

# Annual Progress Report (APR)



2022 Air Quality Annual Progress Report (APR) for Orkney Islands Council

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

June 2022

**Orkney Islands Council**

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

### **Air Quality in Orkney Islands Council**

The Orkney Islands is an archipelago of over 70 islands and skerries located some seven miles north of the Scottish mainland and covering an area of just under 100,000 hectares. The county has a population in the region of 22,000 with over 80% of the population inhabiting the main island (called The Mainland). Orkney's two main towns of Kirkwall (population approximately 9,000+) and Stromness (population approximately 2,200) are situated on The Mainland.

The main traffic routes in Orkney are a series of 'A' roads that link the west mainland to the east, through Kirkwall and southwards across the barriers to South Ronaldsay. The highest volume of traffic can be found within Kirkwall, with very light levels of traffic found across the mainland and the Outer Isles. The islands are linked to mainland Scotland via its airport situated 2 miles outside Kirkwall, and via ferry services across three routes. Other smaller air and ferry links serve the outer isles and link to 'The Mainland'.

Because of the islands predominantly rural nature and the lack of large-scale industrial processes the main potential source of pollution that may impact on human health is that produced by motor vehicles with Nitrogen Dioxide the main pollutant of concern. However, traffic flows are low and reflect Orkney's small population. A network of diffusion tubes is maintained to monitor those areas deemed to be subject to higher concentrations. Recently acquired monitoring data clearly shows that Orkney is currently meeting the air quality objectives and that pollutant levels remain at consistently low levels with no significant risk of Orkney exceeding these objectives. There are no air quality issues in your area, please provide a statement to this effect.

### **Actions to Improve Air Quality**

As indicated above air quality in Orkney is considered very good. The Council has not identified any areas where there is a risk of exceeding the air quality objectives and where consequent action is required to improve air quality.

## Local Priorities and Challenges

Although no specific priorities or challenges have been identified, Orkney Islands Council will continue to monitor nitrogen dioxide at existing locations unless there becomes reason to do otherwise. These monitoring results will be discussed in the 2023 Progress Report.

## Table of Contents

<b>Executive Summary: Air Quality in Our Area .....</b>	<b>i</b>
Air Quality in Orkney Islands Council.....	i
Actions to Improve Air Quality .....	i
Local Priorities and Challenges .....	ii
<b>1 Local Air Quality Management.....</b>	<b>6</b>
<b>2 Actions to Improve Air Quality.....</b>	<b>7</b>
Air Quality Management Areas.....	7
Cleaner Air for Scotland 2 .....	7
2.1.1 Placemaking – Plans and Policies .....	7
2.1.2 Transport – Low Emission Zones .....	8
2.1.3 Other plans and Strategies that contribute towards maintaining Air Quality .....	8
<b>3 Air Quality Monitoring Data and Comparison with Air Quality Objectives .....</b>	<b>9</b>
Summary of Monitoring Undertaken .....	9
3.1.1 Automatic Monitoring Sites .....	9
3.1.2 Non-Automatic Monitoring Sites .....	9
Individual Pollutants .....	9
3.1.3 Nitrogen Dioxide (NO <sub>2</sub> ) .....	9
3.1.4 Particulate Matter (PM <sub>10</sub> ) .....	10
3.1.5 Particulate Matter (PM <sub>2.5</sub> ).....	10
3.1.6 Sulphur Dioxide (SO <sub>2</sub> ).....	11
3.1.7 Carbon Monoxide, Lead and 1,3-Butadiene .....	11
<b>4 New Local Developments .....</b>	<b>12</b>
Road Traffic Sources.....	12
Other Transport Sources .....	12
Industrial Sources.....	12
Commercial and Domestic Sources.....	13
New Developments with Fugitive or Uncontrolled Sources .....	13
<b>5 Conclusions and Proposed Actions.....</b>	<b>14</b>

Conclusions from New Monitoring Data.....	14
Conclusions relating to New Local Developments .....	14
Proposed Actions .....	14
<b>Appendix A: Monitoring Results .....</b>	<b>15</b>
<b>Appendix B: Full Monthly Diffusion Tube Results for 2021 .....</b>	<b>18</b>
<b>Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC .....</b>	<b>19</b>
New or Changed Sources Identified Within Orkney Islands Council During 2021 .....	19
Additional Air Quality Works Undertaken by Orkney Islands Council During 2021 .....	19
QA/QC of Diffusion Tube Monitoring .....	19
Diffusion Tube Annualisation.....	19
Diffusion Tube Bias Adjustment Factors .....	19
Discussion of Choice of Factor to Use .....	20
NO <sub>2</sub> Fall-off with Distance from the Road.....	20
<b>Appendix D: Map of diffusion tube sites. ....</b>	<b>21</b>
<b>Glossary of Terms .....</b>	<b>22</b>
<b>References .....</b>	<b>23</b>

## List of Tables

Table 1.1 – Summary of Air Quality Objectives in Scotland.....	6
Table A.1 – Details of Non-Automatic Monitoring Sites .....	15
Table A.2 – Annual Mean NO <sub>2</sub> Monitoring Results (µg/m <sup>3</sup> ) .....	16
Table B.1 – NO <sub>2</sub> 2021 Monthly Diffusion Tube Results (µg/m <sup>3</sup> ).....	18
Table C.1 – Bias Adjustment Factor .....	20

## List of Figures

Figure A.1 - Chart showing the trend of annual NO<sub>2</sub> levels in the County's main population centres of Kirkwall and Stromness since 2008

Figure A.2 - Chart Showing Average Annual NO<sub>2</sub> Concentrations for Individual Monitoring Stations

Figure D.1 – Map of Diffusion tube locations across Mainland Orkney and the linked isles  
Please insert a list of Figures/Charts here.

# 1 Local Air Quality Management

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

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Progress Report (APR) summarises the work being undertaken by Orkney Islands Council to improve air quality and any progress that has been made.

**Table 1.1 – Summary of Air Quality Objectives in Scotland**

Pollutant	Air Quality Objective Concentration	Air Quality Objective Measured as	Date to be Achieved by
Nitrogen dioxide (NO <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/m <sup>3</sup>	Annual mean	31.12.2010
Particulate Matter (PM <sub>2.5</sub> )	10 µg/m <sup>3</sup>	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
Carbon Monoxide	10.0 mg/m <sup>3</sup>	Running 8-Hour mean	31.12.2003



## 2 Actions to Improve Air Quality

### Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12 months, setting out measures it intends to put in place in pursuit of the objectives.

Orkney Islands Council currently does not have any AQMAs, and from this report and previous annual reporting it is unlikely that there will be reason to declare any AQMAs in the future. Furthermore, Orkney Islands Council at present does not have an Air Quality Strategy or similar document to address air quality issues.

### Cleaner Air for Scotland 2

Cleaner Air for Scotland 2 – Towards a Better Place for Everyone (CAFS2) is Scotland's second air quality strategy. CAFS2 sets out how the Scottish Government and its partner organisations propose to further reduce air pollution to protect human health and fulfil Scotland's legal responsibilities over the period 2021 – 2026. CAFS2 was published in July 2021 and replaces Cleaner Air for Scotland – The Road to a Healthier Future (CAFS), which was published in 2015. CAFS2 aims to achieve the ambitious vision for Scotland "to have the best air quality in Europe". A series of actions across a range of policy areas are outlined, a summary of which is available on the Scottish Government's website.

Progress by Orkney Islands Council against relevant actions for which local authorities are the lead delivery bodies within this strategy is demonstrated below.

#### 2.1.1 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.

Orkney Islands Council considers Orkney to have excellent air quality and therefore it is not an active issue that is generally focused on. Through the Local Development Plan

processes and the national focus on place and climate change, various departments within the Council work collaboratively, along with partner organisations such as Sustrans, NatureScot and Voluntary Action Orkney in delivery of this function. Indirectly and with the remit of place and climate change Orkney Islands Council is working actively to facilitate improvements to our public realm to improve places and encourage active travel (walking, cycling and wheeling). New development has to consider the use of Green Infrastructure Networks. These are networks where active travel, sustainable urban drainage systems and biodiversity corridors are located together.

### **2.1.2 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.

Orkney Islands Council have no plans at present to promote zero-carbon city centres given that the air quality in Orkney is considered excellent.

### **2.1.3 Other plans and Strategies that contribute towards maintaining Air Quality**

Orkney Islands Council and its local partner organisations have a number of plans and Strategies which do not specifically address air quality, but the measures within them will help maintain or improve air quality within the county. These plans include but are not limited to;

- a 'Green Travel Plan'<sup>1</sup> with its primary focus on the reducing the reliance on cars for commuting and to adopt greener modes of transport that would improve health and wellbeing.
- The 'Orkney Electric Vehicle Strategy 2018-2023'<sup>2</sup> which seeks to help guide the de-carbonisation of Orkney's road transport by mapping a path for the uptake of EVs within the county.
- The 'Orkney Sustainable Energy Strategy 2017-2025'<sup>3</sup> which continues the drive for a sustainable low carbon island economy.

## **3 Air Quality Monitoring Data and Comparison with Air Quality Objectives**

### **Summary of Monitoring Undertaken**

This section sets out what monitoring has taken place and how local concentrations of the main air pollutants compare with the objectives.

#### **3.1.1 Automatic Monitoring Sites**

Orkney Islands Council does not undertake automatic (continuous) monitoring for the national air quality objectives.

#### **3.1.2 Non-Automatic Monitoring Sites**

Orkney Islands Council undertook non- automatic (passive) monitoring of NO<sub>2</sub> at 8 sites during 2021. Table A.1 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

### **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.

#### **3.1.3 Nitrogen Dioxide (NO<sub>2</sub>)**

Table A.2 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 µg/m<sup>3</sup>.

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Appendix B.

The County has been continuously monitored for a number of years through the placement of diffusion tubes. However, Orkney Islands Council is continuously assessing its NO<sub>2</sub> diffusion tube network with regards to the appropriateness of the localities and

revised, if necessary. This has led to two changes within the network. A new monitoring location within the main population centre of Kirkwall has been added to the network in 2021. The 2017 Annual Progress Report had detailed the creation of new link road and its potential impact on traffic. Since this report, there is a subjective view that although an increase in traffic has not been observed, it appears that traffic flow may have altered leading to greater waiting times at a nearby junction. The new location was chosen to address the possible impact of these perceived waiting times on the NO<sub>2</sub> concentrations.

As there is only data for 2021 at this location a trend in the data cannot yet be established, however it can be concluded that the level of NO<sub>2</sub> at this location is way below the annual mean objective.

The other change has been the removal of one of the rural background locations as it was felt this was no longer required, and that the other location used for this purpose would continue to provide adequate data for the network given its better location.

All other results for 2021 can be seen in Table A.2 and there has been no significant change in levels of NO<sub>2</sub> with the annual mean concentrations of NO<sub>2</sub> continuing to be well below the annual objectives.

With the majority of sites having been monitored continuously for over 10 years trends have been plotted in Figure A.1 for the two main centres within the islands and these show the annual average trend is downwards.

Even though it is unlikely that levels will ever exceed the NAQS objective of 40 µg/m<sup>3</sup>, it is essential that we don't become complacent with the knowledge that air quality in the county is very good and will seek to ensure that measures are taken as and when necessary to maintain NO<sub>2</sub> at these low levels, or better still reduce them.

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

Orkney Islands Council does not monitor PM<sub>10</sub> and has no plans to do so in the future

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

Orkney Islands Council does not monitor PM<sub>2.5</sub> and has no plans to do so in the future.

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

Orkney Islands Council does not monitor SO<sub>2</sub> and has no plans to do so in the future.

### **3.1.7 Carbon Monoxide, Lead and 1,3-Butadiene**

Orkney Islands Council does not monitor Carbon Monoxide, Lead and 1,3-Butadiene and has no plans to do so in the future

## 4 New Local Developments

### Road Traffic Sources

Orkney Islands Council confirms that there are no new/newly identified:

- Narrow congested streets with residential properties close to the kerb.
- Busy streets where people may spend one hour or more close to traffic.
- Roads with a high flow of buses and/or HGVs.
- Junctions.
- Roads with significantly changed traffic flows.
- Bus or coach stations.

that require further assessment.

### Other Transport Sources

Orkney Islands Council confirms that there are no new/newly identified:

- Airports.
- Locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.
- Locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.
- Ports for shipping.

that require further assessment.

### Industrial Sources

Orkney Islands Council confirms that there are no new/newly identified:

- Industrial installations: new or proposed installations for which an air quality assessment has been carried out.
- Industrial installations: existing installations where emissions have increased substantially, or new relevant exposure has been introduced.
- Industrial installations: new or significantly changed installations with no previous air quality assessment.
- Major fuel storage depots storing petrol.
- Petrol stations.
- Poultry farms

that require further assessment.

## **Commercial and Domestic Sources**

As previously reported, the exact number of biomass combustion installations and other domestic solid fuel installations continues to be an unknown in Orkney.

The use of domestic solid fuel sources is widespread throughout Orkney in both the towns and countryside and are predominantly supplementary to, rather than a primary source of heating for these individual properties.

These sources are not considered a significant risk air quality given the County's rural nature and in considering data within the background concentration maps<sup>4</sup> for Orkney it can be concluded that there is no expected exceedance of the NAQS objective for PM<sub>10</sub>.

## **New Developments with Fugitive or Uncontrolled Sources**

Orkney Islands Council confirms that there are no new potential sources of fugitive or uncontrolled particulate matter that require further assessment.

## **5 Conclusions and Proposed Actions**

### **Conclusions from New Monitoring Data**

The recently acquired monitoring data included in this report clearly shows that Orkney continues to meet the air quality objectives. The graph in Appendix A comparing historic data against the current data clearly show a long-term steady or falling trend and that NO<sub>2</sub> levels have remained at a consistently low level and there is no significant risk of Orkney exceeding the air quality objective.

### **Conclusions relating to New Local Developments**

There have been no new developments which would be considered likely to significantly affect air quality.

### **Proposed Actions**

The new monitoring data has not identified any exceedance in the air quality objective for NO<sub>2</sub>. 2021 saw a change to the monitoring network with the addition of a new monitoring location added to an existing junction within the main town of Kirkwall. This will continue to form part of the network of diffusion tubes going forwards and the current monitoring regime for NO<sub>2</sub> within Orkney will continue to show and ensure that the high standard of air quality in the county continues.

The results of the continued monitoring and any other work addressing air quality will be contained in the next Annual Progress Report due in 2023.



## Appendix A: Monitoring Results

**Table A.1 – Details of Non-Automatic Monitoring Sites**

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube co-located with a Continuous Analyser?	Tube Height (m)
KW	Kirkwall	Roadside	344812	1011017	NO2	No	0.0	1.0	No	2.8
SN	Stromness	Roadside	325590	1009553	NO2	No	0.0	1.0	No	2.8
SM	St Mary's	Roadside	347140	1001235	NO2	No	10.0	1.0	No	2.4
WM	Waulkmill	Rural	339525	1006985	NO2	No	N/A	1.0	No	1.5
MH	St Margarets Hope	Roadside	344598	993509	NO2	No	0.0	3.0	No	3.0
FT	Finstown	Roadside	335993	1013893	NO2	No	0.0	1.0	No	2.4
PD	Papdale	Other	345419	1010847	NO2	No	4.0	1.0	No	2.8
CL	Clay Loan	Roadside	344732	1010592	NO2	No	0.0	1.0	No	2.4

**Notes:**

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

(2) N/A if not applicable.

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2021 (%) <sup>(2)</sup>	2017	2018	2019	2020	2021
KW	Roadside	Diffusion Tube	100.0	100.0	14.3	14.6	13.5	10.8	12.3
SN	Roadside	Diffusion Tube	100.0	100.0	8.7	9.8	8.1	7.1	7.3
SM	Roadside	Diffusion Tube	100.0	100.0	4.4	4.1	3.8	4.1	3.5
WM	Rural	Diffusion Tube	100.0	100.0	2.6	3.3	2.9	2.8	2.5
MH	Roadside	Diffusion Tube	100.0	100.0	3.9	4.3	3.6	3.9	3.6
FT	Roadside	Diffusion Tube	90.4	90.4	7.9	9.9	8.3	6.5	6.6
PD	Other	Diffusion Tube	100.0	100.0	-	5.2	4.5	4.3	4.5
CL	Roadside	Diffusion Tube	84.6	84.6	-	-	-	-	16.0

**Notes:**

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

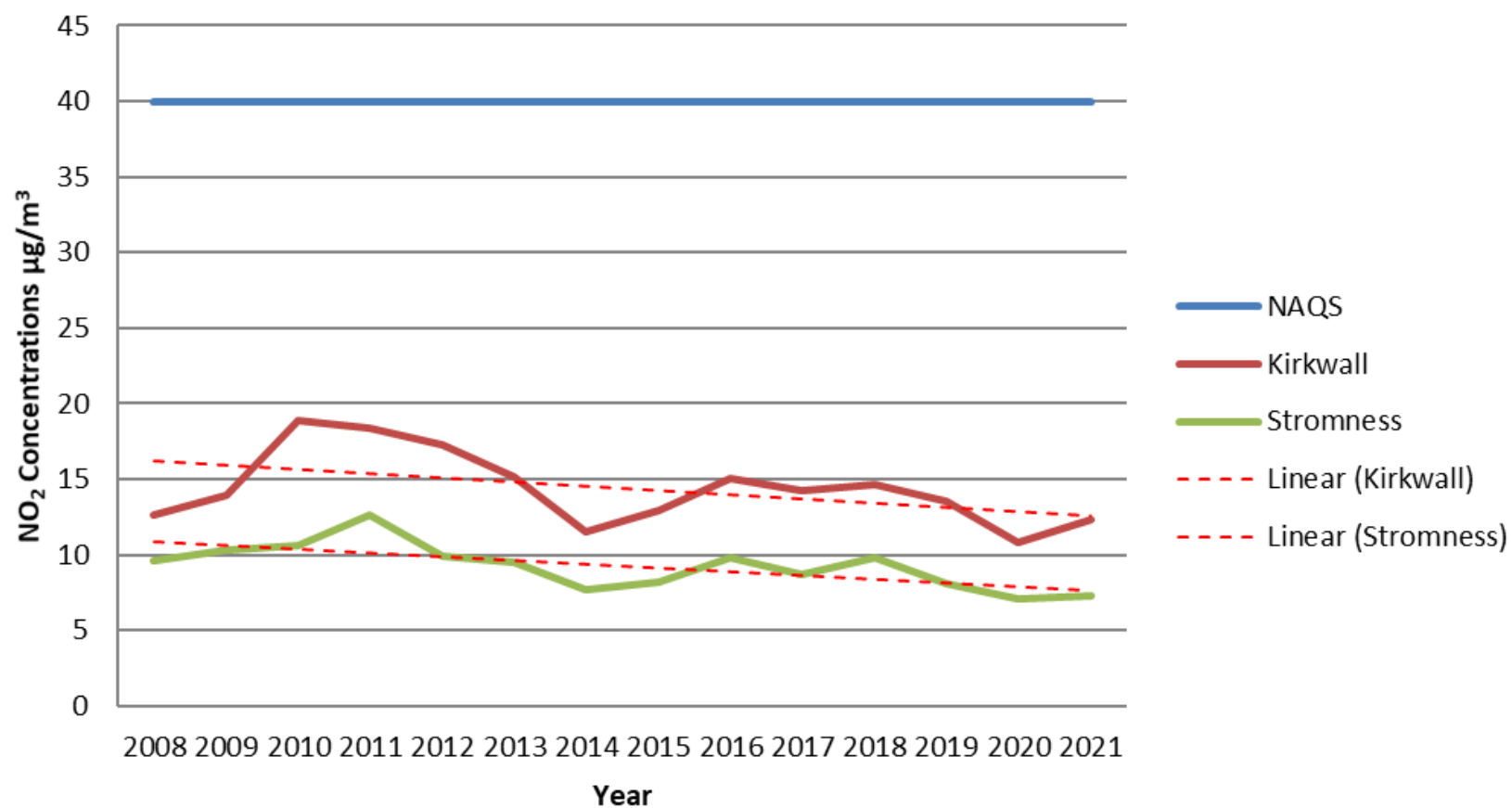
NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG(16) if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

Figure A.1 - Chart showing the trend of annual NO<sub>2</sub> levels in the County's main population centres of Kirkwall and Stromness since 2008



## Appendix B: Full Monthly Diffusion Tube Results for 2021

**Table B.1 – NO<sub>2</sub> 2021 Monthly Diffusion Tube Results (µg/m<sup>3</sup>)**

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Bias Adjusted <sup>(1)</sup>
KW	20.2	13.2	11.3	14.6	11.5	8.9	16.1	16.3	16.5	15.7	11.8	13.8	14.2	12.3
SN	7.8	10.9	5.8	8.6	6.5	6.0	8.7	10.4	12.7	9.2	6.8	7.8	8.4	7.3
SM	5.7	1.0	3.5	4.9	3.9	2.4	5.5	4.3	4.2	5.4	3.7	3.9	4.0	3.5
WM	3.1	5.3	2.2	3.3	2.6	2.7	4.3	3.5	2.5	1.2	2.8	1.4	2.9	2.5
MH	5.5	4.0	2.2	4.1	3.8	2.5	5.9	5.2	5.3	3.8	3.2	3.7	4.1	3.6
FT	11.9	8.9	4.8	-	7.1	6.0	9.4	8.8	12.6	2.4	7.7	3.7	7.6	6.6
PD	7.0	5.6	6.0	4.1	2.3	3.5	6.5	5.8	4.2	5.8	6.6	4.4	5.2	4.5
CL	-	-	13.6	16.4	16.3	17.9	19.8	19.0	20.8	20.9	18.9	20.1	18.4	16.0

**Notes:**

(1) See Appendix C for details on bias adjustment

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

### **New or Changed Sources Identified Within Orkney Islands Council During 2021**

Orkney Islands Council has not identified any new sources relating to air quality within the reporting year of 2021.

### **Additional Air Quality Works Undertaken by Orkney Islands Council During 2021**

Orkney Islands Council has not completed any additional works within the reporting year of 2021.

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

All diffusion tubes are supplied and analysed by Edinburgh Scientific Services and prepared using 50% TEA in acetone. Orkney Islands Council administers the county's diffusion tube network as per Section 3 of "Diffusion Tubes for Ambient NO<sub>2</sub> Monitoring:- Practical Guidance." The duration of exposure for all monitoring points is as suggested in the calendar provided annually by Defra.

### **Diffusion Tube Annualisation**

All diffusion tube monitoring locations within Orkney Islands 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**

Orkney Islands Council have applied a national bias adjustment factor of 0.87 to the 2021 monitoring data. A summary of bias adjustment factors used by Orkney Islands Council over the past five years is presented in Table C.1.

### Discussion of Choice of Factor to Use

The national bias adjustment factor was used as there have been no local bias adjustment factors calculated through a co-location study.

**Table C.1 – Bias Adjustment Factor**

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	03/22	0.87
2020	National	06/21	0.88
2019	National	03/20	0.87
2018	National	03/19	0.96
2017	National	03/18	0.89

### NO<sub>2</sub> Fall-off with Distance from the Road

No diffusion tube NO<sub>2</sub> monitoring locations within Orkney Islands Council required distance correction during 2021

## Appendix D: Map of diffusion tube sites.

Figure D.1 – Map of Diffusion tube locations across Mainland Orkney and the linked isles



## Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
APR	Air quality Annual Progress Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	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
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide



## References

1. Orkney Islands Council (2016) 'Orkney's Green Travel Plan' Available at: [https://www.orkney.gov.uk/Files/Transport/Green\\_Travel\\_Plan.pdf](https://www.orkney.gov.uk/Files/Transport/Green_Travel_Plan.pdf)
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