Hope St Long Term PM<sub>10</sub> (Hourly Measured) Concentrations



de-seasonalised PM<sub>10</sub> particulate matter (Hourly measured)

### Figure 12 – A7 Falkirk West Bridge St Long Term PM<sub>10</sub> (Hourly Measured) Concentrations



de-seasonalised PM10 particulate matter (Hourly measured)

### Figure 13 – A8 Grangemouth AURN Long Term PM<sub>10</sub> (Hourly Measured) Concentrations



de-seasonalised PM10 particulate matter (Hourly measured)

### Figure 14 – A10 Grangemouth Municipal Chambers Long Term PM<sub>10</sub> (Hourly Measured) Concentrations



de-seasonalised PM<sub>10</sub> particulate matter (Hourly measured)

### Figure 15 – A11 Grangemouth Zetland Park Long Term PM<sub>10</sub> (Hourly Measured) Concentrations



de-seasonalised PM<sub>10</sub> particulate matter (Hourly measured)

### Figure 16 – A15 Main St, Bainsford Long Term PM<sub>10</sub> (Hourly Measured) Concentrations



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Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
	Falkirk Haggs (Uncorrected)				5.3	5.7	6.1	5.3
A4	Falkirk Haggs (Mean Corrected – Fidas) <sup>(3)</sup>	88	88		5.6	6.1	6.4	5.6
٨٢	Falkirk Hope St (Uncorrected)	00	00		E 1	5	5.3	4.8
Ab	Falkirk Hope St (MC – Fidas) <sup>(3)</sup>	99	99		5.1	5.3	5.6	5.1
47	Falkirk West Bridge St (Uncorrected)	02	02	5.9	4.4	4.9	5.2	5.3
A7	Falkirk West Bridge St (MC – Fidas) <sup>(3)</sup>	93	93	6.2	4.7	5.2	5.5	5.6
A8	Grangemouth AURN	98	98	8	6	5.4	8	5.1
A10	Grangemouth Municipal Chambers (Uncorrected)	100	100		4.3	4.7	5.4	5
AIU	Grangemouth Municipal Chambers (MC – Fidas) <sup>(3)</sup>	100	100		4.5	5	5.8	5.3
A 1 1	Grangemouth Zetland Park (Uncorrected)	00	00			5.2	5.5	4.9
A11 -	Grangemouth Zetland Park (MC – Fidas) <sup>(3)</sup>	99	99			5.5	5.8	5.2
A 15	Main St, Bainsford (Uncorrected)	00	00		6.2	6.1	6.2	5.4
AIS	Main St, Bainsford (MC – Fidas) <sup>(3)</sup>	39	59		0.2	6.4	6.5	5.7

#### Table A.8 – Annual Mean PM<sub>2.5</sub> Monitoring Results (µg/m<sup>3</sup>)

#### Notes:

Exceedances of the PM<sub>2.5</sub> annual mean objective of 10  $\mu$ g/m<sup>3</sup> 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%).
- (3) In accordance with the Scottish Government Guidance Note "Measurement of Ambient Particulate Matter (PM) and the LAQM Reporting of Measured Concentrations" May 2023<sup>1</sup> - Corrected and uncorrected results (greyed out) are displayed for PM concentration with Fidas analysers in operation.

### Figure 17 – A4 Falkirk Haggs Long Term PM<sub>2.5</sub> Concentrations



de-seasonalised PM<sub>2.5</sub> particulate matter (Hourly measured)

### Figure 18 – A7 Falkirk West Bridge St Long Term PM<sub>2.5</sub> Concentrations



de-seasonalised PM2.5 particulate matter (Hourly measured)





de-seasonalised PM2.5 particulate matter (Hourly measured)

# Figure 20 – A10 Grangemouth MC Long Term PM<sub>2.5</sub> Concentrations



de-seasonalised PM<sub>2.5</sub> particulate matter (Hourly measured)

Site ID	Site Type	Valid Data Capture for monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	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	95	95	0	0	0
A5	Falkirk Hope St	98	98	0	0	0
A8	Grangemouth AURN	93	93	16	0	0
A9	Grangemouth Moray	100	100	16	1	0
A10	Grangemouth Municipal Chambers	99	99	6	0	0
A11	Grangemouth Zetland Park	99	99	1	0	0

Table A.9 – SO<sub>2</sub> 2023 Monitoring Results, Number of Relevant Instances

#### Notes:

Exceedances of the SO<sub>2</sub> 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: 99.9<sup>th</sup> percentile, 1-hour means: 99.7<sup>th</sup> percentile, 24-hour means: 99.2<sup>nd</sup> 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%).







de-seasonalised Sulphur dioxide

# Figure 22 – A5 Falkirk Hope St Long Term SO<sub>2</sub> Concentrations

# Figure 23 – A8 Grangemouth AURN Long Term SO<sub>2</sub> Concentrations



# Figure 24 – A9 Grangemouth Moray Long Term SO<sub>2</sub> Concentrations



# Figure 25 – A10 Grangemouth Municipal Chambers Long Term SO<sub>2</sub> Concentrations



### Figure 26 – A11 Grangemouth Zetland Park Long Term SO<sub>2</sub> Concentrations


### Figure 27 – Polar Plots of Average SO<sub>2</sub> Concentrations Recorded at the Grangemouth Sites



A) Grangemouth AURN: 2023

B) Grangemouth AURN: 2019 – 2023



### C) Grangemouth Moray: 2023

### D) Grangemouth Moray 2019 - 2023



Polar plot of SO<sub>2</sub> at Grangemouth Moray mean for the period 2023 to 2023



### E) Grangemouth Municipal Chambers: 2023

F) Grangemouth Municipal Chambers: 2019 – 2023



Polar plot of SO<sub>2</sub> at Falkirk Grangemouth MC mean for the period 2023 to 2023



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### G) Grangemouth Zetland Park: 2023

H) Grangemouth Zetland Park: 2019 – 2023

Polar plot of SO<sub>2</sub> at Falkirk Grangemouth Zetland Park mean for the period 2019 to 2023



Polar plot of SO<sub>2</sub> at Falkirk Grangemouth Zetland Park mean for the period 2023 to 2023





Figure 28 – Exceedances of the 15 Minute SO<sub>2</sub> NAQS Objective Concentration at the Grangemouth Sites 2013 – 2023

Site ID	Location	Data Capture (%)	An	nual Mean	Concentrat	tions (µg/m	<sup>3</sup> )
		in 2023	2019	2020	2021	2022	2023
NA41	Seaview Place, Bo'ness	91.7	0.05	0.05	0.05	0.05	0.05
NA55	Inchyra Station, Grangemouth	100	0.05	0.06	0.05	0.06	0.06
NA104	Powdrake Road, Grangemouth	100	0.05	0.05	0.05	0.05	0.05

### Table A.10 – 1, 3 Butadiene Annual Mean Diffusion Tube Results for 2023

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

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Table A.11 – Benzene A	Annual Mean	Diffusion <sup>-</sup>	Tube	Results	for	2023
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Site ID	Location	Within	Data Capture (%)	A	nnual Mea	n Concentr	ations (µg/	m³)
			in 2023	2019	2020	2021	2022	2023
NA3	Tinto Drive, Grangemouth	Ν	100	0.8	0.48	0.51	0.58	0.54
NA21	Grangemouth Road, Falkirk College	Ν	100	0.65	0.43	0.37	0.57	0.51
NA27	West Bridge Street, Falkirk	Ν	100	1.07	0.61	0.54	0.60	0.62
NA37	Denny Town House	Ν	100	0.77	0.43	0.39	0.51	0.54
NA38	Larbert Village Primary School	Ν	91.7	0.51	0.45	0.39	0.45	0.39
NA41	Seaview Place, Bo'ness	Ν	100	0.96	0.63	0.61	0.74	0.65
NA42	Municipal Chambers, Grangemouth	N	91.7	0.78	0.45	0.51	0.57	0.96
NA44	Harvey Avenue, Polmont	Ν	100	0.67	0.38	0.41	0.42	0.45
NA55	Inchyra AQ Station, Grangemouth	N	100	0.73	0.49	0.52	0.58	0.62
NA77	Kinnaird Village	Ν	100	0.59	0.41	0.38	0.44	0.43
NA80	Cow Wynd, Falkirk	N	100	0.66	0.46	0.45	0.49	0.53
NA81	Grahams Road, Falkirk	N	100	0.97	0.62	0.61	0.74	0.76
NA94	A905 (Glensburgh Rd), Grangemouth	N	100	0.77	0.46	0.49	0.66	0.71
NA105	West of Shieldhill	Ν	100	0.4	0.25	0.28	0.33	0.32
NA116	Kersiebank Avenue, Grangemouth	Y	100	0.76	0.46	0.45	0.52	0.52
NA117	Oswald Avenue (East), Grangemouth	Y	100	0.99	0.53	0.55	0.64	0.71

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### Table A.12 – Pumped Benzene Annual Mean Results for 2023

Site ID	Location	Within	Data Capture	An	inual Meai	n Concentr	ations (µg/ı	m³)
		AQIVIA :	(%) 111 2023	2019	2020	2021	2022	2023
A8	Grangemouth AURN	Y	100	0.78	0.53	0.68	0.66	0.79

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

### Figure 29 – Maps of the AQMA Boundaries in the Falkirk Council Area



A) Grangemouth AQMA (SO<sub>2</sub>, 15min mean) with relevant diffusion tube locations, declared November 2005



B) Falkirk Town Centre AQMA (NO<sub>2</sub> Annual Mean, PM<sub>10</sub> annual and 24-hour mean) with relevant diffusion tube locations, declared March 2010

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### Figure 30 – Maps Showing Automatic Monitoring Locations



A) A3 Bo'ness

### B) A4 Haggs



#### C) A5 Falkirk Hope Street



#### D) A7 Falkirk West Bridge Street



#### E) A8 Grangemouth AURN



#### F) A9 Grangemouth Moray



#### G) A10 Grangemouth Municipal Chambers



#### H) A11 Grangemouth Zetland Park



#### I) A15 Main Street, Bainsford



# Appendix B: Full Monthly Diffusion Tube Results for 2023

## Table B.1 – NO $_2$ 2023 Monthly Diffusion Tube Results ( $\mu$ g/m<sup>3</sup>)

Diffusion	XOS Crid Pof	YOSGrid					<b>Vean</b> (	Conce	entrati	ons (j	<b>.g/</b> m³)				Simp	en (µg/m3)		
	(Easting)	(Northing)	Jan	Feb	Mar	Apr	May	Jn	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.88) and Annualised	Distance Corrected to Nearest Exposure	
3	293427	680386	20.6	14.9	19.9	14.5	13.0	11.5	9.1	12.3	13.9	15.5	26.4	15.4	15.6	13.7		
5	287332	680333	23.6	22.3	24.0	21.7	192	192	15.1	17.1	18.9	21.5	31.1	21.1	212	18.6		
9	286048	683542	24.5	202	21.9	16.5	16.7	14.1	12.1	152	17.4	17.1	29.5	19.6	18.7	16.4		
19	278779	679301	24.1	21.9	29.8	262	18.9	182	14.8	14.7	21.5	17.9	28.0	23.1	21.6	18.9		
20	278957	679169	252	22.1	23.0	12.1	13.4	13.5	12.6	15.0	17.3	-	25.8	20.4	182	16.0		
21	290112	680500	25.7	20.8	24.4	23.1	19.8	20.3	162	18.5	21.6	24.0	262	232	22.0	19.3		
24	289189	680018	35.3	29.4	32.6	-	29.7	24.5	225	252	28.0	21.3	-	30.7	27.9	24.5		
26	289234	680121	17.6	14.7	16.7	14.3	11.6	11.7	9.4	11.0	13.4	16.3	19.6	16.5	14.4	12.6		
27	288490	680055	39.0	38.7	47.9	50.1	-	37.0	25.1	35.5	39.1	392	-	39.5	39.1	34.3		
29	288467	680220	15.6	14.9	172	15.6	11.8	11.4	7.7	10.4	12.4	16.6	222	18.5	14.5	12.8		
36	278985	679273	34.3	31.6	32.3	28.1	26.0	27.1	19.9	24.0	27.3	29.0	35.5	20.9	28.0	24.6		

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37	281226	682526	16.3	147	179	155	110	102	86	98	12.3	118	191	139	134	11.8	
									0.0								
38	285937	682309	192	14.0	14.6	11.4	9.8	9.0	7.4	8.8	11.3	12.6	-	17.6	12.3	10.8	
41	299722	681594	25.1	17.0	212	19.5	16.7	13.9	14.5	15.4	172	14.7	272	18.3	18.4	16.1	
<b>42</b> a	292817	682000	182	16.5	15.4	13.4	11.5	9.6	<u>9.</u> 9	11.6	152	12.0	22.8	18.0	-	-	Triplicate Site Annual dat
<b>42</b> b	292817	682000	20.6	15.8	16.9	12.9	11.1	9.5	9.4	11.7	15.6	14.3	232	14.9	-	-	Triplicate Site Annual dat
<b>42</b> c	292817	682000	19.8	172	17.0	12.5	10.4	9.5	9.6	11.9	13.6	152	23.9	15.3	14.6	128	Triplicate Site Amual dat
44	293720	678911	18.8	15.0	15.9	14.4	122	112	10.4	12.5	122	15.0	23.7	162	14.8	13.0	
48	289197	681564	21.1	16.7	19.4	14.5	13.9	13.4	9.4	11.8	14.0	18.0	23.3	17.1	16.0	14.1	
50	288671	680047	17.3	17.1	26.3	22.0	14.3	12.9	9.7	15.8	0.8	-	26.8	23.8	17.0	14.9	
51	290965	679490	24.6	22.5	24.3	19.4	17.9	142	14.9	17.9	18.1	15.5	28.6	22.4	20.0	17.6	
52	285866	682356	24.8	19.0	22.4	18.4	15.8	17.0	12.9	16.0	18.6	17.1	25.3	212	19.0	16.7	
53	281211	682727	29.4	24.8	26.1	22.0	17.1	17.4	13.4	-	15.0	15.4	27.3	-	20.8	182	
58	290194	679624	18.4	17.5	20.4	15.4	-	13.4	10.9	122	15.4	14.9	242	18.6	16.5	14.4	
59	288392	681931	30.3	24.0	27.3	25.3	18.3	20.5	17.5	19.1	19.7	21.0	30.9	23.5	23.1	20.3	
60	288133	681587	28.7	22.8	25.0	-	19.1	17.9	13.0	16.1	19.9	17.9	28.6	25.9	21.4	18.7	
61	287976	680656	24.6	21.3	23.8	19.5	16.0	15.5	11.7	14.8	182	19.3	292	19.9	19.5	17.1	

## **FakirkCouncil**



ie with 42a, 42b and 42cta provided for 42c only

ie with 42a, 42b and 42cta provided for 42c only

62	289125	679705	36.1	34.7	33.9	-	26.4	27.1	23.6	24.9	28.1	27.1	342	27.0	29.4	25.8	
ស	288055	680134	33.0	33.3	34.5	30.9	25.5	25.7	25.7	26.7	30.3	29.7	38.4	30.1	30.3	26.6	
64	288807	678422	11.8	11.8	15.0	13.6	11.3	11.6	8.0	11.0	11.5	142	212	142	12.9	11.3	
65	291356	678644	20.9	182	24.0	19.7	13.7	15.6	12.9	14.8	15.8	172	262	18.7	18.1	15.9	
67	289430	680433	-	-	292	272	-	19.5	17.5	23.1	252	24.8	-	27.3	242	222	
69	289025	679991	27.3	27.7	325	32.1	25.9	24.3	19.4	23.9	28.4	28.8	35.9	26.6	27.7	24.3	
71	288910	680112	30.9	28.8	30.0	27.7	26.3	21.3	22.8	24.1	25.4	22.0	33.9	27.1	26.7	23.4	
72	288824	680120	23.9	24.0	26.3	23.9	192	19.8	14.1	17.6	19.9	20.5	30.3	25.9	22.1	19.4	
73	288467	680048	26.6	25.6	<u>29.</u> 0	30.1	22.9	24.1	23.5	19.7	25.8	21.6	322	28.4	25.8	22.6	
76	286851	683229	22.7	16.4	192	12.7	13.0	11.1	8.9	10.4	14.9	13.4	24.8	18.5	15.5	13.6	
77	286490	683775	24.0	21.7	20.1	162	15.4	14.8	11.4	152	16.8	15.1	27.5	16.0	17.8	15.6	
78	288525	678991	21.3	22.1	26.5	22.1	21.4	18.9	18.0	20.1	19.9	19.9	27.4	18.7	21.4	18.7	
80	288765	679456	28.7	26.8	25.9	21.3	20.4	17.1	152	192	20.0	18.8	27.7	22.6	22.0	19.3	
81	288817	680911	27.7	26.7	312	28.1	19.1	24.5	17.0	19.7	232	26.0	29.3	27.1	25.0	21.9	
82	288858	681036	18.7	14.4	16.6	15.1	12.0	11.1	9.7	102	14.3	16.7	24.6	17.5	15.1	132	
83	288614	681415	33.0	32.7	33.8	28.1	28.5	24.8	21.5	242	272	25.8	38.8	27.0	28.8	25.3	
85	278752	679049	-	192	19.4	19.8	13.9	19.4	11.6	10.8	16.4	20.5	27.6	21.8	182	16.0	

## Falkirk Council

## Falkirk Council

with 111a, 111b and 111ca provided for 111c only

with 111a, 111b and 111ca provided for 111c only

with 111a, 111b and 111ca provided for 111c only

117	294101	681532	21.6	16.5	17.0	16.7	13.3	13.4	9.1	11.6	11.3	12.3	202	13.9	14.7	129	
118	288726	680096	-	21.4	272	26.3	17.6	-	13.0	15.4	16.9	23.7	29.7	21.8	21.3	18.7	
119	288728	681383	24.7	20.5	22.5	20.4	13.7	15.7	12.6	142	16.4	19.6	23.3	182	18.5	162	
120	294097	681488	22.3	19.6	21.6	19.3	18.0	13.3	11.7	142	14.4	14.8	26.7	16.7	17.7	15.5	
121	291956	680522	25.0	20.8	27.5	26.4	20.4	0.6	17.4	192	20.0	18.6	29.0	23.8	20.7	182	

 $\boxtimes$  All erroneous data has been removed from the NO<sub>2</sub> 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 LAQMITG22 (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 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System (confirm by selecting in box). Notes:

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

ND<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the ND<sub>2</sub>1-hour mean objective are shown in <u>bold and underlined</u>. See Appendix C for details on bias adjustment and annualisation.

## **FalkirkCouncil**

Site D	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data (ppb)	Annual Mean: Raw Data (µg/m²)
41	0.03	0.02	0.02	0.02	0.02	0.02	0.02	-	0.02	0.02	0.04	0.02	0.02	0.05
55	0.03	0.02	0.02	0.02	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.06
104	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.05

## Table B.3 - Benzene Monthly Diffusion Tube Results for 2022

Site D	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data (ppb)	Annual Mean: Raw Data (µg/m²)
3	026	0.13	020	0.16	0.17	0.10	0.07	0.15	0.16	022	0.31	0.06	0.17	0.54
21	026	0.16	0.17	024	0.14	0.11	0.13	0.14	023	0.07	0.05	0.17	0.16	0.51
27	027	0.17	024	022	0.07	0.14	0.12	0.14	020	0.19	029	024	0.19	0.62
37	0.19	0.14	0.17	0.14	0.12	0.09	0.11	0.16	021	020	026	021	0.17	0.54
38	021	0.12	0.13	0.11	0.11	0.08	0.10	0.12	0.16	0.12	-	0.06	0.12	0.39
41	0.07	0.17	023	021	020	0.05	0.16	021	0.19	023	0.46	023	020	0.65
42	1.01	-	022	0.19	0.18	0.18	0.17	0.19	023	0.18	0.31	0.38	029	0.96
44	0.17	0.13	020	0.13	0.10	0.08	0.08	0.11	0.18	0.17	024	0.06	0.14	0.45
55	029	0.14	021	021	0.17	0.18	0.10	0.12	021	0.19	0.30	0.18	0.19	0.62
77	0.18	0.13	0.18	0.14	0.13	0.08	0.09	0.10	0.12	0.14	020	0.11	0.13	0.43
80	022	0.15	0.16	0.18	0.11	0.13	0.10	0.12	0.14	020	023	020	0.16	0.53
81	0.32	020	027	0.17	0.16	0.15	020	0.19	023	021	0.44	026	023	0.76
94	028	0.19	0.18	020	0.36	0.12	0.15	0.17	0.26	022	024	025	022	0.71
105	0.12	0.08	0.08	0.16	0.07	0.05	0.07	0.07	0.12	0.16	0.10	0.11	0.10	0.32
116	022	0.07	0.17	0.17	0.15	0.14	0.09	0.17	0.16	0.18	0.31	0.10	0.16	0.52
120	023	0.12	024	028	0.38	025	0.16	0.17	0.18	020	0.30	0.10	022	0.71

### **FalkirkCouncil**

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

### New or Changed Sources Identified Within Falkirk Council During 2023

Falkirk Council has not identified any new sources relating to air quality within the reporting year of 2023.

### Additional Air Quality Works Undertaken by Falkirk Council During 2023

In 2023, Falkirk Council developed and published the Proposal for the Revocation of the Grangemouth AQMA, as shown in Appendix D. In addition to the Proposal Report, Falkirk Council collaborated with consultants Sweco to produce a comprehensive Grangemouth Detailed Assessment which is due to be published after approval in June 2024.

### **QA/QC of Diffusion Tube Monitoring**

In 2023, the nitrogen dioxide (NO<sub>2</sub>), 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<sub>2</sub> 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 <u>DEFRA 2023 Diffusion Tube Calendar</u> and with all monitoring data and additional bias / annualisation information entered into the latest <u>DEFRA Diffusion Tube Data</u> <u>Processing Tool</u>.

### **Nitrogen Dioxide Diffusion Tubes**

In 2023, the NO<sub>2</sub> diffusion tube analysis was completed by Gradko International Ltd. Gradko adheres to the DEFRA guidance for the preparation and analysis of the NO<sub>2</sub> diffusion tubes. All the results relating to the concentration of NO<sub>2</sub> present on the diffusion tube are within the scope of Gradko's United Kingdom Accreditation Service (UKAS) accreditation.

The full set of monthly NO<sub>2</sub> 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 **0.88** to the 2023 monitoring data. A summary of bias adjustment factors used by Falkirk Council over the past five years is presented in C.1.

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	Local	-	0.88
2022	Local	-	0.84
2021	Local	-	0.84
2020	Local	-	0.94
2019	Local	-	0.94

### Table C.1 – Bias Adjustment Factor

### NO<sub>2</sub> Diffusion Tube Bias Adjustment Factor (Local and National)

In accordance with LAQM TG22<sup>Ref 2</sup>, a locally derived Bias Adjustment Factor has been calculated for the 2023 NO<sub>2</sub> 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 2023 was **0.83**.

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 <sub>2</sub> Bias Adjustment Factor	0.88
National NO <sub>2</sub> Bias Adjustment Factor	0.83
Difference	-0.05

In accordance with LAQM TG22<sup>Ref 2</sup> 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<sub>2</sub> 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<sub>2</sub> diffusion tube results.

### NO2 Fall-off with Distance from the Road

No diffusion tube NO<sub>2</sub> monitoring locations within Falkirk Council required distance correction during 2023.

### Figure 31 – NO<sub>2</sub> Locally Derived Bias Adjustment Factor Spreadsheets

	NO₂ Period Mean (μg/m³)							
Period	Tube 1	Tube 2	Tube 3	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% Cl of Mean	Data Quality Check
1	31.2	31.7	32.9	31.9	0.9	3%	2.2	Good
2	33.1	34.0	32.2	33.1	0.9	3%	2.3	Good
3	37.0	39.4	42.3	39.6	2.7	7%	6.6	Good
4	40.6	41.4	41.4	41.2	0.5	1%	1.1	Good
5	37.0	37.4	36.4	36.9	0.5	1%	1.2	Good
6	31.2	31.0	30.6	30.9	0.3	1%	0.7	Good
7	18.0	20.3	19.3	19.2	1.2	6%	2.9	Good
8	29.4	28.7	27.1	28.4	1.2	4%	2.9	Good
9	31.0	34.0	19.7	28.2	7.5	27%	18.7	Poor Precision
10	33.1	32.4	33.2	32.9	0.4	1%	1.1	Good
11	40.5	41.7	41.0	41.1	0.6	2%	1.5	Good
12	29.8	34.0	31.3	31.7	2.1	7%	5.3	Good
								Good Overall Precision

A) A7 Falkirk West Bridge St

Period	Period Mean	Data Capture (%)	Data Quality Check
1	25.6	100.0%	Good
2	29.2	100.0%	Good
3	36.6	100.0%	Good
4	34.3	100.0%	Good
5	27.6	100.0%	Good
6	23.9	100.0%	Good
7	16.9	100.0%	Good
8	24.0	100.0%	Good
9	27.5	100.0%	Good
10	27.4	100.0%	Good
11	38.4	100.0%	Good
12	27.1	100.0%	Good
			Good Overall Data Capture

### Falkirk Council

### B) A10 Grangemouth Municipal Chambers

	NO₂ Period Mean (μg/m³)							
Period	Tube 1	Tube 2	Tube 3	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% Cl of Mean	Data Quality Check
1	18.2	20.6	19.8	19.5	1.2	6%	3.0	Good
2	16.5	15.8	17.2	16.5	0.7	4%	1.8	Good
3	15.4	16.9	17.0	16.4	0.9	5%	2.2	Good
4	13.4	12.9	12.5	12.9	0.4	3%	1.1	Good
5	11.5	11.1	10.4	11.0	0.6	5%	1.4	Good
6	9.6	9.5	9.5	9.5	0.1	1%	0.1	Good
7	9.9	9.4	9.6	9.6	0.2	2%	0.6	Good
8	11.6	11.7	11.9	11.7	0.2	1%	0.4	Good
9	15.2	15.6	13.6	14.8	1.0	7%	2.6	Good
10	12.0	14.3	15.2	13.9	1.7	12%	4.1	Good
11	22.8	23.2	23.9	23.3	0.6	2%	1.4	Good
12	18.0	14.9	15.3	16.0	1.7	10%	4.1	Good
				-				

Good Overall Precision

Period	Period Mean	Data Capture (%)	Data Quality Check
1	18.3	100.0%	Good
2	14.8	100.0%	Good
3	15.6	100.0%	Good
4	13.3	100.0%	Good
5	11.0	100.0%	Good
6	9.2	100.0%	Good
7	8.5	100.0%	Good
8	10.2	100.0%	Good
9	12.3	100.0%	Good
10	11.4	100.0%	Good
11	22.3	100.0%	Good
12	12.6	89.6%	Good
			Good Overall Data Capture

### Table C.2 – Local Bias Adjustment Calculations

	STEP 3a Local Bias Adjustment Input 1	STEP 3b Local Bias Adjustment Input 2
Periods used to calculate bias	11	12
Bias Adjustment Factor A	0.85 (0.81 - 0.89)	0.91 (0.86 - 0.96)
Diffusion Tube Bias B	18% (12% - 24%)	10% (4% - 16%)
Diffusion Tube Mean (µg/m³)	33.4	14.6
Mean CV (Precision)	3.2%	5.1%
Automatic Mean (μg/m³)	28.3	13.3
Data Capture	100%	99%
Adjusted Tube Mean (µg/m³)	28 (27 - 30)	13 (13 - 14)

Overall Diffusion Tube Precision	Good Overall Precision	Good Overall Precision
Overall Continuous Monitor Data Capture	Good Overall Data Capture	Good Overall Data Capture

Combined Local Bias Adjustment Factor	0.88
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### Notes:

A combined local bias adjustment factor of **0.88** has been used to bias adjust the 2023 diffusion tube results.

### Table C.4 – Annualisation Summary (concentrations presented in µg/m<sup>3</sup>)

### **Non-Automatic Monitoring Annualisation**

Diffusion Tube ID	Annualisation Factor Falkirk WBS	Annualisation Factor Falkirk HS	Annualisation Factor Site 3 Name	Annualisation Factor Site 4 Name	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m3)	Annualised Data Simple Annual Mean (µg/m3)
67	1.0387	1.0550			1.0469	24.2	25.4

### 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

QA / QC in 2023					
Site	Analyser	Network			
A3. Bo'ness	SO <sub>2</sub>	SAQN			
A4 Falkirk Haggs	NOx	SAON			
A4. Faikirk Haggs	PM10+2.5 (Fidas)				
	NOx				
A5. Falkirk Hope St	SO <sub>2</sub>	SAQN			
	PM10+2.5 (Fidas)				
AZ Falkirk Maat Dridge St	NOx	CAON .			
A7. Faikirk west Bridge St	PM10+2.5 (Fidas)	SAQN			
	NOx				
A8. Grangemouth AURN (Inchyra)	PM <sub>10</sub> (BAM)	AURN			
	PM <sub>2.5</sub> (BAM)				
	SO <sub>2</sub>				
A9 Grangemouth Moray	NOx	AURN			
A9. Grangemouth Moray	SO <sub>2</sub>	SAQN			

Table C 5 – Details of the	QA / QC at the	Automatic Monitoring	stations in 2023
Table C. J = Details Of the			j Stations in 2023

A10. Grangemouth Municipal Chambers	NOx PM <sub>10+2.5</sub> (Fidas) SO <sub>2</sub>	SAQN
A11. Grangemouth Zetland Park	SO <sub>2</sub> PM <sub>10+2.5</sub> (Fidas)	SAQN
A15 Main St Bainsford	NOx	SAQN
	PM10+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<sub>x</sub> and SO<sub>2</sub> analysers receive fortnightly zero and span checks and filter changes.

- BAM PM<sub>10</sub> and PM<sub>2.5</sub> 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 <u>Air Quality in Scotland</u> website. Full details of the data QA / QC ratification process are detailed here: <u>https://www.scottishairquality.scot/data/verification-ratification</u>

- Live air quality data from all Falkirk Council sites are presented on the <u>Air Quality in</u> <u>Scotland</u> 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<sub>10</sub> and PM<sub>2.5</sub> Monitoring Adjustment

In accordance with the Scottish Government Guidance Note "Measurement of Ambient Particulate Matter (PM) and the LAQM Reporting of Measured Concentrations" May  $2023^{\text{Ref 4}}$ . Corrected and uncorrected results (greyed out) are displayed in "Table A.6 – Annual Mean PM<sub>10</sub> Monitoring Results ( $\mu$ g/m<sup>3</sup>)" and "Table A.8 – Annual Mean PM<sub>2.5</sub> Monitoring Results ( $\mu$ g/m<sup>3</sup>)" for PM concentrations with Palas Fidas 200 analysers in operation.

### NO2 Fall-off with Distance from the Road

No automatic NO<sub>2</sub> monitoring locations within Falkirk Council required distance correction during 2023.
# Appendix D - Additional Air Quality Works Undertaken by Falkirk Council During 2023

Proposal for the Revocation of the Grangemouth Air Quality Management Area



# Proposal for the Revocation of the Grangemouth Air Quality Management Area (AQMA)



In fulfillment of Section 83(2)of the Environment Act 1995 – Local Air Quality Management

2023

LAQM Annual Progress Report 2024

## Proposal for the Revocation of the Grangemouth AQMA

Local Authority Officer	Author: John Millar (Air Quality Specialist)			
Eocal Autionty Onicer.	Reviewed by: David Gray (Env. Protection Co-ordinator)			
Department:	Environmental Protection - Growth, Planning and Climate Division			
Address:	Place Services, 4 Stadium Way, Falkirk FK2 9EE			
Email:	pollution@falkirk.gov.uk			
Report Ref:	Proposal for the Revocation of the Grangemouth AQMA			
Status:	Final, v2			
Date:	21/11/2023			

#### Executive Summary

An Air Quality Management Area (AQMA) encompassing a section of Grangemouth was declared in 2005 due to exceedances of the sulphur dioxide (SO<sub>2</sub>) 15-minute mean <u>national air quality strategy (NAQS) objective</u>.

Measured SO<sub>2</sub> concentrations in Grangemouth have declined over recent years and become regularly compliant with the NAQS objective for ten years (since 2012). Section 4 "AQMA" of Part IV of the Environment Act 1995<sup>1</sup> states:

"There are no set criteria on which an AQMA amendment or revocation decision will be based, and the Scottish Government considers each request on a case-by-case basis. A minimum requirement however will normally be **at least three consecutive years** where the NAQS objectives of concern are being achieved and where monitoring data demonstrates that further exceedances of the objectives are unlikely to occur."

On this basis, Falkirk Council are proposing to revoke the Grangemouth AQMA (SO<sub>2</sub> 15-min mean). This proposed revocation report and an associated Detailed Assessment<sup>2</sup> aims to provide evidence that will assist Falkirk Council in doing so following public consultation.

This proposal includes the following elements:

- Background and history of the Grangemouth AQMA;
- Description of local SO<sub>2</sub> pollution sources;
- Monitoring equipment used;
- A review of measured SO<sub>2</sub> concentrations;
- Conclusions and recommendations.

Detailed dispersion modelling of current and future SO<sub>2</sub> concentrations with associated meteorological conditions in Grangemouth are included in the Detailed Assessment<sup>1</sup>.

<sup>\*</sup> https://www.gov.acot/publications/local-air-quality-management-policy-guidance/pages/ \* https://www.faikirk.gov.uk/services/environment/environmental-policy/sir-quality/

There were eleven SO<sub>2</sub> (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<sub>2</sub> (15-min mean) concentrations recorded in the past ten years (since 2012) have complied with the NAQS objective. Falkirk Council expects continued compliance of the SO<sub>2</sub> (15-min mean) NAQS objective in future years.

Revoking an AQMA is an indication that there has been an improvement in air quality within that designated area over a period of time. This improvement has public health benefits through the achievement and the 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.

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## 1. Background

#### 1.1 Introduction

Falkirk Council has been working to improve air guality and public health for many years. The Council has a responsibility to comply with legislation and policy regulations when managing local air quality. The Council completes its Local Air Quality Management (LAQM) duties by managing an extensive air quality monitoring network, assessing collected data and reporting on areas of existing or anticipated poor air quality - declared via AQMAs.

#### 1.2 Legislation and Policy

#### European Legislation

The European Union (EU) has published a Directive on Ambient Air Quality Assessment and Management<sup>3</sup> which came into force in September 1996. This Directive was intended as a strategic framework for tackling air quality consistently, through setting European-wide air quality limit values in a series of daughter directives, superseding and extending European legislation. The first four daughter directives were placed into national legislation. A new EU air guality directive<sup>4</sup> came into force in June 2008 and was transposed into The Air Quality Standards Regulations<sup>5</sup> in Scotland, Wales, Northern Ireland and England in June 2010.

#### National Legislation

The Environment Act 1995<sup>6</sup> (UK Government) required the preparation of a NAQS setting Air Quality Objectives (AQOs) for specified pollutants and outlining measures to be adopted by local authorities through the system of LAQM and by others to work. in pursuit of the achievement of these objectives. The NAQS was published in 1997 and subsequently reviewed and revised in 2000, and an addendum to the Strategy published in 2002. The current Strategy<sup>7</sup> was published in July 2007.

The Air Quality Standards (AQS) are set for the purpose of protecting human health, vegetation, and ecosystems from certain harmful atmospheric pollutants. The Scottish air quality standards take account of the EU objective values and are either effectively

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sur-lex europa europai-content/EN/TXT0/TML/2uri=CELEX%34

en/uploads/system/uploads/attachment\_dats/file/59336/pb12654-air-quality-strategy-vol1-

identical, or more stringent. LAQM Technical Guidance TG228 provides advice on where the AQS for pollutants considered in this study apply. These are summarised in Table 1.

Averaging Period	Standards Should Apply to	Standards Should Generally Not Apply to
24-hour mean and 8-hour mean	All locations where members of the	Building façades of offices or other places of
	public might be regularly exposed.	work where members of the public do not have
	Building façades of residential	regular access. Hotels, unless used as a
	properties, schools, hospitals, care	permanent residence. Gardens of residential
	homes etc.	properties. Kerbside sites (as opposed to
		locations at the building façade), or any other
		location where public exposure is expected to
		be short term.
24-hour mean and 8-hour mean	All locations where the annual mean	Kerbside sites (as opposed to locations at the
	objective would apply, together with	building taçade), or any other location where
	hotets. Gardens of residential	public exposure is expected to be shorter than
	propenses.	erher he 24- or 8-hour relevant mean.
1-hour mean	All locations where the annual mean	Kerbside sites where the public would not be
	and 24- and 8-hour mean objectives	expected to have regular access.
	apply. Kerbside sites (for example,	
	pavements of busy shopping streets).	
	Those parts of car parks, bus	
	stations and railway stations etc.	
	which are not fully enclosed, where	
	members of the public might	
	reasonably be expected to spend one	
	hour or more.	
	Any outdoor locations where	
	members of the public might	
	reasonably expect to spend one hour	
	or longer which are not fully enclosed,	
	where members of the public might	
	reasonably be expected to spend one	
	HOLF OF FILCHE.	
	members of the public might	
	reasonable extent to shared one hour	
	or longer.	
15 min mean	All invotions where members of the	
	public might reasonably be exposed	
	for a period of 15 minutes or longer.	

## Cleaner Air for Scotland

The Scottish Government's Cleaner Air for Scotland (CAFS) Strategy - The Road to a Healthier Future<sup>9</sup> is a national strategy that sets out how the Scottish Government will deliver its commitment to further improving air quality to protect health.

The CAFS strategy aims to help the Scottish Government achieve the ambitious goal "to have the best air quality in Europe". A National Modelling Framework (NMF) and

ntiuplands/2022/00/LAQM-TG22-August-22-r1.0.pdf Seamer-air-scolland-toad-healthise.det-sed a:/lagm.defra.gov.uk/wp-conte

National Low Emission Framework (NLEF) are being developed to provide the tools and mechanisms to improve national air quality.

Cleaner Air for Scotland 2 (CAFS2) - Towards a Better Place for Everyone<sup>10</sup> 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 from 2021 to 2026. A series of actions across a range of policy areas are outlined within the strategy.

## Local Air Quality Management

The AQOs which are relevant to LAQM in Scotland and have been set into regulations, namely the Air Quality (Scotland) Regulations 2000<sup>11</sup>, the Air Quality (Scotland) Amendment Regulations 2002<sup>12</sup> and the Air Quality (Scotland) Amendment Regulations 2016<sup>13</sup>.

AQMA revocation information can be found in Section 4 "AQMA" of Part IV of the Environment Act 1995 LAQM: Policy Guidance which states:

"Local authorities are able to amend or revoke an existing AQMA order at any time as set out under section 83(2) of the 1995 Act. Where an authority considers it necessary to do this, the Scottish Government expects the authority to consult SEPA and all other statutory consultees, businesses, members of the public and other interested parties in the vicinity of the AQMA. All available supporting information to justify the amendment or revocation should be provided to the Scottish Government before any changes take effect (and this should take the form of a revocation proposal report – as outlined below). A local authority may submit a proposal to amend or revoke an existing AQMA order at any time."

LAQM Technical Guidance TG22<sup>14</sup> requires that a decision to amend or revoke an AQMA should only be taken "In most cases the decision to amend or revoke an AQMA should only be taken following a detailed study, to be appended to the ASR/APR as additional supporting technical information. A modelling study may allow compliance to be assessed over a wider geographical area than when compared to monitoring alone. This should set out in detail all the available information used to reach the decision, with the same degree of confidence as was provided for the original

https://www.gov.acotipublicationalcleaner-air-acotiand-2-towarda-better-place-everyone/

https://www.legistation.gov.uk/usi2002/297/contents/made
https://www.legistation.gov.uk/udi/2016/9760111030837/contents/

Interschewerlegistation.gov.uk/ebi/2016/9780111030837/contents https://team.defts.gov.uk/ep-content/up/cade/2022/08/LAOM-TG22-August-22-v1.0.odf

declaration." as displayed in this report. An associated Detailed Assessment report has been completed by consultants Sweco to support the revocation of the Grangemouth AQMA.

## 1.3 Summary of Proposal

One of the Falkirk Council areas which had historic, poor air quality was Grangemouth. Its town centre and nearby residential areas are located adjacent to a large industrial petrochemical area and international shipping container port. The geographical location and transport infrastructure (nearby the Forth estuary and the M9 motorway) enables Grangemouth to be advantageous for these national and economically significant industries. These areas are shown in Map 1.Grangemouth Layout in Appendix A.

The Grangemouth Air Quality Action Plan (AQAP)<sup>15</sup> was completed by consultants BMT Cordah and published in July 2007. The AQAP Section 2 (p.4) states:

"Up to 2004, the number of measured exceedances of the SO<sub>2</sub> NAQS (15-min) objective appeared to be reducing year on year. In the period following the completion of the Detailed Assessment a number of exceedances of the objective were measured. Analysis of the meteorological conditions at the time of the exceedances and through discussions with Ineos (formerly BP) identified that some of the measured exceedances were directly attributable to events on the Ineos site. Following discussions with SEPA and the Scottish Executive (now the Scottish Government) it was determined that an AQMA should be declared as a precautionary measure for the area covering residential properties within Grangemouth, due to historical exceedances of the 15-min mean NAQS objective for SO<sub>2</sub>."

<sup>&</sup>lt;sup>4</sup> https://www.falkirk.gov.uk/services/environment/environmental-policy/ak-quality/doculaiautiv/00%202007%20Cranoemouth%20Ar%20Cluality%20Action%20Pten.pdf?v=202208250912

## 2. Description of the Grangemouth AQMA

#### 2.1 Pollutant

The World Health Organisation (WHO) description<sup>16</sup> of pollutant SO<sub>2</sub>:

"SO<sub>2</sub> is a colourless gas that is readily soluble in water. It is predominantly derived from the combustion of fossil fuels for domestic heating, industries and power generation."

## 2.2.Time Intervals

The AQS<sup>17</sup> are recorded concentrations (of a pollutant) over a given period, which are considered to be acceptable in terms of what is scientifically known about the effects on health and the environment. They can also be used as a benchmark to indicate whether air pollution is getting better or worse.

An exceedance is a period of time (defined for each standard) where the concentration is higher than that set out in the AQS. The Grangemouth AQMA relevant AQS are shown in Table 2.

## Table 2: SO<sub>2</sub> AQS

Pollutant	Concentration	Measured As	To Be Achieved By
Sulphur Dioxide (SO <sub>2</sub> )	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15 minute average	31 <sup>st</sup> December 2005

## 2.3 Date AQMA Declared

The AQMA was declared by Falkirk Council on 1<sup>st</sup> November 2005. The AQMA has been active for 18 years at the time this report was published. The original Falkirk Council AQMA Declaration Order and associated map can be shown in Appendix B.

#### 2.4 Description and Extent of the Grangemouth AQMA Boundary

The area shown inside the solid black line on Figure 1 Grangemouth AQMA Boundary below is the designated AQMA area. This designated area incorporates the Grangemouth oil terminal, the extensive petrochemical complex, the international shipping port / docks, several chemical manufacturing sites and adjacent town centre / residential areas. The area generally covers the Grangemouth town centre to the

<sup>\*\*</sup> https://www.who.in/hearss/environment-clmate-change-and-health/air-quality-and-health/health-impacts/types-of-pollutants \*\* https://www.acotts/heirounlity.acotts/heirounlity.atandarde

Proposal for the Revocation of the Grangemouth AQMA

Forth estuary port area and extends south to the M9 motorway. Figures 2 and 3 display the petrochemical area and international shipping port respectively.

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# Figure 1 - Grangemouth AQMA

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## Figure 2 - Grangemouth Petrochemical Area



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Figure 3 - Grangemouth International Port



## 3. Historical Grangemouth LAQM Reports / Assessments

There have been many air quality related reports completed before and during the AQMA designation in Grangemouth, these are summarised and listed below.

1. 2003 LAQM Updating and Screening Assessment (U&SA) - Available on Request

The LAQM U&SA report was completed by BMT Cordah for Falkirk Council in July 2003 which states within Section 7.9 Conclusion:

"Based on the Review and Assessment work carried out to date, current emissions levels from the main industrial operators and the recent monitoring data, it has been identified that there is a high probability of the SO<sub>2</sub> objectives being exceeded within the Falkirk Council area. A Detailed Assessment (DA) for SO<sub>2</sub> is therefore required for Falkirk Council."

## 2. 2004 Supplementary Report to DA - Available on Request

Following the recommendations stated in the 2003 U&SA report above, Falkirk Council completed a Supplementary Report to DA in November 2004. The studies completed by BMT Cordah were: 1 Review of (SO<sub>2</sub>) exceedance data, 2. Modelling study of SO<sub>2</sub> sources, and 3. Emissions inventory. The 2004 report concludes:

"Despite the levels of SO<sub>2</sub> which have been recorded at Inchyra Park during 2004, the predictions based upon the known reductions in SO<sub>2</sub> emission rates from BP Grangemouth and improvements in management control over SO<sub>2</sub> emissions from the power stations and refinery indicate that the AQS objectives will be met by the relevant dates; there is therefore no need to declare an AQMA."

## 3. 2005 Grangemouth AQMA Declared

Following Falkirk Council committee meetings and an external consultation process, the Grangemouth AQMA Declaration Order was published on 24<sup>th</sup> October 2005 and can be shown in Appendix B. The Declaration Order states:

"The (Grangemouth) Designated Area is designated in relation to a likely breach of the SO<sub>2</sub> (15-min mean) objective as specified in the Air Quality (Scotland) Regulations 2000."

The Grangemouth AQMA became active on 1<sup>st</sup> November 2005.

## 4. 2007 Grangemouth AQMA Further Assessment - Available on Request

After the Grangemouth AQMA was declared in 2005, the Grangemouth AQMA Further Assessment (FA) report was developed by BMT Cordah for Falkirk Council on 18<sup>th</sup> May 2007. The FA contained: 1. Review of SO<sub>2</sub> data, 2. Emissions inventory and 3. Atmospheric dispersion modelling including source apportionment. The FA concludes: "The emission inventory has indicated that the greatest contributor to annual SO<sub>2</sub> emissions in the Falkirk Council area was lneos. The SO<sub>2</sub> emissions from shipping and from domestic / commercial sources were also greater than those from smaller industrial emitters. It is intended that monitoring of SO<sub>2</sub> concentrations within the Grangemouth AQMA is maintained and an AQMA action plan be drawn up to target improved monitoring and communication between industrial operators, SEPA and Falkirk Council."

#### 2007 Grangemouth AQMA Action Plan

The Grangemouth AQMA Action Plan was completed by BMT Cordah for Falkirk Council on 31<sup>st</sup> July 2007. The AQAP outlined local and national policy developments relating to the National Emissions Ceilings and Large Combustion Plant Directives (LCPD), the Ineos Pollution Prevention and Control (PPC) environmental permit, the site sulphur reduction plan and agreed AQAP measures.

## 6. 2010 Grangemouth AQMA - Further Assessment

Air quality data recorded from three Grangemouth automatic monitoring stations indicated an increase in ambient SO<sub>2</sub> concentrations since 2005. This study was undertaken to provide further analysis to establish any identifiable cause. The 2010 FA report consisted of two stages:

 Evidence based study to analyse monitoring data in relation to meteorological data during the periods of SO<sub>2</sub> exceedances; and

Dispersion modelling study of emissions from Grangemouth industrial operators and Longannet (coal fired) power station during exceedance periods.

## The FA concludes:

"Considering the meteorological analysis, the modelling study, and the fact that lneos are frequently operating normally during pollution episodes, it would appear likely that the main cause of the 15-min mean exceedances is the combined effect of all sources within lneos. Overall, the (Grangemouth) area should remain designated as an AQMA. Considering the extent of the predicted exceedances, it is concluded that the current boundary of the AQMA is appropriate and does not need adjustment."

## 7. 2014 Grangemouth Tail Gas Study

The Grangemouth Tail Gas Study was completed by Golder Associates on behalf of Falkirk Council in July 2014. In response to the AQMA declaration, a working group of key stakeholders including Falkirk Council, SEPA, the Scottish Government and the petrochemical plant operators (Ineos and Petroineos) was formed to implement an action plan of measures to improve local air quality. Petroineos, in discussion with SEPA brought forward proposals to install Tail Gas Treatment (TGT) de-sulphurisation plant technology to reduce emissions of SO<sub>2</sub> from its site. The Tail Gas Study was undertaken to understand the effect of the proposed TGT installation on local SO<sub>2</sub> emissions.

## The study concludes:

"Modelling predictions of 2013 without the TGT indicates that the 15-min mean objective would continue to be breached based on projected emissions data. Modelling predictions of 2013 with the TGT installation indicates that the number of exceedances of the 15-min mean objective would reduce markedly. Predicted concentrations at Grangemouth AURN and Moray would continue to be in excess of the objective level, however the number of predicted exceedances would be below that allowed under the objective. No exceedances are predicted at Grangemouth MC. Overall, maximum concentrations are predicted to reduce markedly as a result of the TGT introduction."

#### 8. 2020 Grangemouth Emissions Study

An extensive air quality modelling study was undertaken by consultants Sweco on behalf of Falkirk Council in 2020 to identify and assess the major sources of (industrial

and traffic) emissions within the Grangemouth area as no AQMA-related emissions assessment had been completed since 2014.

The study considers multiple pollutants such as SO<sub>2</sub>, nitrogen dioxide (NO<sub>2</sub>) and particulates (PM<sub>10</sub>+PM<sub>2.5</sub>). The study includes baseline air quality, road traffic emissions assessment, industrial emissions assessment, source apportionment and utilises emissions modelling to predict future emissions at local receptors. The fundamental concept was that this study could be updated in future (and expanded for any additional sources) which would be advantageous to understanding current and future emissions in Grangemouth.

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#### 4. Description of Local Pollution Sources

The 2010 Grangemouth FA<sup>18</sup> and the 2020 Grangemouth Emissions Study<sup>19</sup> assesses the main sources of SO<sub>2</sub> in Grangemouth. Over time, these sources may have changed / been modified, improved efficiency or have been decommissioned / mothballed.

The main SO<sub>2</sub> source list can be shown below in Table 3: Grangemouth SO<sub>2</sub> Sources. Please note that, this is not a definitive list of *all* SO<sub>2</sub> sources in the Grangemouth area, it is describing the main contributor sources to historical poor air quality.

The Scottish Environment Protection Agency (SEPA) is the regulator for industrial operators through managing environmental permits such as Pollution Prevention and Control (PPC). More information on how SEPA regulates industry in Grangemouth can be found here:

## https://www.sepa.org.uk/regulations/air/air-guality/grangemouth/

The major Grangemouth industrial operators map can be shown in Appendix A: Maps, 2. Major Industrial Operators.

<sup>&</sup>lt;sup>6</sup> https://www.fakirk.gov.uk/services/environment/environmental-policy/sit-quality/docs/sitquality/00%202010%20Cranoemouth%20AdMA%20Further%20Assessment.pdf?v=2020209151334

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quality/12%20Grangemouth%20Emissions%20Study%202020.pdf%=202103021416

# Table 3: Grangemouth SO2 Sources

	Grangemouth Major	SO <sub>2</sub> Source Summary	
Operator	Group Type	Source	Still Operating in 2023?
BP (Now INEOS FPS)	BP (Now INEOS FPS)	BP A17	Y
Calachem	Bailers	BB02 / BB03 / BB05	Y.
France	Ballana	Cochrane	Y.
Enge	Bollers	Nebraska 1+2	Y
All the residues	11 mars	Boilers	Y.
INEUS Chemicals	None	Flares	YE
		P/ST8	Y.
		Boller 9 / 10	Y
		Boiler 11	N
NEW CONTRACTOR	Boilers	Boiler 12	14
NEOS Mastucture	2 24-307-574	Boiler 13	N
		Boiler 14	Y.
		Boiler 15	Y.
	CH	P	V.
		No 1 Flare	Y-
	Flares	No. 2 Flare	Y (spare)
		No. 3 Flare	Y
	CDU3	CDU3 / DHT3	y.
Petroineos	VDU / HCU	VDU/HCU	Ý
	H / Unit	H / Unit	¥.
	And a second sec	SRU 5 Tall Stack	Y.
	SRU Units	SRU 6 Tall Stack	Y.
6	FCCU Unit	FCCU	N.
		1CDUB1	N (mothballed)
		CRU-Main	Y
		CRU 1st Interheater	Y
		Hydrofiner	Y.
		H/Unit	¥.
100 Color 200 Co		SRU 5 Tall Stack	Y
Petromeos	All Petroineos Sources	SRU 6 Tall Stack	Y
	NUMBER OF STREET, STORY 1999	1 CDUB1A	N (mothballed)
		CDU2 / DHT2	Y
		CDU3 / DHT3	Y.
		VDU / HCU	Y
		FCCU	N.
		HCU Mild Column Reboiler	Y
		Longannet 1	N
	Longannet Coal Fired Station	Longannet 2	N.
Scottish Power	(Decommissioned in 2016)	Longannet 3	N
		Longannet 4	N

Acronym	Full Description	
CDU	Crude Distillation Unit	
CHP	Combined Heat and Power	
CRU	Catalytic Reformer Unit	
DHT	Distillate Hydrotreater	
FCCU	Fluidised Catalytic Cracking Unit	
H7 Unit	Hydrogen Unit	
HCU	Hydrocracker	
P/ST8	Boller 8	
SRU	Sulphur Recovery Units	
VDU	Vacuum Distillation Unit	
1CDUB1 Crude Distillation Unit 1B		

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#### 4.1 Changes to Local Pollution Sources

The following organisations have provided the following Grangemouth SO<sub>2</sub> emission related information over recent years.

#### Industrial Operator: Ineos (Refinery, Petrochemicals and Power Station from 2005)

"In 2004, discussions between Falkirk Council and (then) BP identified a route to providing a way forward to reduce the SO<sub>2</sub> emissions for the installation. These planned measures were the result of numerous teams reviewing the sites operations and possible minimisation/mitigating options. One comprehensive piece of work that greatly assisted with this drive and direction was a detailed assessment of the SO<sub>2</sub> sources using air dispersion modelling. This was undertaken internally within BP/Ineos. The dedicated resource reviewed many scenarios of the sites operations to fully understand the SO<sub>2</sub> sources and build a comprehensive picture of the mechanics of both refinery and the power station to provide the best approach in reducing SO<sub>2</sub> emissions and their impact on the local environment. Through this the SO<sub>2</sub> sources were categorised into their contribution to the overall SO<sub>2</sub> emission of the installation and then these were further interrogated to provide a way forward where some could be improved through fuel switching, process operational changes and retrofitting.

 Recommissioning of the Fluidised Catalytic Cracking Unit (FCCU) and installation of a new sulphur recovery unit (SRU). The latter leading to negation of any incremental SO<sub>2</sub> emissions from the reinstatement of the FCCU, through improvements in flaring reduction and increasing the reliability and availability of this equipment;

 Under normal operations the modelling determined that fuel oil could be replaced with fuel gas in the power station and this could be achieved by Dec 2003 without detailed study work or retrofitting, thus reducing SO<sub>2</sub> emissions almost immediately.

The modelling also identified the Sulphur Recovery unit improvements and retrofitting option of Tail Gas Treatment.

 Reformation of the CRU fired heater leading to a reduction in SO<sub>2</sub> emissions was also identified and undertaken.

In addition to the above where possible, the Grangemouth refinery purchased feedstock with low sulphur content. The purchasing policy has a direct effect on reducing sulphur emissions but also has an effect on operational costs. Industrial Operator: Petroineos (Grangemouth Refinery - 2011 onwards)

"Over the years, Petroineos have invested and taken action to reduce sulphur dioxide emissions from the Refinery. There are also two further improvements planned for 2024/5 as detailed below."

Year of	Project	Colour of Bar in	
Improvement	Project	Graph	
2013	Tail Gas Unit commissioned	Pale blue	
2015	Sulphur Recovery Unit reliability improvements	Purplish blue	
2018 2019	Fuel Gas Conversion Projects on three major heaters, resulting in elimination of fuel oil burning from Refinery.	Dark Purple	
2020	Fluidised Catalytic Cracker Unit decommissioned. The FCCU was the unit with the largest single contribution to SO2 emissions. It was not economic to fund environmental improvements.	Pink	
2020	Crude Distillation Unit 1 decommissioned. This reduced the nameplate throughput of the Refinery and eliminated all liquid fuel burning. This dual impact reduced SO2 emissions	Dark Purple	
2024	Fuel Gas Sweetening Project to be commissioned to minimise the concentration of sulphur dioxide created by burning fuel gas	Dark Purple	
2024/5	Sulphur Recovery Unit Turndown Project commissioning. On occasion, the closure of the FCCU in 2020 has resulted in the sulphur recovery units not being able to operate because there is insufficient quantity of sulphur requiring removal from gaseous streams	Purplish blue	

## Proposal for the Revocation of the Grangemouth AQMA



## Refinery SO2 Emissions by Year

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## Environmental Regulator: SEPA

"SO<sub>2</sub> emissions from the Petroineos Refinery have undergone a significant downward trend over recent years following the Tail Gas Treatment unit upgrade in 2013, flaring reductions in 2017 and large gas conversion projects in 2018 and 2019 respectively. Emissions then fell further following the restructuring of the site in 2021. The oil refinery is a very complex and highly integrated site, which requires careful planning and checks during the implementation of any change, so SEPA have been working constantly over this time to ensure that the upgrades were implemented as soon as possible. Further improvements are due in early 2024 and discussions are underway to improve the reliability of the sulphur abatement system to ensure that levels remain low in the future."

"The reduction in flaring was achieved through a programme of improved reliability maintenance targeting key risk areas, such as compressors. The conversion from mixed gas and oil to gas only firing took place over two years, with upgrades to the burner system on Crude Unit 3 completed in 2018, followed by Crude Unit 2 and the Vacuum Distillation Unit in 2019. Crude Unit 1 is currently mothballed but would use gas only if reinstated."

## Local Authority: Falkirk Council

Historically and in general, elevated levels of SO<sub>2</sub> have been recorded in Grangemouth during periods of industrial maintenance with subsequent flaring when strong onshore winds (direction from northeast to southwest) and higher ambient temperatures are prevalent. Elevated levels of SO<sub>2</sub> have frequently been recorded during the spring and summer months when these conditions are generally more common and industrial maintenance activities are often undertaken.

### 5. Implemented AQAP Measures

The agreed Grangemouth AQAP measures below are detailed in the 2007 Grangemouth AQMA Action Plan<sup>20</sup>.

## AQAP Measure 1

"The Integrated Pollution Prevention and Control (IPPC) regulatory regime requires that SEPA ensure that industrial operators adopt Best Available Techniques (BAT) to minimise emissions from regulated sites."

"Falkirk Council will provide SEPA with sufficient information on ambient measured SO<sub>2</sub> concentrations (and other pollutant concentrations) to adequately regulate emissions from industrial operators. Falkirk Council has developed an air quality website to which SEPA will have a privileged level of access through password control."

Achieved: The previously established Falkirk Council air quality website has subsequently been replaced by the <u>Air Quality in Scotland</u> website which provides all of Falkirk Council's live and historical air quality data.

#### AQAP Measure 2

"It is proposed that a working group is setup comprising officers from both SEPA and Falkirk Council. The working group will meet on a regular basis (bi-annually) to monitor air quality issues within the AQMA. Where appropriate, the working group can also meet on an ad-hoc basis. In particular, the working group should evaluate any measured pollution episodes or changes to plant, processes or emission profiles from industrial sites in the Grangemouth area."

Achieved: Falkirk Council has established a working group and provides SO<sub>2</sub> exceedance reports, weather and industrial plant related information on a monthly basis via email. SEPA and industrial operators are included in this group and are regular contributors. An example of a Falkirk Council monthly exceedance report is shown in Appendix C: Monthly SO<sub>2</sub> Working Group Report Example.

<sup>&</sup>lt;sup>28</sup> https://www.falkirk.gov.uk/services/servicesment/environmental-policy/air-quality/doculairquality/00%202007%20Grangemouth%20Air%20Quality%20Action%20Plan.pdf?v=202308290912

## AQAP Measure 3

"Historically, in the event of a pollution episode or measured exceedance of an NAQS objective at a monitoring station in Grangemouth, Falkirk Council officers have made contact with lneos to notify them of the event and to ascertain any reason(s) for the high SO<sub>2</sub> concentrations. Falkirk Council therefore proposes to introduce a system whereby in the event of elevated SO<sub>2</sub> concentrations being measured at one of the Grangemouth monitoring stations a text alert message will be sent to the mobile phones of persons on a relevant working group contact list."

Achieved: A text alert system (direct from SO<sub>2</sub> analyser) had been established by Falkirk Council previously however, the Air Quality in Scotland website created the <u>Know and Respond</u> text / email alert system which is available for all to use and has replaced the Council system.

## AQAP Measure 4

"The trend in measured concentrations and the inability of the modelling studies to replicate the measured concentrations means that the spatial extent of elevated SO<sub>2</sub> concentrations is not fully understood. Falkirk Council proposes to introduce additional monitoring within the AQMA including the new automatic monitoring station at Moray Primary School in Grangemouth."

Achieved: Falkirk Council installed the <u>Grangemouth Moray</u> fixed, automatic air quality station on 20<sup>th</sup> September 2006. The site, since installation, continually monitors SO<sub>2</sub> and nitrogen dioxide (NO<sub>2</sub>). The location of the Grangemouth Moray site can be shown in Appendix A Map 5.

## 6. Monitoring Equipment

Falkirk Council monitors SO<sub>2</sub> and other pollutants at several locations throughout the Council area using automatic and manual sampling methods. The automatic monitoring data displayed below has been fully checked and ratified in accordance with the Scottish Air Quality Database Quality Assurance / Quality Control (QA/QC) process<sup>21</sup>. Full details of all monitoring undertaken by Falkirk Council can be found in the latest <u>Annual Progress Report</u>.

## 6.1 Automatic

Falkirk Council currently maintains and operates four automatic monitoring stations (with continuously monitoring, reference method SO<sub>2</sub> analysers) located within the Grangemouth AQMA as detailed in Table 4 below, these are: A8 Grangemouth Automatic Urban and Rural Network (AURN), A9 Grangemouth Moray, A10 Grangemouth Municipal Chambers, A11 Grangemouth Zetland Park and one nearby "Background" station, A3 Bo'ness. The locations of all automatic monitoring stations are displayed in Appendix A – Maps of Automatic Monitoring Locations.

Site information and live monitoring data from all Falkirk Council's network can be viewed using following link:

https://www.scottishairguality.scot/latest/summary

## 6.2 Non-Automatic

Falkirk Council deploys and utilises many non-automatic monitoring methods such as diffusion and benzene, toluene, ethylbenzene and xylenes (BTEX) post-mounted tubes across its region however none of these methods monitor SO<sub>2</sub> which is the focus of this AQMA revocation proposal so are not included.

<sup>24</sup> https://www.acottishairquality.acotidata/verification-tatification

Proposal for the Revocation of the Grangemouth AQMA

# The automatic, fixed air quality monitoring stations and associated equipment are displayed in Table 4. Table 4: Automatic Stations

AQ Monitoring Site ID:		A3 Bo'mens	AB Grangemouth AURN	A9 Grangemouth Moray	A10 Grangemouth Municipal Chambers	A11 Grangemouth Zetland Park	
Site Type:		Urban Backround / Industrial	Urban Bacilround / Industrial	Ulban Backround / Industrial	Urbas Backround / Industrial	Urban Backround / Industrial	
Address		Bolness Town Hall, Stewart Avenue, EH51 0EF	Inchyra Park, Inchyra Place, Grangemouth, PK3 9EV	Abbotsgrange Early Learning and Childcare Centre, Oxgang Rd, Grangemouth, FK3 9DL	Grangemouth Municipal Chambers, Bo'ness Rd, FIG 8AF	Sostiah Water lacility, Zetland Park, Grangemouth, 143 8JB	
Easting / No	rthing:	2996157683481	233830 / 681022	293469 / 481321	252516 / 482009	292969 / 681106	
	19 nt 503	Horiba 360 APSA (2016)	Teledyne ML9850B (2000 - 24/94/19)	Horiba APSA 360 (20/05/06 - 04/16)	Hariba 360 APSA (1997 - 02/17)	Horiba 368 APSA (05/05/15 -67/03/22)	
Monitoring Equipment		Ecote	Ecotech Serinus 50 (24/04/19 - 04/02/22)				
		Horiba 370 APSA (66/16 - present)	API Teledyne T100 (04/02/22 - present)	Horba APSA 370 (04/16 - present)	Horiba APSA 370 (02/17 - present)	APt Teledyne T100 (07/03/22 - present)	
Reference Method Monitoimg Technique	\$0 <sub>1</sub>	Horiba 300 and 370 APSA: UV Fluorescence	Teledyne ML9850B: UV Fluorescence Ecotech Serieus 50: UV Fluorescence API Teledyne T100 UV Fluorescence	Horiba 360 and 370 APSA: UV Fluorescence			
Date Site Installed:		2903	2000	20/09/2006	1997	05/05/2015	
Date Site Removed:		Still operational	Still operational	Sell operational	Still operational	Still operational	
Comments		Considered a site for "background" S0; monitoring in comparison to the Grangemouth sites.	One of two Automatic Urban and Rural Network atfiliated sites (including Grangemouth Moray)	AURN alliated			

## 7. Monitoring Data

# SO<sub>2</sub> 15min Mean (>266µg/m<sup>3</sup>) – Total Number of Annual Exceedances by Site (2004 - 2022)

The measured, total SO<sub>2</sub> (15-min) NAQS exceedances (over 266µg/<sup>3</sup> not to be exceeded over 35 times) are presented in Table 5 below. The last time a NAQS objective exceedance was recorded in the Grangemouth area was in 2012 at sites A8 Grangemouth AURN (50 times), A9 Grangemouth Moray (92 times) and A10 Grangemouth MC (51 times). Since 2012, no other NAQS exceedance has been recorded and there has been a significant decline in overall total number of annual exceedances to date at all monitoring sites.

There were eleven SO<sub>2</sub> (15min mean) NAQS objective exceedances recorded at three Grangemouth sites (above) over the displayed, last eighteen-year period. No further NAQS objective exceedances were recorded since 2012.

The site with the overall highest exceedance total was the A9 Grangemouth Moray site with 114 times (>266µg/m<sup>3</sup>) exceedances recorded in 2008. There were subsequent exceedances recorded at this site in the following years until the second highest exceedance of 92 times recorded in 2012. There were no other NAQS objective exceedances recorded after 2012 at any of the Grangemouth sites.

More recently in 2016, a relatively high exceedance total of 28 times was recorded at the A10 Grangemouth MC site, this was within the NAQS objective but was elevated in comparison to other Grangemouth monitoring sites in this year. Since 2016, the exceedance amounts have declined and remained low until present. Most exceedances recorded can be attributable to episodes of industrial flaring.

The sites with the lowest number of exceedances are A3 Bo'ness and A11 Grangemouth Zetland Park with no exceedances recorded from 2015 until present.

These results demonstrate that the SO<sub>2</sub> (15-min mean) concentrations for the past ten years (since 2012) have complied with the NAQS objective. Falkirk Council expects the SO<sub>2</sub> (15-min mean) exceedances to remain within the NAQS objective (35 times) for many years in the future due to the ongoing AQAP measures as part of a longer

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term Falkirk Council Air Quality Strategy and industrial process improvements as detailed in Section 5 Implemented AQAP Measures.

Falkirk Council expects to publish a 5-year Air Quality Strategy in 2024 which will include all agreed and ongoing Grangemouth AQAP measures.

Proposal for the Revocation of the Grangemouth AQMA

## Table 5: SO<sub>2</sub> 15min Mean (>266µg/m<sup>3</sup>) - Total Number of Annual Exceedances by Site (2004 - 2022)

Site ID	Site Type	SO <sub>2</sub> 15min Mean (>266µg/m <sup>3</sup> ) - Total Number of Annual Exceedances by Site																		
		Pre AQMA		AQMA Declared	AQMA Active															
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	COVID-19 20		2022
		2004	2000															2020	2021	1 2022
A3	Bo'ness													0(1)	0	0	0	0	0	0
A8	Grangemouth AURN	60	- 4	13	1	4	21	45	36	50	6	3	1	3	0	0	2	6	0	5
A9	Grangemouth Moray				0	114	65	62	72	92	25	-5	2	26	10	1	12	0	0	0
A10	Grangemouth MC				$11^{(0)}$	49	17	12	6	51	0	30	8	28	- 4	0	0	0	0	0
A11	Grangemouth Zetland Park												0(10	0	0	0	0	0	0	0

#### Notes: Exceedances of the SO<sub>2</sub> (15min) NAQS objective of 266µg/m<sup>3</sup> over 35 times are shown in bold.

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

Proposal for the Revocation of the Grangemouth AQMA



## Graph 1: Measured Automatic SO<sub>2</sub> 15min Mean (>266µg/m<sup>3</sup>) - Total Number of Annual Exceedances by Site (2004 - 2022)

#### 8. Future AQMA Actions to be Retained

The Grangemouth AQMA actions that will be retained by Falkirk Council to provide essential air quality services within the Grangemouth area in future are:

 Retain, maintain and operate all existing fixed, automatic monitoring stations within the Grangemouth area as specified in Section 5. Monitoring;

 Providing monthly SO<sub>2</sub> exceedance reports to the existing formal working group (SEPA, industrial operators, Falkirk Council etc.). Recipients can be added or removed as necessary via a request to Falkirk Council Environmental Protection;

 Continue to monitor local weather and provide data access to the Grangemouth working group partners. The monitoring equipment is located at the Grangemouth Zetland Park AQ site and will be operated / maintained by Falkirk Council to supplement the nearest Met Office weather station at Gogarbank, Edinburgh;

 Exceedance notification and investigation with relevant organisations such as SEPA and industrial operators utilising text / email alerts from the <u>Air Quality in Scotland</u> website to continue as currently undertaken via the formal working group;

 Publication of an updated <u>Grangemouth Emissions Study</u> on a regular basis (at least every five years) to quantify and take in account any new or changed emission source in the Grangemouth area.

Falkirk Council expects to publish a 5-year Air Quality Strategy in 2024 which will include all agreed and ongoing AQAP actions. The Falkirk Council Annual Progress Reports (APR)<sup>22</sup> will keep a record of achievements.

<sup>&</sup>lt;sup>20</sup> https://www.faikirk.gov.uk/services/environment/environmental-policy/air-guality/

## 9. Conclusions and Recommendations

The Grangemouth AQMA was declared by Falkirk Council on the 1st November 2005 following exceedances of the SO<sub>2</sub> (15min mean) NAQS objective. Since the AQMA was declared, measured concentrations of SO2 (using automatic monitoring methods) have gradually declined and have since become compliant with the NAQS objective consistently over the past ten years (since 2012).

The 2010 Grangemouth FA23 assesses the main sources of SO2 in Grangemouth. These are summarised in Section 4: Description of Local Pollution Sources. Historically, the petrochemical area has been responsible for the majority of SO<sub>2</sub> emissions sources in the Grangemouth area.

As a result of the achievement and on-going work of the AQAP measures (as described in the above Section 5) and other improvements in industrial processes and utilisation of cleaner fuels / technologies, Falkirk Council has demonstrated that the 15min mean concentrations of SO2 complies with the relevant NAQS objective and that the Grangemouth AQMA should be revoked.

Please note that SO2 exceedances may still be recorded in Grangemouth in certain conditions / scenarios. It is unlikely that the SO2 NAQS objective will be exceeded in future years.

As stated within Section 4 "AQMA" of Part IV of the Environment Act 1995<sup>24</sup> states in relation to AQMA Revocation:

"Local authorities are able to amend or revoke an existing AQMA order at any time as set out under section 83(2) of the 1995 Act. Where an authority considers it necessary to do this, the Scottish Government expects the authority to consult SEPA and all other statutory consultees, businesses, members of the public and other interested parties in the vicinity of the AQMA. All available supporting information to justify the amendment or revocation should be provided to the Scottish Government before any changes take effect (and this should take the form of a revocation proposal report - as outlined below).

vices/environment/environmental-policy/air-quality/docs/air-mouth%20ADMA%20Further%20Aasesement.pdf?v=202309454334

A local authority may submit a proposal to amend or revoke an existing AQMA order at any time."

Falkirk Council will continue to have (automatic, reference method) SO<sub>2</sub> monitoring capabilities within the Grangemouth area for many years to come. It is anticipated that annual Scottish Government LAQM funding will continue to be provided for this. This will provide a valuable resource for public health resources into the future.

Falkirk Council is requesting the permission of the Scottish Government and Scottish Environment Protection Agency (SEPA) to revoke the Grangemouth AQMA for SO<sub>2</sub> (15-min mean). Pending permission approval, Falkirk Council will notify all other statutory consultees and publicise the revocation through local / social media, so the public and local businesses are fully aware of the situation.

## 10. Acknowledgements

Falkirk Council gratefully acknowledges the support received from SEPA, Ineos, Petroineos, consultants Sweco and the Civil Air Support when completing this proposal report.
Proposal for the Revocation of the Grangemouth AQMA

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### Appendix A – Maps Map 1.Grangemouth Layout (Approximate areas)

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Proposal for the Revocation of the Grangemouth AQMA

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## Map 2. Major Industrial Operators (Approximate areas)

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Proposal for the Revocation of the Grangemouth AQMA

## Maps of Automatic Monitoring Stations Map 3: A3 Bo'ness



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## Map 4: A8 Grangemouth AURN



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## Map 5: A9 Grangemouth Moray



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## Map 6: A10 Grangemouth Municipal Chambers

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## A11 Grangemouth Zetland Park



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#### Appendix B – Grangemouth AQMA Order

## Environment Act 1995, Part IV, section 83(1)

#### Falkirk Council

#### Air Quality Management Area (No. 1) Order 2005

Falkirk Council, in exercise of the powers conferred upon it by section 83(1) of the Environment Act 1995, hereby makes the following Order.

This Order may be referred to as the Falkirk Council Air Quality Management Area (No. 1) Order 2005 and shall come into effect on 1 November 2005.

The area shown inside the solid black line on the map accompanying this Order is to be designated as an air quality management area ("the Designated Area"). The Designated Area incorporates the Grangemouth petrochemical complex and adjacent area. The map may be viewed at (i) the Council Offices, Municipal Buildings, Falkirk, (ii) Abbotsford House, David's Loan, Bainsford and (iii) Grangemouth Library, Bo'ness Road, Grangemouth.

The Designated Area is designated in relation to a likely breach of the sulphur dioxide (15 minute mean) objective as specified in the Air Quality (Scotland) Regulations 2000.

This Order shall remain in force until it is varied or revoked by a subsequent order.

The Common Seal of Falkirk Council was hereto affixed on 24<sup>th</sup> October 2005 on behalf of Falkirk Council

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Acting Director of Law and Administration Services Municipal Buildings Falkirk

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## Grangemouth AQMA Map



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Proposal for the Revocation of the Grangemouth AQMA

## Appendix C: Monthly SO<sub>2</sub> Working Group Report Example

Table 1: SO<sub>2</sub> Exceedances Summary December 2020

1st - 31st December 2020	Number	of exceedance rtion value / lin	s of SO <sub>3</sub> nit value	Highest SO;	Concentration	n (wg/m²)	Data capture	Date of last	Status
	15-minute	Hourty	Doily	15-minute	Hourly	Duily			
Grangemouth AURN	0	0	0	41	11.6	4.1	58	21/04/2020	
Grangemouth Moray	0	0		18.4	8.6	2.9	58	29/64/2019	
Grangemouth Municipal Chambers	0	0	•	\$0.6	8.5	1.3	98	25/06/2019	Description of
Grangemouth Zetland Park	۰	0	۰	7.2	3.4	0.7	99	none	Provisional
Falkirk Hope St	0	0	0	72.2	18.8	4	99	none	
Bo'ness	0	0	8	14.9	10.6	2.8	99	none	

Scottish SO <sub>2</sub> Air Quality Objectives					
Time period	Concentration ug/m3	No. of exceedances permitted			
15-min	266	35			
Hourly	350	24			
Daily	125	3			

Prepared by Falkirk Council

#### Proposal for the Revocation of the Grangemouth AQMA

#### Table 2: Exceedances of the 15-Minute SO<sub>2</sub> Objective Concentration by Month

15-min 50 <sub>2</sub> exceedances by month												
2020	January	February	March	April	May	June	July	August	September	October	November	December
Grange mouth AURN	0		1	5	0	0	0	0	0	0	0	0
Grangemouth Moray	0		0	0	0	0	0	0	0	0	0	0
Grangemouth Municipal Chambers	0		0	0	0	0	0	0	0	0	0	0
Grangemouth Zetland Park	0		0	0	0	0		0	0	0	0	0
Falkirk Hope St	0		0	0	0	0	0	0	0	0	0	0
Bo'ness	0		0	0	0	0	0	0	0	0	0	0

#### Table 3: Running Totals of the 15-Minute SO<sub>2</sub> Objective Concentration by Month

15-min 50, esceedances by month, running totals												
2020	January	February	March	April	May	June	July	August	September	October	November	December
Grange mouth AURN	0		1	6	6	6	6	6	6	6	6	6
Grangemouth Moray	0		0	0	0	0	0	0	0	0	0	0
Grangemouth Municipal Chambers	0		0	0	0	0		0	0	0	0	0
Grangemouth Zetland Park	0		0	0	0	0		0	0	0	0	0
Falkirk Hope St	0		0	0	0	0		0	0	0	0	0
Boiness	0		0	0	0	0		0	0	0	0	0

Prepared by Falkirk Council

#### Proposal for the Revocation of the Grangemouth AQMA

Table 4: Summary of SO<sub>2</sub> Exceedances at Grangemouth Sites

List of SO <sub>2</sub> exceedances				
All times GMT and all presented data is 'Provisional'				
Grangemouth AURN				
Date	Time	Conc. µg/m3		
27/03/2020	21:45	321.2		
09/04/2020	14:00	286		
09/04/2020	16:00	371.7		
18/04/2020	21:30	297.8		
21/04/2020	03:45	288.7		
21/04/2020	06:30	302		

Proposal for the Revocation of the Grangemouth AQMA



Prepared by Falkirk Council

# **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
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 <sub>2</sub>	Nitrogen Dioxide
NOx	Oxides of Nitrogen
PDU	Public Display Unit
PM10	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	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 <sub>2</sub>	Sulphur Dioxide
TD	Thermal Desorption – Analysis Method
ТЕОМ	Tapered Element Oscillating Microbalance
TGT	Tail Gas Treatment

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