Inverclyde Council

Annual Progress Report (APR)

Inverclyde

2021 Air Quality Annual Progress Report (APR) for Inverclyde Council

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

June 2021

Information	Inverclyde Council			
Local Authority Officer	Kerri Todman			
Department	Public Protection & Covid Recovery			
	The James Watt Building			
Addross	105 Darlymple Street			
Address	Greenock			
	PA15 1HU			
Telephone	01475 714207			
E-mail	Kerri.Todman@inverclyde.gov.uk			
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Executive Summary: Air Quality in Our Area

Air Quality in Inverclyde

Under the requirement of the Environment Act 1995, Inverclyde Council regularly monitors the air quality within the local area. There is a diffusion tube network in place which monitors NO₂ within 17 different sites. There is also an Automatic Air Quality Monitoring Station in place to measure the levels of NO₂, PM₁₀, PM_{2.5} and PM₁ at East Hamilton Street, Greenock.

The results have consistently shown NO₂ and PM levels to be below the National Air Quality Objectives, therefore there has been no requirement to proceed to a Detailed Assessment for any of the pollutants. To date there has been no declaration of an Air Quality Management Area within Inverced.

There has been no significant changes which have taken place within the local area that could have a negative impact on air quality or any new domestic or industrial sources since the previous report in 2020.

Actions to Improve Air Quality

There has been a notable decrease in the concentration of measured pollutants this year. The Covid-19 pandemic has had a notable impact on air quality within the local area. The lockdown measures and numerous restrictions put in place by the Scottish Government has reduced the level of traffic on the road network. Subsequently, this has decreased the concentration of pollutants, in particular NOx.

Road traffic is the main source of air pollution within Inverclyde. To improve air quality further in Inverclyde, the council must continue to promote and encourage active travel. The Inverclyde Green Connection Programme aims to construct better network links and develop the ground area of Greenock and Port Glasgow. This programme will implement elements of the Active Travel Strategy and the Green Network Strategy. If the programme is successful, it will improve the health and wellbeing of citizens and also local air quality.

Inverclyde Council continues to strive to reduce carbon emissions. By 2021/2022 a target of 16% reduction on the 2007/2008 baseline has been set. The greenhouse gas emissions recorded for the whole of Inverclyde has also been steadily declining.

Local Priorities and Challenges

Inverclyde Council does not have any specific priorities or challenges for the coming year. Statutory monitoring will continue and the next report to be submitted will be the 2022 Air Quality Annual Progress Report.

How to Get Involved

Air Quality information and Inverclyde Council's Air Quality Annual Progress Reports can be found at the following link on the Inverclyde Council website, <u>Air quality - Inverclyde</u> Council ⁽¹⁾

Up to date monitoring results from the automatic monitoring station can be found on the Scottish Air Quality website, <u>www.scottishairquality.scot/</u>⁽²⁾

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1 Local Air Quality Management

This report provides an overview of air quality in Inverclyde 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) summarises the work being undertaken by Invercive 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 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/m³	Annual mean	31.12.2010
Particulate Matter (PM _{2.5})	10 μg/m³	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/m³	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m ³	Running 8-Hour mean	31.12.2003

Table 1.1 – Summary of Air Quality Objectives in Scotland

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 an Air Quality Action Plan (AQAP) within 12 months, setting out measures it intends to put in place in pursuit of the objectives.

Inverclyde Council currently does not have any AQMAs.

2.2 Cleaner Air for Scotland

Cleaner Air for Scotland – The Road to a Healthier Future (CAFS) is a national crossgovernment 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 <u>the Scottish Government's</u> <u>website</u> ⁽³⁾. Progress by Inverclyde Council against relevant actions within this strategy is demonstrated below.

2.2.1 Transport – Avoiding Travel – T1

Inverclyde's Connectivity

Inverclyde has a great transport network keeping people well connected. The A8 and A78 are two trunk roads that run through the area. There are a number of bus companies that operate. The rail network is comprised of two train lines and fourteen stations. Inverclyde is situated on the coastal route whereby ferry services operate to several locations in Argyll and Bute.

Inverclyde is also connected by a comprehensive core path network and National Cycle Network routes. The NCN75 and NCN753 provide active travel to Renfrewshire, Glasgow and Ayrshire.

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Planning to Reduce Transport

Inverclyde Council's Local Development Plan ⁽⁴⁾ recognises that travel is a factor in making an area successful but incorporating a green infrastructure into planning is also important. The Local Development Plan aims to ensure Inverclyde is well connected to encourage people within the community to use more sustainable forms of transport in order to reduce transport related emissions.

Inverclyde Council adopted an Active Travel Strategy ⁽⁵⁾ in 2018 which sets out several actions to be taken to promote and encourage active travel within the community by enhancing opportunities.

Furthermore, Inverclyde Council is one of the local authorities involved in the Glasgow City-Region City Deal Project. The participation in the City Deal will allow funding for major infrastructure projects. This will improve public transport and connectivity within this region, thus encouraging more use of public transport and more active travel. The Clydeplan⁽⁶⁾ sets out strategies to promote sustainable transport, promote active travel and increase connectivity within the region.

Improving Active Travel in the Community

Funding was approved by the Spaces for People and Safer Walking, Safer Roads group to make proposed cycling, walking and wheeling infrastructure improvements. These two funding schemes can allow permanent and temporary measures to be installed in the local area to improve active travel routes. In 2020 temporary measures were required to improve social distancing for users during the current Covid-19 pandemic. The foot path from Brougham Street to Laird Street and Grey Place has been provisionally widened to allow a dedicated cycle lane.

Local groups within Inverclyde further promote active travel. Within Inverclyde there are two local travel active hubs which have been established to provide advice and support on active travel. The Inverclyde Bothy⁽⁷⁾ is a walk-in hub situated at Gourock railway station and can also be accessed online. This hub can help people plan walking and cycling routes, allow people to access history walks, health walks or led bike rides. Community Tracks is an online hub that similarly offers a wide range of advice and support for locals. The hub can provide people with access to cycle maintenance classes, bike fixing

workshops, cycling for confidence sessions and led bike rides. In addition, Community Tracks has had a project titled' flattening hills' which allows people to hire e-bikes. The topography in Inverclyde contains a vast amount of hills and this can often be a barrier to encouraging active travel. The Community tracks 'flattening hills' project was an initiative that would attract more people within the community to uptake cycling.

The public can access numerous active travel related links through Inverclyde Council website ⁽⁸⁾.

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

The Council initially produced the Carbon Management Plan in 2007, which sets out targets to reduce carbon emissions from the Councils operation. The Carbon Management Plan has been reinvented to the Climate Change Plan ⁽⁹⁾, focusing not only on the decreasing carbon emissions but also taking measures to mitigate climate change at present and in the future.

Since the introduction of the Carbon Management Plan the carbon emissions omitted from the Councils operations has been reducing each year. By 2021/2022 a target of 16% reduction on the 2007/2008 baseline has been set. Each year Inverclyde Council reports the total amount of greenhouse gas emissions, in tonnes, created by the Councils operations over the year (April to March). The Council began reporting on greenhouse gas emissions in 2012/2013 and since then there has been a gradual decline in greenhouse gas emissions. Table 2.1 details the amount of greenhouse gas emissions generated by Inverclyde Council over the last five years.

Total Greenhouse Gas Emissions Generated by Inverclyde Council									
Year 2015/2016 2016/2017 2017/2018 2018/2019 2019/20									
Tonnes CO ₂	14,808	14,457	12,777	10,928	10,212				

Table 2.1 Inverclyde Council's Greenhouse Gas Emissions.

Furthermore, since the introduction of the original plan the greenhouse gas emissions generated by the whole of Inverclyde has been declining over the years. The annual greenhouse gas emissions generated by the Inverclyde area is shown in table 2.2.

Table 2.2 Inverclyde's Greenhouse Gas Emissions (10)

Total Greenhouse Gas Emissions Generated by Inverclyde								
Year	2015	2016	2017	2018	2019			
Tonnes CO ₂	363.70	335.0	321.80	309.6	297.0			

2.2.3 Place Making

The Local Development plan aims to improve air quality by reducing transport related emissions through the use of land allocation and spatial development strategy. The focus is to ensure that urban areas are well connected at the planning stage. The Council will aim to ensure new housing, business and industry, retail and other commercial and community developments are easily accessible in line with the sustainable travel hierarchy.

2.3 Fleet Management

Inverclyde Council introduced four electric vehicles into the council fleet in 2011. Since then the procurement of electric vehicles has increased each year. Inverclyde Council has received funding from Transport Scotland over the last three years to invest in electric vehicles and electrical charging points.

By the end of 2020, the Council had a total of 31 electric vehicles within its fleet. Two new electric charging points have been introduced in Greenock (Station Avenue and Battery Park) and a new charging point was installed at Willison's Lane in Port Glasgow. By the end of 2020, a total of 22 council owned charging stations have been implemented within the local area for public use. There are privately owned charging stations that are also available for use throughout the local area these can be found using Live Map - Charge Place Scotland ⁽¹¹⁾. These charging points are usually found in car parks of supermarkets, train stations and business establishments.

It's hoped that the investment in electrical charging points within the local area will encourage people within the community to switch to electric vehicles.

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.

Inverclyde Council undertook automatic (continuous) monitoring at East Hamilton Street, Greenock site during 2020. Appendix A shows the details of the sites. National monitoring results are available at <u>Site Info - Air Quality in Scotland (scottishairquality.scot)</u> ⁽²⁾. Ricardo Energy & Environment have published an air pollution report for Inverclyde which provides an analytical overview of the air quality measured throughout the year ⁽¹²⁾.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Inverclyde Council undertook non- automatic (passive) monitoring of NO₂ at 17 sites. 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.

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 (NO₂)

Appendix A, Table A.3 compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of $40\mu g/m^3$.

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

Appendix A, Table A.4 compares the ratified continuous monitored NO₂ hourly mean concentrations for the past 5 years with the air quality objective of $200\mu g/m^3$, not to be exceeded more than 18 times per year.

In 2020, the automatic monitoring machine recorded no exceedences of the hourly mean objective or the annual mean objective for NO₂. The annual mean NO₂ concentration measured by the automatic monitor was 18 μ g/m³, significantly below the National Air Quality Objective Limit.

The results obtained from the NO₂ diffusion tubes also show no exceedances of the annual mean objective at the 17 non-automatic monitoring sites.

The automatic and non-automatic monitoring sites consistently measure NO₂ concentrations below the annual mean objective with the exception of one diffusion tube situated at East Hamilton Street, before the installation of the automatic monitor machine. The data from the diffusion tube located at the nearest residential property on East Hamilton Street has consistently shown lower concentrations of NO₂ in comparison to the diffusion tubes situated at the roadside.

3.2.2 Particulate Matter (PM₁₀)

Table A.5 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.6 in Appendix A compares the ratified continuous 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.

In 2020, the automatic monitoring machine recorded no exceedences for both the 24 hourly mean objective and the annual mean objective. The annual mean concentration measured for PM_{10} was 10 μ g/m³, this was below the National Air Quality Objective Limit.

Since the automatic air quality machine was installed at East Hamilton Street in 2014 there has been no exceedances of the annual mean and only in 2019 has there been daily exceedances recorded.

3.2.3 Particulate Matter (PM_{2.5})

Table A.7 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 $10\mu g/m^3$.

In 2020, the automatic monitoring machine recorded no exceedences of the annual mean objective set for $PM_{2.5}$. The annual mean concentration measured was 5 μ g/m³, this was below the National Air Quality Objective Limit.

3.2.4 Sulphur Dioxide (SO₂)

Inverclyde Council does not monitor for SO₂.

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

Inverclyde Council does not monitor for Carbon Monoxide, Lead and 1,3-Butadiene.

4 New Local Developments

4.1 Road Traffic Sources

There has been no road traffic sources that have not been considered in previous review and assessment exercises.

4.2 Other Transport Sources

There is no airport situated within Inverclyde Council and no significant changes have occurred in the Shipping Port operations.

4.3 Industrial Sources

There are no new or proposed industrial installations for which an air quality assessment has been carried out in 2020. Inverclyde Council is not aware of any significant changes to existing installations of the introduction of a new receptor that is exposed.

4.4 Commercial and Domestic Sources

There has been no new planning applications approved for the installation of biomass combustion plants.

4.5 New Developments with Fugitive or Uncontrolled Sources

Inverclyde Council has not identified any new potential sources of fugitive or uncontrolled particulate matter.

5 Impact of COVID-19 upon LAQM

5.1 Air Quality Monitoring

When the restrictions came into place in March 2020, the analysis of NO₂ diffusion tubes was affected. In normal circumstances the diffusion tubes would be taken away for lab analysis every four weeks. In some instances the diffusion tubes remained in situ for up to 6 weeks before being removed for analysis. Appendix B, Table B.2 shows the dates when the diffusion tubes were installed and removed.

The automatic air quality monitor machine was regularly calibrated throughout the year. There has been no issues identified with Inverclyde's local air quality monitoring network in relation to Covid-19 pandemic.

5.2 Data Capture

In 2020, the data capture for NO₂ diffusion tubes was 98%. The data capture for the automatic monitoring machine was 97.60% for NO_x and 99.85% for PM. Thus, the data capture for both automatic monitoring and non-automatic monitoring was above 75%. No other methods of low-cost air quality monitoring was carried out.

5.3 The Impact on Local Air Quality

This year has been far from normal, the Covid-19 pandemic has caused a number of restrictions to be imposed at both national and local levels. The Scottish Government's main message for 2020 was 'stay home and stay safe'. Only businesses and industries that were classed as 'essential' were allowed to remain open to the public. Non-essential businesses were for the most part of the year closed. Businesses were instructed to setup home working were possible. Travelling out with the local authority area was only allowed if essential. The restrictions on the movement of people led to less traffic on the road network. The data from Transport Scotland reveals the annual average traffic flow count on the Greenock A8 was reduced by 28% on the previous year. The restrictions imposed on society has led to a reduction in anthropogenic activities and in turn reduced the level of air pollution.

The country entered the first national lockdown on 23rd March 2020. People were only allowed to leave their homes once for daily exercise or for essential purposes. The air pollution measured in the first week of lockdown (Figure 1) was compared to the same week in the previous year (Figure 2) in order to highlight the impact strict national lockdown had on air quality. The comparison shows a stark contrast whereby the restrictions caused a substantial decrease in the air pollution. Furthermore, traffic data was obtained from Transport Scotland for the same week for both 2019 and 2020. The traffic count for 2020 showed a 67% reduction in comparison to the previous year. This emphasises the well-known correlation between road traffic and air pollution.



Figure 1. Air Pollution March 2020- Beginning of Lock Down



Figure 2. Air Pollution March 2019

Moreover, the annual hourly mean concentrations of NOx, PM_{10} and $PM_{2.5}$ for 2020 was considerably lower than the concentrations recorded in 2019. The average monthly PM concentrations measured for this year was the same or lower than the previous year. The average monthly NO_x concentrations measured for this year was the same or lower than the same or lower than the previous year with the exception of December.

The heightened NO_x concentration for December could be a result of the time of year and the easing of Scottish Government restrictions. Inverclyde was placed into the tier two level of restrictions allowing more movement and socialisation of people within the area.

5.4 Comparison of Modelled Data and Measured Data

A report produced by Ricardo Energy & Environment ⁽¹³⁾ examined the impact of lockdown measures on local air quality in Inverclyde. Within this report annual NO₂ and NO_x concentrations were modelled to what would be expected in 2020 referred to as "business as usual" (BAU) concentrations. This modelled data took into account various factors such as weather, temperature, wind speed, time of day, time of year, trends in NO_x emissions. The actual measured annual average pollution concentrations for both NO₂ and NO_x in 2020 was compared to the modelled data and the results from previous years. This

comparison indicated a difference showing the actual annual average concentration for both NO_2 and NO_x to be lower than predicted and much lower than previous years.

The modelled and measured data reported is pending ratification processes.

Figure 3. Comparison of the Annual Average NOx Concentrations with the BAU modelled 2020 data ⁽¹³⁾.



Figure 4: Comparison of the Annual Average NO₂ Concentrations with the BAU modelled 2020 data ⁽¹³⁾.



6 Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

In conclusion all measured air pollutants did not have concentrations which exceeded the National Air Quality Objective. Therefore no air quality management area needs to be declared.

The Covid-19 pandemic has had a notable effect on the air quality within Inverclyde in the year 2020. The local and national restrictions placed on people's lives has reduced the amount of traffic on the road network. As a consequence the annual mean concentrations of measured pollutants have decreased.

6.2 Proposed Actions

Inverclyde Council will continue to regularly monitor and review air quality within the local area. The NO₂ diffusion tubes have been located at the same sites for a long period of time. Discussions have taken place as to whether to change the locations of the diffusion tubes. Instead of removing diffusion tubes from some areas, it has been proposed that we will add further diffusion tube sites. This will allow continued monitoring of busy areas in Inverclyde and highlight potential air pollution hot spots.

The automatic monitoring machine will remain situated at East Hamilton Street. The collocation study will continue at East Hamilton Street, obtaining data from the air monitor and three NO₂ diffusion tubes to develop a local bias adjustment factor.

A comparison of 2019 air pollution data and traffic count data with those recorded in 2020 indicate a correlation between the level of road traffic and the concentration of air pollutants. The reduction in road traffic causes a reduction in measured concentrations of air pollutants. This relationship between road traffic and air pollution is well documented and it reinforces that proposed actions need to be targeted at reducing road traffic. It is proposed that further efforts will be made to promote and encourage active travel within the local area.

The next Air Quality Annual Progress Report will be submitted June 2022.

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? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⑴	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
Inverclyde Greenock A8	Roadside	229365	675700	NO2, PM10, PM2.5, PM1	Ν	TEOM	12	2.5	1.8

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

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)	Tube co-located with a Continuous Analyser?
Carwood Court	Roadside	229503	675400	NO ₂	N	13.5m	5m	Ν
Brown Street, PG	Roadside	231699	674620	NO ₂	N	1m	1m	Ν
Bridge of Weir Rd	Roadside	235824	669909	NO ₂	N	1m	1m	Ν
East Hamilton Street (1)	Roadside	229365	675700	NO ₂	N	12m	2.5m	Y
East Hamilton Street (2)	Roadside	229365	675700	NO ₂	N	12m	2.5m	Y
East Hamilton Street (3)	Roadside	229365	675700	NO ₂	N	12m	2.5m	Y
East Hamilton Street (property)	Roadside	229301	675712	NO2	Ν	0m	14.25m	Ν
Dellingburn St	Roadside	228422	675735	NO ₂	N	3.5m	5m	N

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Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⑴	Distance to kerb of nearest road (m) (2)	Tube co-located with a Continuous Analyser?
Dalrymple St	Roadside	228311	675993	NO2	Ν	15m	3m	Ν
Inverkip St	Roadside	227563	676246	NO ₂	Ν	1m	2.5m	Ν
Dunlop St	Roadside	226827	675622	NO ₂	N	4m	2m	Ν
Nelson St	Roadside	227092	676134	NO ₂	Ν	1m	5m	Ν
Inverkip Rd	Roadside	224441	675224	NO ₂	Ν	15m	4m	Ν
Larkfield Rd	Roadside	224869	675757	NO ₂	Ν	3m	2m	Ν
Main St, WB	Roadside	219407	668573	NO ₂	Ν	1m	2m	Ν
Kempock St,	Roadside	224097	677910	NO ₂	N	1m	1m	Ν
Cardwell Rd	Roadside	224664	677168	NO ₂	N	3m	4m	Ν

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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?
Newark St	Roadside	225460	677501	NO ₂	Ν	1m	5m	Ν
Brougham St	Roadside	227242	677032	NO ₂	Ν	7m	5.5m	Ν
MacDougall St	Roadside	229605	675593	NO ₂	Ν	13m	3m	Ν

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.

Table A.3 – Annual Mean NO₂ Monitoring Results (µg/m³)

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
Inverclyde Greenock A8	Roadside	Automatic	98	28.0	28.0	32.0	28.0	21
Carwood Court	Roadside	Diffusion Tube	100	10.6	9.8	10.5	7.8	8.0
Brown Street, PG	Roadside	Diffusion Tube	100	20.8	18.1	17.7	14.4	14.1
Bridge of Weir Rd	Roadside	Diffusion Tube	100	16.1	15.1	14.0	12.3	9.3
East Hamilton Street (1)	Roadside	Diffusion Tube	100	34.1	34.7	31.6	27.6	23.7
East Hamilton St (2)	Roadside	Diffusion Tube	100	34.1	36.0	35.1	28.5	24.8
East Hamilton St (3)	Roadside	Diffusion Tube	100	29.7	35.0	33.9	27.0	23.9
East Hamilton St (property)	Roadside	Diffusion Tube	91	21.7	22.0	20.4	17.6	12.2
Dellingburn St	Roadside	Diffusion Tube	100	34.3	33.5	29.3	24.8	21.1
Dalrymple St	Roadside	Diffusion Tube	100	23.4	22.5	23.8	18.5	15.3

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
Inverkip St	Roadside	Diffusion Tube	91	27.5	27.4	27.6	24.1	23.7
Dunlop St	Roadside	Diffusion Tube	100	18.3	19.2	16.1	14.8	13.4
Nelson St	Roadside	Diffusion Tube	100	25.3	26.4	24.9	22.9	18.3
Inverkip Rd	Roadside	Diffusion Tube	100	19.9	19.7	18.9	16.5	13.1
Larkfield Rd	Roadside	Diffusion Tube	100	18.2	20.5	17.0	15.8	11.8
Main St WB	Roadside	Diffusion Tube	100	13.6	14.1	12.7	11.2	8.2
Kempock St	Roadside	Diffusion Tube	91	14.4	14.7	14.6	11.6	9.1
Cardwell Rd	Roadside	Diffusion Tube	100	22.8	24.7	25.3	20.1	16.5
Newark St	Roadside	Diffusion Tube	100	15.1	19.9	15.2	11.8	10.0
Brougham St	Roadside	Diffusion Tube	91	20.7	24.9	24.7	20.3	14.9
MacDougall St	Roadside	Diffusion Tube	100	23.0	21.2	21.5	16.7	13.8

Notes:

Exceedances of the NO₂ annual mean objective of $40\mu g/m^3$ are shown in bold.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 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%).

Table A.4 – 1-Hour Mean NO ₂ Mo	nitoring Results, Number	of 1-Hour Means > $200 \mu g/m^3$
	intoring results, rumber	

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
Inverclyde Greenock A8	Roadside	Automatic	98	0	0 (99)	0	0	0

Notes:

Exceedances of the NO₂ 1-hour mean objective (200 μ g/m³ not to be exceeded more than 18 times/year) are shown in bold.

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

- (1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
- (2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.5 – Annual Mean PM₁₀ Monitoring Results (µg/m³)

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
Inverclyde Greenock A8	Roadside	Automatic	100	11	10	12	12	10

Notes:

Exceedances of the PM₁₀ annual mean objective of $18 \mu g/m^3$ are shown in bold.

All means have been "annualised" as per LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

Table A.6 – 24-Hour Mean PM₁₀ Monitoring Results, Number of PM₁₀ 24-Hour Means > 50µg/m³

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
Inverclyde Greenock A8	Roadside	Automatic	100	0	0	0	5	0

Notes:

Exceedances of the PM₁₀ 24-hour mean objective (50 µg/m³ not to be exceeded more than seven times/year) are shown in bold.

If the period of valid data is less than 85%, the 98.1st percentile of 24-hour means is provided in brackets.

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

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

Table A.7 – Annual Mean PM_{2.5} Monitoring Results (µg/m³)

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
Inverclyde Greenock A8	Roadside	Automatic	100	x	5	6	7	5

Notes:

Exceedances of the PM_{2.5} annual mean objective of 10 μ g/m³ are shown in bold.

All means have been "annualised" as per LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2020

Site ID	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Bias Adjusted ⁽¹⁾
Carwood Court	10.5	9.6	6.0	6.2		8.5	3.0	7.1	7.5	8.0	6.4	19.0	8.3	8.0
Brown Street PG	14.4	14.1	9.9	9.7		14.4	5.8	1.5	38.8	7.8	20.3	25.1	14.7	14.1
Bridge of Weir Rd	13.6	10.0	7.3	7.3		11.3	5.7	4.1	9.9	6.1	12.2	18.8	9.7	9.3
East Hamilton Street (1)	33.2	26.9	17.0	19.3		27.2	19.4	25.2	34.1	24.2	25.8	18.7	24.6	23.7
East Hamilton Street (2)	33.1	30.5	21.4	17.1		28.5	20.8	22.4	35.9	16.1	23.5	35.1	25.9	24.8
East Hamilton Street (3)	28.2	27.7	18.1	20.6		29.3	10.8	17.1	30.7	27.0	27.5	36.4	24.9	23.9
East Hamilton Street (property)	19.5	15.6	12.7	9.2		16.4	2.1	7.9	16.5	12.3	14.5		12.7	12.2
Dellinngburn St	22.2	35.7	14.7	19.1		20.6	12.2	15.0	30.0	17.8	21.4	33.4	22.0	21.1
Dalrymple St	21.4	22.9	16.1	12.3		13.8	2.1	9.2	17.4	14.0	17.5	29.0	16.0	15.3

Table B.1 – NO₂ 2020 Monthly Diffusion Tube Results (µg/m³)

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Site ID	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Bias Adjusted ⁽¹⁾
Inverkip St	36.8	42.5	20.6			15.8	8.6	18.6	19.9	23.9	25.6	34.8	24.7	23.7
Dunlop St	19.4	13.9	11.7	9.9		14.5	7.6	6.7	16.5	12.8	17.1	23.5	14.0	13.4
Nelson St	26.8	27.3	14.9	13.1		19.6	2.1	14.2	19.5	18.1	21.7	32.6	19.1	18.3
Inverkip Rd	17.1	16.5	11.6	10.5		13.0	6.2	10.6	15.7	15.4	11.8	22.0	13.7	13.1
Larkfield Rd	14.6	15.6	13.1	8.9		14.5	4.7	6.0	15.0	9.0	12.0	22.1	12.3	11.8
Main St, WB	10.5	12.8	8.2	7.3		9.5	3.4	5.6	10.1	6.8	7.7	12.5	8.6	8.2
Kempock St	10.6	11.4	9.8			10.6	2.1	5.6	9.3	8.1	9.7	18.0	9.5	9.1
Cardwell Rd	23.6	20.6	14.1	8.7		15.7	7.2	13.4	18.7	20.3	15.8	31.3	17.2	16.5
Newark St	15.5	17.0	8.1	4.9		11.0	2.1	3.9	14.4	10.4	9.7	17.2	10.4	10.0
Brougham St	27.0	4.6	16.0	10.7		16.9	10.6	11.5	22.5	20.3	15.4		15.6	14.9
MacDougall St	13.9	11.9	13.2	12.3		19.5	8.5	13.7	16.2	14.7	12.4	10.6	14.4	13.8

Notes: (1) See Appendix C for details on bias adjustment

Table B.2 – Diffusion Tube Deployment Dates

Diffusio	on Tube Deplo	byment Dates
Month	Tube On	Tube Off
Jan	10/01/2020	07/02/2020
Feb	07/02/2020	06/03/2020
Mar	06/03/2020	28/04/2020
Apr	28/04/2020	03/06/2020
May		
Jun	03/06/2020	30/06/2020
Jul	30/06/2020	27/07/2020
Aug	27/07/2020	04/09/2020
Sep	04/09/2020	02/10/2020
Oct	02/10/2020	06/11/2020
Nov	06/11/2020	04/12/2020
Dec	04/12/2020	08/01/2021

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

QA/QC of Diffusion Tube Monitoring

Glasgow Scientific Services supply and analyse the NO₂ diffusion tubes on a monthly basis. The preparation method used for NO₂ diffusion tubes is 20% TEA in Water. The Laboratory has adopted the procedures for preparation and analysis of the diffusion tubes contained in the document 'Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance' ⁽¹³⁾.

There are 3 diffusion tubes currently located at the automatic monitoring site at East Hamilton Street.

The National Bias adjustment factor of 0.96 for 2020 was obtained from the Scottish Air Quality website. The Local Bias adjustment factor of 0.72 was obtained from the DEFRA website and also using monthly period mean data from the Scottish Air Quality website. For the purposes of this report, the National Bias adjustment factor of 0.96 has been used (with 95% confidence interval accuracy using 12 periods of data with 'good' precision overall).

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Inverclyde 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

Inverclyde Council have applied a national bias adjustment factor of 0.96 to the 2020 monitoring data. A summary of bias adjustment factors used by Inverclyde over the past five years is presented in Table C.1.

Year	Local or National	Adjustment Factor	
2020	National	03/21	0.96
2019	Local	-	0.73
2018	Local	-	0.79
2017	National	09/18	0.91
2016	National	06/17	0.97

Table C.1 – Bias Adjustment Factor

NO2 Fall-off with Distance from the Road

No diffusion tube NO₂ monitoring locations within Inverclyde Council required distance correction during 2020.

QA/QC of Automatic Monitoring

The automatic monitoring site at East Hamilton Street contains one NO_x/NO₂ analyser and one TEOM Ambient Particulate Monitor. Throughout 2020 site audits and calibrations were undertaken by Ricardo AEA and services carried out every 6 months by Air Monitors. Fortnightly manual calibrations were carried out by Inverclyde Council.

PM₁₀ and PM_{2.5} Monitoring Adjustment

The PM₁₀ data contained in this report has been obtained from the Scottish Air Quality website (2). The data provided is the VCM corrected data from the TEOM within at the automatic monitoring site at East Hamilton Street, Greenock.

Automatic Monitoring Annualisation

All automatic monitoring locations within Inverclyde 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.

NO2 Fall-off with Distance from the Road

No automatic NO₂ monitoring locations within Inverclyde Council required distance correction during 2020.



Appendix D: Maps of Monitoring Locations in Inverclyde

Map of Automatic Air Monitoring Site and Collocation study at East Hamilton Street

□ NO₂ diffusion tube at façade of nearest property (East Hamilton Street)

□ Automatic Air Quality Monitor with 3 x NO₂ diffusion tubes (East Hamilton Street)

□ 1 x NO₂ diffusion tube (MacDougall Street

Map of NO₂ Diffusion Tube Monitoring Network: Greenock Central





Map of NO₂ Diffusion Tube Monitoring Network: Greenock South

Map of NO₂ Diffusion Tube Monitoring Network: Gourock/Greenock West





Map of NO₂ Diffusion Tube Monitoring Network: Port Glasgow

Map of NO2 Diffusion Tube Monitoring Network: Kilmacolm





Map of NO₂ Diffusion Tube Monitoring Network: Wemyss Bay

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)
BAU	Business As Usual
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 ₂	Nitrogen Dioxide
NOx	Nitrogen Oxides
PM10	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM2.5	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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