Annual Progress Report (APR)

2021 Air Quality Annual Progress Report (APR) for Orkney Islands Council

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

November 2021

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Executive Summary: Air Quality in Our Area

Air Quality in the Orkney Islands

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 21,500 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.

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 2022 Progress Report.

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1 Local Air Quality Management

This report provides an overview of air quality in Orkney Islands Council during 2020. 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) is 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_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
Nitrogen dioxide (NO_2)	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
Particulate Matter (PM_{10})	18 µg/m^3	Annual mean	31.12.2010
Particulate Matter ($PM_{2.5}$)	10 µg/m^3	Annual mean	31.12.2020
Sulphur dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
Sulphur dioxide (SO_2)	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
Sulphur dioxide (SO_2)	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 µg/m^3	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m^3	Running 8-Hour mean	31.12.2003

2 Actions to Improve Air Quality

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

Cleaner Air for Scotland – The Road to a Healthier Future (CAFS) is a national cross-government strategy that sets out how the Scottish Government and its partner organisations propose to reduce air pollution further to protect human health and fulfil Scotland's legal responsibilities as soon as possible. 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 within this strategy is demonstrated below.

2.1.1 Transport – Avoiding Travel – T1

All local authorities should ensure that they have a corporate travel plan (perhaps within a carbon management plan) which is consistent with any local air quality action plan. Orkney Islands Council does not have an AQAP although it does have a Carbon Management Plan[1]. The focus of this plan is in the reduction of carbon emissions from its building stock with little or no focus on emissions from transportation. However, in addition to this the Council has a Green Travel Plan[2] 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. This document does not specifically address air quality, but the measures that the plan encourages will help maintain or improve air quality within the county.

Orkney Islands Council also continues to increase the number of electric vehicle charging points in line with its 'Orkney's Electric Vehicle Infrastructure Strategy'[3] published in 2014, and the more recent Orkney Electric Vehicle Strategy 2018-2023[4].

There are a number of other projects which continue to be implemented and will aid a reduction in emissions and continue to contribute to maintaining, if not improving Orkney's good air quality.

2.1.2 Climate Change – Effective co-ordination of climate change and air quality policies to deliver co-benefits – CC2

Scottish Government expects any Scottish local authority which has or is currently developing a Sustainable Energy Action Plan to ensure that air quality considerations are covered. Orkney Islands Councils is a partner in a Sustainable Energy Strategy for Orkney. Within the 'Orkney Sustainable Energy Strategy 2017-2025'[5], it makes clear that the next step will be the development of a sustainable energy action plan. Although air quality is not mentioned within the strategy it is expected that the sustainable energy action plan will address air quality issues. As reported last time at present there is no date set for producing this.

In addition to this Orkney Islands Council has in place other strategies which include provisions with the potential to exploit the relationship between climate change and air quality, an example of which is the 'Orkney Hydrogen Strategy - The Hydrogen Islands 2019 – 2025'[6] which sits within the Sustainable Energy Strategy and 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_2 at 8 sites during 2020. 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_2)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40 µg/m^3.

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B.

As can be seen from the results in Table A.2 in 2020 there has been no significant change in levels of NO_2 and that annual mean concentrations of NO_2 continue to be well below the annual objectives.

The inpact of the COVID-19 pandemic, in particular the lockdown peiod where there was significantly reduced vehicle movements has not had significant impact of the annual mean concentrations of NO_2, However, when viewing the full 2020 data set in Appendix B, a drop in NO^2 emmisions could be seen across all monitoring sites when compared to previous years data at the height of lockdown in April and May, especuially so within the main population centre of Kirkwall.

The majority of sites have been monitored continuously for over 10 years allowing trends to be plotted and it can be seen from Figure A.1, in the two main centers within the islands the annual average trend is downwards at these sites.

Even though it is unlikely that levels will ever exceed the NAQS objective of 40 mg/m3, 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^2 at these low levels, or better still reduce them.

3.1.4 3.2.2 Particulate Matter (PM_{10})

Orkney Islands Council does not monitor PM_{10} and has no plans to do so in the future

3.1.5 Particulate Matter ($PM_{2.5}$)

Orkney Islands Council does not monitor PM2.5 and has no plans to do so in the future.

3.1.6 Sulphur Dioxide (SO_2)

Orkney Islands Council does not monitor SO_2 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

The number of biomass combustion installations and other domestic solid fuel installations continues to be unknown in Orkney.

Domestic solid fuel sources continue to be 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[7] for Orkney it can be concluded that there is no expected exceedance of the NAQS objective for PM_{10}.

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 Planning Applications

In the 2020 Annual Progress Report it was reported that a planning application for a major expansion of an existing quarry on Mainland Orkney which is owned by Orkney Islands Council and provides the majority of aggregate for road infrastructure within the islands had been submitted and was under consideration.

This was approved on the 30 June 2021. Air quality and in particular the impact of dust generation on surrounding receptors was addressed within the EIAR that was submitted in support of the proposal.

The report did not assess the impact of road vehicle emissions associated with the development as it was concluded that the development would be unlikely to increase levels of road traffic above that of the existing quarry and there are no air quality issues regarding NO_2 in Orkney at present.

The main air quality effects considered in the EIAR were for coarse dust and PM_{10} and the investigation followed the Institute of Air Quality Management's (IAQM) 'Guidance on the Assessment of Mineral Dust Impacts for Planning' 2016.

It was found that, throughout the year, current levels of dust deposition outside the existing boundary of the operational quarry are well below the level at which impacts on amenity would be expected to occur.

With particular reference to the air quality objective for PM_{10}, the EIAR sought to estimate the likely contribution from the proposed works and the risk of the annual mean PM_{10} objective level of 18 micrograms per cubic metre being exceeded. The EIAR predicted that likely PM_{10} concentrations at nearby sensitive receptors would be in the range of approximately 13 to 15 micrograms per cubic metre, which is below the objective, and therefore it was concluded that the effect on human health is not significant.

Furthermore, a number of planning conditions have also been added to the planning consent, including the implementation of dust management plan to avoid unacceptable levels of dust from the site.

6 Impact of COVID-19 upon LAQM

Orkney Islands Council were able to maintain the network of diffusion tube monitoring as normal and exposure and analysis continued throughout in line with the diffusion tube calendar) during 2020, including over the lockdown period.

7 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 graphs in Appendix A comparing historic data against the current data clearly show a long-term steady or falling trend and that NO_2 levels have remained at a consistently low level and there is no significant risk of Orkney exceeding the air quality objectives

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 current monitoring regime for Nitrogen Dioxide within Orkney will continue to 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 2022.

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) (1)	Distance to kerb of nearest road (m) (2)	Tube co-located with a Continuous Analyser?
KW	Kirkwall	Roadside	344812	1011017	NO2	No	0.0	1.0	No
SN	Stromness	Roadside	325590	1009553	NO2	No	0.0	1.0	No
SM	St Mary's	Roadside	347140	1001235	NO2	No	10.0	1.0	No
WM	Waulkmill	Rural	339525	1006985	NO2	No	N/A	1.0	No
HE	Herston	Rural	341995	991999	NO2	No	10.0	1.0	No
MH	St Margarets Hope	Roadside	344598	993509	NO2	No	0.0	3.0	No
FT	Finstown	Roadside	335993	1013893	NO2	No	0.0	1.0	No
PD	Papdale	Other	345419	1010847	NO2	No	4.0	1.0	No

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_2 Monitoring Results (µg/m^3)

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
KW	Roadside	NO_2	100.0	100.0	15.1	14.3	14.6	13.5	10.8
SN	Roadside	NO_2	100.0	100.0	9.9	8.7	9.8	8.1	7.1
SM	Roadside	NO_2	100.0	100.0	4.3	4.4	4.1	3.8	4.1
WM	Rural	NO_2	100.0	100.0	3.0	2.6	3.3	2.9	2.8
HE	Rural	NO_2	100.0	100.0	2.6	2.6	2.3	2.0	2.2
MH	Roadside	NO_2	100.0	100.0	4.1	3.9	4.3	3.6	3.9
FT	Roadside	NO_2	100.0	100.0	8.4	7.9	9.9	8.3	6.5
PD	Other	NO_2	90.4	90.4	-	-	5.2	4.5	4.3

Notes:

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

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

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG(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_2 levels in the County's main population centres of Kirkwall and Stromness since 2008

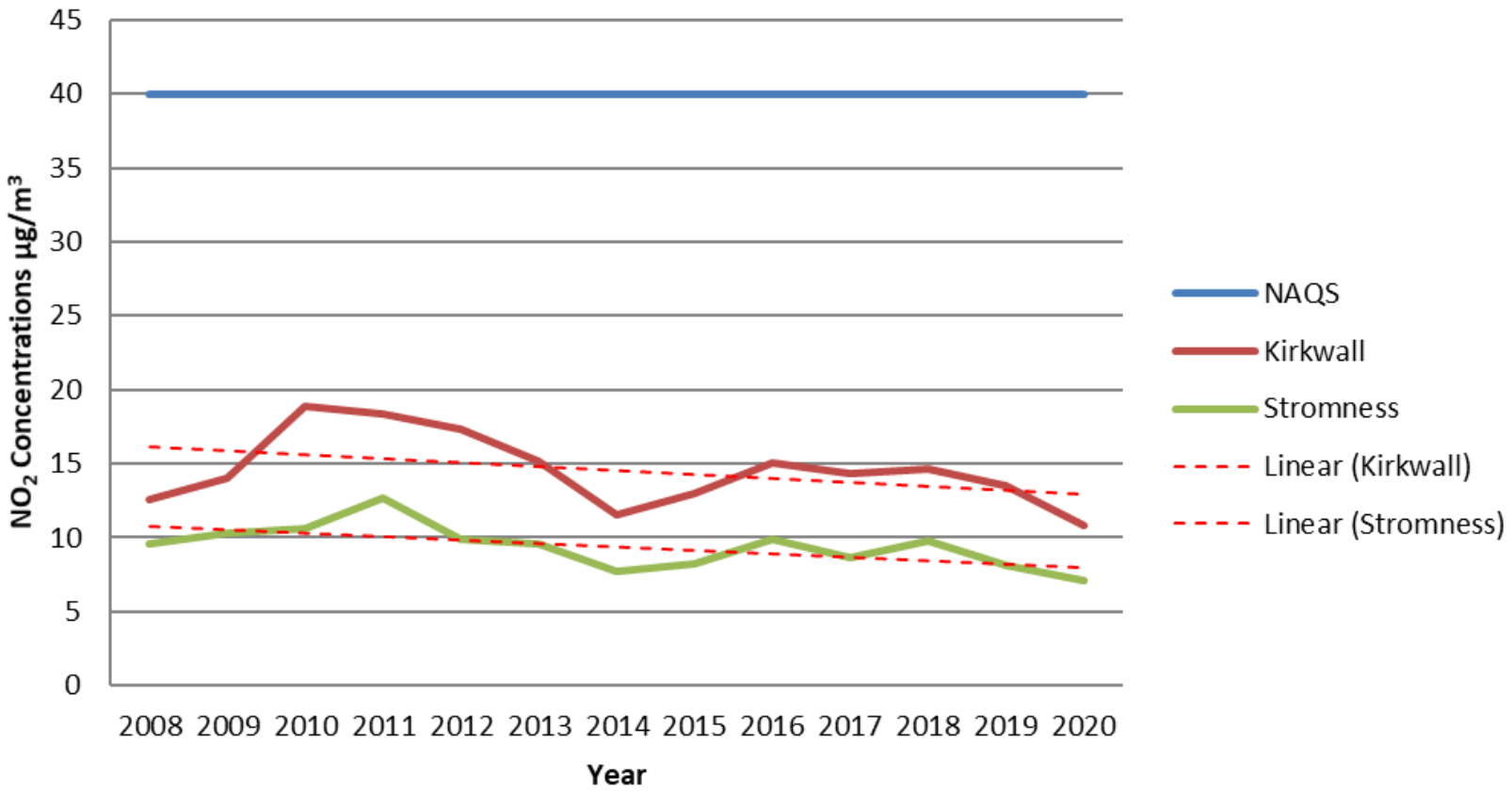
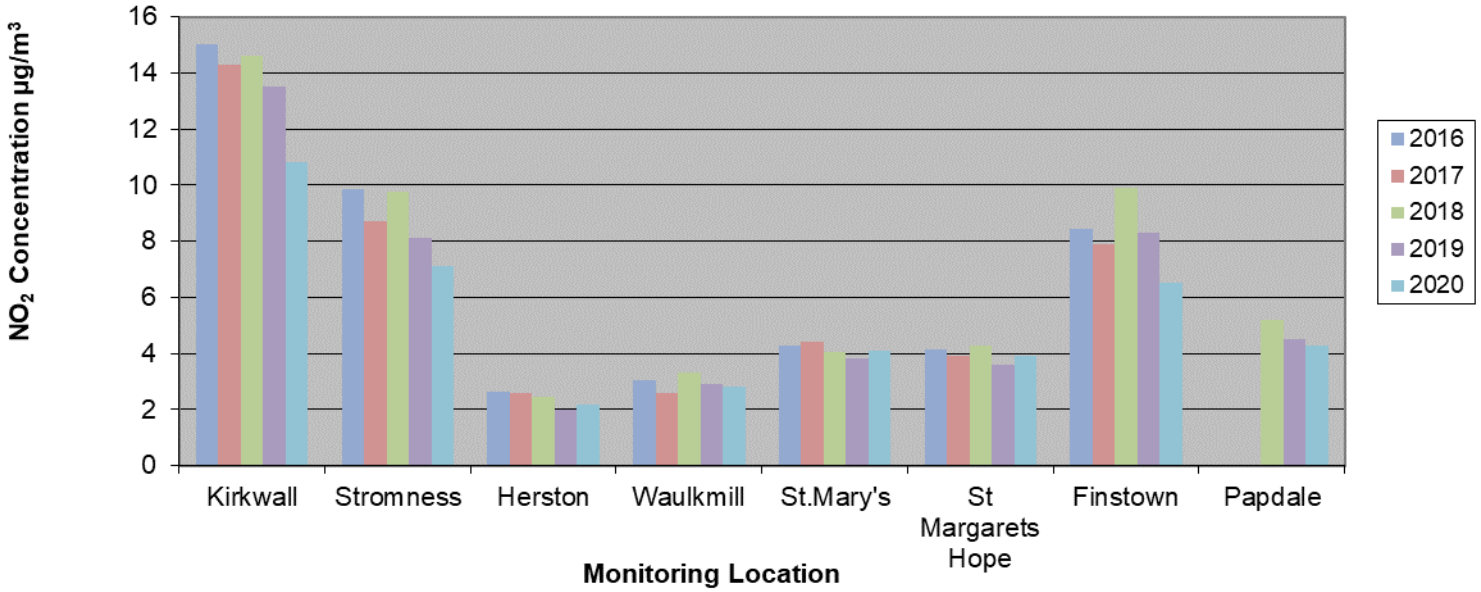


Figure A.2 - Chart Showing Average Annual NO_2 Concentrations for Individual Monitoring Stations



Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 2020 Monthly Diffusion Tube Results ($\mu g/m^3$)

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Bias Adjusted (1)
KW	15.8	15.1	11.1	6.7	6.7	8.9	8.0	10.1	11.5	13.8	21.9	17.6	12.3	10.8
SN	9.8	9.7	9.5	5.5	5.6	7.6	4.8	7.2	7.8	8.0	13.3	8.2	8.1	7.1
SM	5.7	8.2	3.8	3.4	4.5	5.5	3.4	3.7	3.1	3.1	5.1	6.4	4.7	4.1
WM	3.3	4.2	1.9	2.7	2.6	2.5	1.9	2.8	4.0	3.0	4.8	4.6	3.2	2.8
HE	2.3	3.4	3.2	1.7	1.6	2.9	2.5	2.1	2.1	1.7	3.4	2.5	2.5	2.2
MH	6.5	4.2	6.0	3.0	3.2	4.7	2.6	4.0	4.6	3.8	5.3	4.6	4.4	3.9
FT	8.5	11.9	7.0	4.1	4.7	5.9	5.3	8.5	7.3	8.1	9.3	8.1	7.4	6.5
PD	6.3	6.8	5.6	2.7	3.1	4.5	2.9	NA	3.4	5.1	6.8	7.0	4.9	4.3

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 2020

Orkney Islands Council has not identified any new sources relating to air quality within the reporting year of 2020.

Additional Air Quality Works Undertaken by Orkney Islands Council During 2020

Orkney Islands Council has not completed any additional works within the reporting year of 2020.

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 NO2 Monitoring:- Practical Guidance."[7] 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 0.88 to the 2020 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

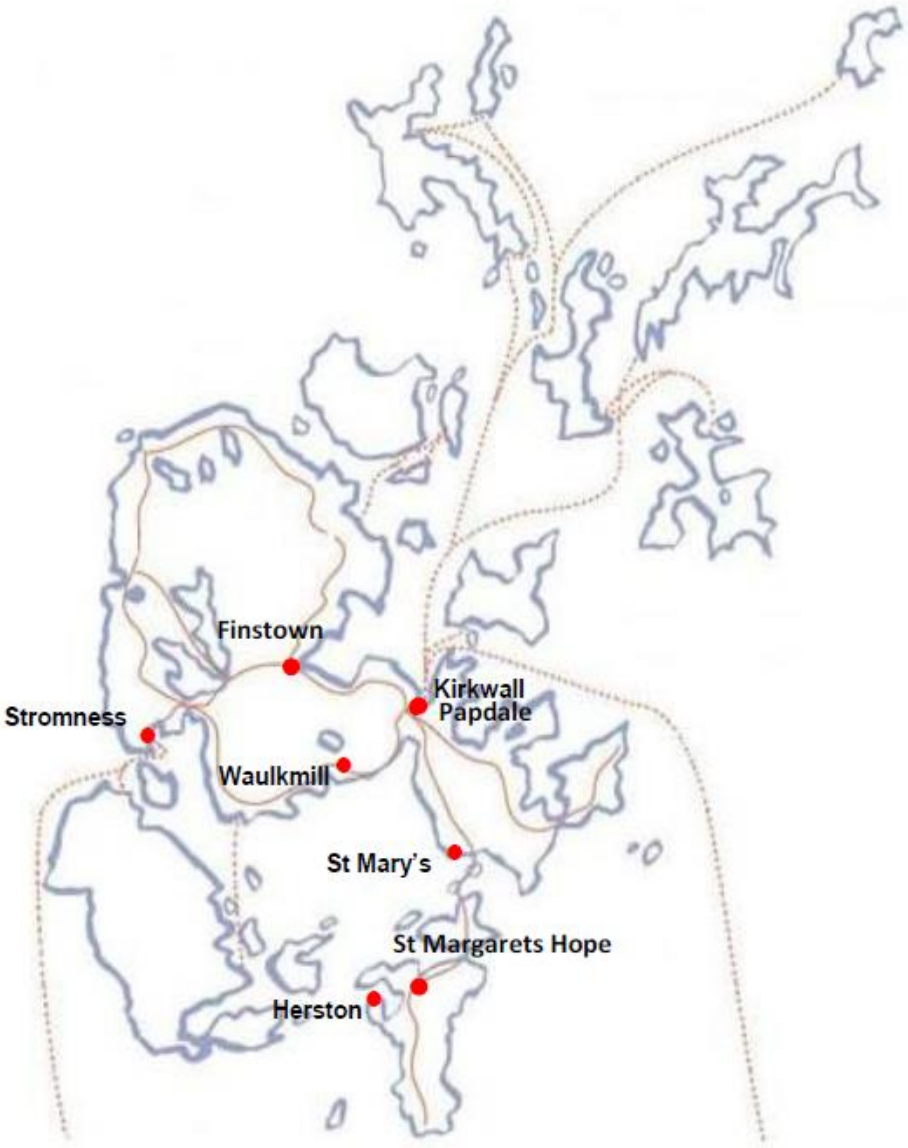
Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	06/21	0.88
2019	National	03/20	0.87
2018	National	03/19	0.96
2017	National	03/18	0.89
2016	National	03/17	0.87

NO_2 Fall-off with Distance from the Road

No diffusion tube NO_2 monitoring locations within Orkney Islands Council required distance correction during 2020

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
EIAR	Environmental Impact Assessment Report
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

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