2019 Air Quality Annual Progress Report (APR) for Glasgow City Council

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

August 2019

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Executive Summary: Air Quality in Our Area

Air Quality in Glasgow

During 2018, Glasgow City Council measured concentrations of Nitrogen Dioxide (NO_2) above the Annual Mean Objective at one automatic monitoring station within the existing City Centre Air Quality Management Area (AQMA) and at several locations, measured by diffusion tube, also within the City Centre AQMA. However, the number of diffusion tube exceedences (7) showed a notable reduction from the previous year 2017 (12).

The NO_2 Hourly Mean Objective was not exceeded at any of the automatic monitoring stations.

Neither the Annual Mean Objective for PM_{10} nor the PM_{10} Daily Mean Objective were exceeded at any monitoring location during 2018.

For Scottish Local Authorities particulates at $PM_{2.5}$ have now been prescribed in regulation with an Annual Mean Objective of 10µg/m^3 by 2020. This objective was not exceeded at any monitoring location during 2018.

The previous 2018 Air Quality Annual Progress Report confirmed compliance with relevant Annual Mean Objectives for both Parkhead and Byres Road / Dumbarton Road AQMA's. Proposals to **revoke** the AQMA's currently in place in respect of the Annual Mean Objective for NO_2 at Parkhead Cross and the Annual Mean Objective for PM_{10} at Byres Road / Dumbarton Road will be prepared for committee approval later in 2019.

Actions to Improve Air Quality

In response to the implementation of the AQMA's in the city, Glasgow City Council produced Air Quality Action Plans in 2004 and 2009 introducing a range of measures aimed at reducing pollution in the city. The Action Plan is an evolving project, several measures such as vehicle idling enforcement, vehicle emission testing and initiatives towards cleaner vehicles remain ongoing. Other measures such as a council workplace travel plan and city car club continue to evolve. It is anticipated that work will commence on a revised Air Quality Action Plan later in 2019.

The Scottish Programme for Government announced in 2017 that there would be Low Emission Zones (LEZ's) in 4 cities in Scotland. Glasgow City Council agreed to introduce Scotland's first LEZ in an area broadly equivalent to the city centre AQMA by the end of 2018.

The LEZ is being introduced in two phases, with the first phase targeting improvements in emissions arising from bus journeys going through the city centre. From December 2018 the LEZ required that 20% of bus journeys through the city centre meet the Euro VI emission standard. This target is to be increased by 20% each year, until 100% of buses are compliant by December 2022. The second phase of the LEZ will apply to all vehicle types and will also come into force at the end of 2022.

Link to Glasgow's LEZ.

https://www.glasgow.gov.uk/LEZ

The Council continues to promote and facilitate improvements in sustainable transport through investment in cycling infrastructure, such as the Avenues and City Ways projects, and easier public access to air quality information have been introduced.

Included in the Glasgow City Region City Deal funding, Glasgow City Council is investing approximately £115 million within the city centre to deliver on the Enabling Infrastructure - Integrated Public Realm (EIIPR) programme. More commonly known as the Avenues programme, this will see streetscape improvements made to the public realm, supporting a key strategic objective of the City Centre Strategy and Action Plan 2014-19: the establishment of principal Avenues throughout the city

centre to form an integrated network of continuous pedestrian and cycle priority routes.

Link to City Centre Strategy and Action Plan 2014-19 and Avenues.

https://www.glasgow.gov.uk/article/18277/City-Centre-Centre-Strategy

Link to Avenues programme.

https://www.glasgow.gov.uk/avenues

Design and construction work is being phased over the period 2017 to 2024. The first phase, Sauchiehall St West is nearing completion and will radically alter the balance of traffic mode along Sauchiehall Street prioritising space for cyclists and pedestrians and introducing sustainable green infrastructure.

Sauchiehall Street pre implementation of Avenues Programme.

Sauchiehall Street on completion of Sauchiehall Street West (impression).

Link to Glasgow's Strategic Plan for Cycling 2016 – 2025.

https://www.glasgow.gov.uk/index.aspx?articleid=20804

Link to Glasgow's Cycling Projects.

https://www.glasgow.gov.uk/index.aspx?articleid=19364

https://www.glasgow.gov.uk/index.aspx?articleid=21805

Link to Glasgow's City Centre Transport Strategy 2014 – 2024.

https://www.glasgow.gov.uk/index.aspx?articleid=18276

Measures which have progressed during 2018 within the Air Quality Action Plan (AQAP) programme are shown in Table 2.2. An AQAP summary is shown in Appendix D.

George Square in Glasgow city centre was largely taken over, including a road closure in front of the Council chambers, for National Clean Air Day, 21 June 2018. This event was substantially larger and wider in scope than for previous years. Much of the square was filled with events and activities ranging from displays of electric vehicles, including a 'London' taxi, from a range of manufacturers such as Nissan, Tesla, and BMW.

The normally busy road in front of the chambers was closed to traffic to allow city school children to improve their cycling skills in a 'Bikeability' challenge overseen by Cycling Scotland. The children were then encouraged to show off their skills on a "pump track" set up in the square by the Glasgow 2018 European Championships team.

Information and demonstrations from a diverse range of bodies including Ricardo Energy and Environment, Living Streets, Home Energy Scotland and Healthy n Happy Community Development Trust all added to the flavour of the day.

Unfortunately the two City Trees previously installed at Killermont St and Royal Exchange Square, (June 17) proved to be ultimately unsuccessful. Recurring issues with irrigation and connectivity contributed to repeated die back of the plants and for now these installations have been removed.

Local Priorities and Challenges

Glasgow's low emission zone (LEZ) is an intervention directed at protecting and improving public health. While the concept was introduced in the 2009 Action Plan it is also now part of a broader approach to enhancing the amenity and attractiveness of the city centre through cleaner air.

The LEZ is intended to accelerate the pace of improvement in Glasgow's air quality and in particular to ensure that air pollution levels are reduced in the city centre. The principal source of air pollution in the city is from road traffic and detailed analysis of air pollution in the city centre has been undertaken to determine source apportionment. This identified that, on the streets with the highest level of pollution, buses (60-75%) and other diesel engine vehicles are the main source of pollution.

The LEZ is being introduced in two phases. The first phase looks to improve emissions from bus journeys going through the city centre. Such action should not only improve air quality in the city centre itself, but also have the positive effect of improving emissions in those other parts of the city on through routes.

From December 2018 the LEZ required that 20% of bus journeys through the city centre met the Euro VI emission standard. This target is to be increased by 20% each year until 100% of buses are compliant.

The second phase of the LEZ will apply to all vehicle types and come into place at the end of 2022. This will require a minimum emissions standard from vehicles of Euro 6/VI for diesel engines and Euro 4/IV for petrol engines. In these respects, Glasgow's LEZ will be one of the most ambitious in the UK with emission standards equivalent to those required by London's Ultra Low Emission Zone.

Indicative signage to raise awareness of the LEZ introduction has been installed at key city centre locations and on the main approach routes into the city centre.

An increased emphasis with regard to the awareness and enforcement of legislation to reduce vehicle idling, particularly in the vicinity of schools was introduced during 2018. In addition to the established awareness campaigns via advertising on buses etc. Banner messages, as shown below, are being displayed around schools.

How to Get Involved

Information relating to the LEZ, Local Air Quality Management (LAQM) and AQMA's in Glasgow is available via the Glasgow Council website. This information includes Air Quality Action Plans, Progress Reports and Detailed Assessments.

https://www.glasgow.gov.uk/index.aspx?articleid=18863

The website also contains links to the national Air Quality in Scotland webpage where the public can access both real time and historical monitoring data in addition to registering to receive text/email alerts where poor air quality is forecast.

http://www.scottishairquality.co.uk/

1. Local Air Quality Management

This report provides an overview of air quality in Glasgow during 2018. 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 Glasgow City 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		Date to be achieved by
	Concentration	Measured as	
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	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
	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
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	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
Lead	0.25 µg/m^3	Annual Mean	31.12.2008

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.

A summary of AQMAs declared by Glasgow can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at

https://www.glasgow.gov.uk/index.aspx?articleid=18863

Proposals to revoke the AQMA's currently in place in respect of the Annual Mean Objective for NO_2 at Parkhead Cross and the Annual Mean Objective for PM_{10} at Byres Road / Dumbarton Road will be prepared for committee approval later in 2019.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
City Centre AQMA	NO_2 Annual Mean PM_{10} Annual Mean NO_2 Hourly Mean	Glasgow	The city centre AQMA is loosely bound by the M8 motorway to the west and north (with slight protrusions at North Street and Royston Road), by High Street and Saltmarket to the east and by the river Clyde to the south. This area was declared an AQMA in 2004 in respect of the annual mean NO_2 Objective. In 2007 the area covered by this AQMA was extended and declared in respect of the annual mean PM_{10} Objective. In 2012 a further extension of the AQMA was declared and the order amended in respect of the hourly mean NO_2 Objective.	Glasgow City Council Air Quality Action Plan 2009 https://www.glasgow.gov.uk/CHttpHandler.ashx?id=32447&p=0
Parkhead Cross AQMA	NO_2 Annual Mean *	Glasgow	Parkhead Cross is formed by the convergence of five roads in Glasgow's east end. The roads are Westmuir Street, Tollcross Road, Springfield Road, Duke Street and Gallowgate. The area is a mixture of commercial and residential properties within mostly tenement properties. This area was declared in 2007 in respect of the annual mean NO_2 Objective.	Glasgow City Council Air Quality Action Plan 2009 https://www.glasgow.gov.uk/CHttpHandler.ashx?id=32447&p=0

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
Byres Road and Dumbarton Road AQMA	NO_2 Annual Mean PM_{10} Annual Mean *	Glasgow	This AQMA extends from the junction of Byres Road and Great Western Road, south to Dumbarton Road and west along Dumbarton Road as far as Thornwood Drive roundabout. This area was declared an AQMA in 2007 in respect of the annual mean NO_2 Objective. In 2012 the area covered by this AQMA was extended northwards along Queen Margaret Drive to the junction with Oban Drive. In 2016 this AQMA was amended in respect of the annual mean PM_{10} Objective.	Glasgow City Council Air Quality Action Plan 2009 https://www.glasgow.gov.uk/CHttpHandler.ashx?id=32447&p=0

* Proposals to revoke these AQMA's will be prepared for committee approval later in 2019.

2.2 Progress and Impact of Measures to address Air Quality in Glasgow

Glasgow has taken forward a number of measures during the current reporting year of 2018 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found via the link to the AQAP contained in Table 2.1 above. A summary of the AQAP measures is shown in Appendix D.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Vehicle Idling Council will expand programme of vehicle idling enforcement	Public Information	Regular scheduled patrols to enforce and/or educate regarding vehicle idling	Public Health LES		2003 onwards	Low	Council continues to promote awareness and benefits in regard to reduction of vehicle idling via billboards and advertising campaign on PSV vehicles, around schools and bus stops.	Ongoing	No Fixed Penalty Notices issued during 2018.
2	Emission Testing	Public Information	Council will continue a programme of roadside emission testing	Public Health LES		2003 onwards	Low	40000+ vehicles tested	Ongoing	1187 vehicles tested No Fixed Penalty Notices issued during 2018

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
3	Low Emission Zones	Promoting Low Emission Transport	Cleaner Air for Scotland (CAFS) National Low Emission Framework (NELF)	Scottish Government GCC are a partner authority on the CAFS Governance Group	2015	2018	Medium	Glasgow City Council have agreed to introduce Scotland's first LEZ in an area broadly equivalent to the city centre AQMA. From December 2018 Phase 1 of the LEZ requires that 20% of bus journeys through the city centre meet the Euro VI emission standard.	2022	Compliance target is to be increased by 20% each year until 100% of buses are compliant by 2022. Phase 2 of the LEZ will apply to all vehicle types and come into place at the end of 2022. It will require a minimum emissions standard from vehicles of Euro 6/VI for diesel engines and Euro 4/IV for petrol engines.

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5	Council Workplace Travel Plan	Promoting Travel Alternatives	Travel Plan was relaunched in an updated form.	Glasgow City Council		2014	Low	Cycling Infrastructure improvements Lift share, car share facility for GCC Pool bike scheme Site Bike Scheme Cycle to work scheme Improvements at council premises including secure parking facilities.	Ongoing	2018 saw further investment in infrastructure such as cycle parking facilities for council premises and the provision of a central pool bike facility.

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
6	Car Clubs	Alternatives to Private Vehicle Use	The Council will make on street spaces available for car club vehicles.	Glasgow City Council	2009	2010 Onwards / 2015 Onwards (award of new operator contract)	Low	Car club has 41 vehicles including 5 full electric vehicles, one of which is an EV Van in operation within Glasgow located on street in council provided bays. 2018/19 saw a focus on creating additional users / memberships for the scheme, together with the bidding for funding to provide additional electric vehicles at housing association sites. This has been successful and will see and additional 19 EV's become available at new locations for public use.	Ongoing	Further expansion of the scheme planned in conjunction with the operator and NS Traffic linking specifically with Restricted Parking Zones and Controlled Parking Zones

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
10	Air Quality Information	Public Information	The Council will provide data and information regarding current and longer term air quality monitoring on our web site and at variable message signs throughout the city	Glasgow City Council	2016	2016	Low	The Council secured funding to install two CityTrees in city centre Air Quality Management Area. These installations contain information on and links to air quality information sources.	2017	Recurring issues with irrigation and connectivity contributed to repeated die back of the plants and for now these installations have been removed.

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
13	Cycling Strategy	Promoting Travel Alternatives	Air Quality grants will be sourced for funding cycling improvements in the city.	Glasgow City Council	2011	Ongoing	Low	Grants have been obtained from Scottish Govt. and used for provision of cycling infrastructure such as bike shelters and stances across the city. Continued investment in cycling infrastructure including community centred projects and secure bike storage at schools. Glasgow City Council's Strategic Plan for Cycling 2016 - 2025 was recognised as a category winner courtesy of the Scottish Transport Awards	Ongoing	During 2018–19 funding support from a range of sources including the Scottish Governments AQAP fund and GCC Cycling Development fund was invested in various aspects of Sustainable / Active Travel. Including cycle infrastructure, the permeable streets programme and school cycle parking. This also included supporting improvements to the cycle facilities at the Maryhill Whitehouse centre.

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
17	Promote Greener Vehicles		The Council will investigate the potential for reduced rate street parking for electric and hybrid vehicles	Glasgow City Council	2012	2012	Low	Glasgow City Council has introduced a network of public charging points, presently 93 each point is capable of simultaneously charging 2 vehicles. Charging points have also been provided within council car parking facilities. Parking charges apply in line with local restrictions however GCC will continue to supply the electricity free of charge.	Ongoing	An additional 60 charge points are planned for the 2019/20 programme and a further 70 by 20/21.

2.3 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. The strategy is currently undergoing a comprehensive review and should be published later in 2019. To assist with this review an elected member and officers from GCC have been attending working subgroups covering transport and health.

In the meantime progress by Glasgow City Council against relevant actions within this strategy http://www.gov.scot/Publications/2015/11/5671/17 is demonstrated below.

2.3.1 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.

Glasgow currently does not have a corporate travel plan. The 2009 AQAP includes measures to promote staff travel to the workplace and GCC has produced a staff travel plan and introduced a number of measures to assist staff. Glasgow continue to work with partners to deliver our shared vision in the Cycling Action Plan for Scotland that by 2020, 10% of everyday journeys will be made by bike.

2.3.2 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.

Glasgow has implemented an Energy and Carbon Masterplan which provides a blueprint to reduce carbon dioxide emissions by 30% by 2020. This masterplan highlights over 30 actions to meet the reduction target focussing heavily on renewable energy power supplies and the commitment to less polluting transport modes. Links to the masterplan and Glasgow's Carbon Management Plan 2 are available at.

https://www.glasgow.gov.uk/index.aspx?articleid=17181

Going forward, Glasgow is in the process of creating its new Energy & Carbon Masterplan, which will run from 2020 to 2050. The new plan will take on a more area based approach and will consider all aspects of the environment when devising solutions and actions. Air quality improvements will largely be supported by a continued deployment of electric vehicle charging infrastructure across the city, providing the infrastructural support required to transition away from fossil fuelled transport towards cleaner forms of transport.

In addition to the above, the EU H2020 RUGGEDISED project is installing renewable energy generation and large scale battery storage in tandem with electric vehicle infrastructure to ensure that vehicles are charged with renewable energy where possible. It will also implement electric vehicle charging infrastructure that is integrated into street lighting columns, thus increasing the number of available charge points without increasing street furniture. It is hoped that the RUGGEDISED installations will provide the catalyst that helps private taxi operators' move towards electric vehicles.

http://www.ruggedised.eu/cities/glasgow/

3. Air Quality Monitoring Data and Comparison with Air Quality Objectives

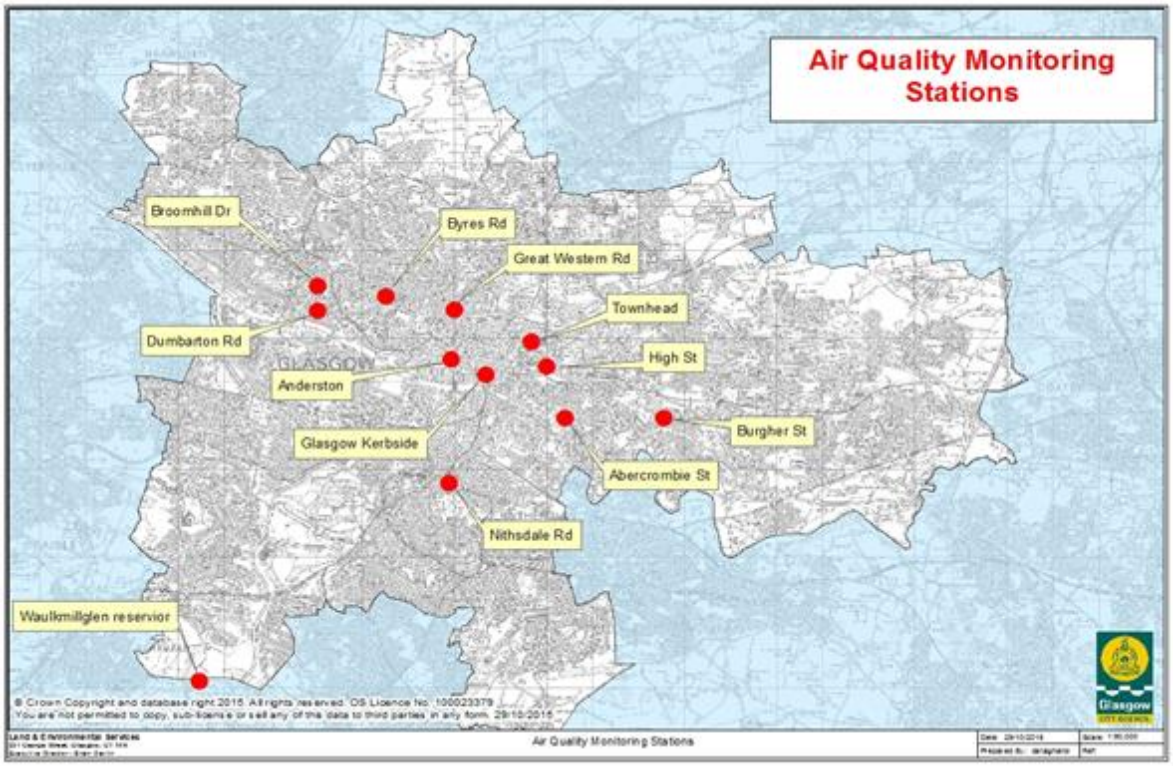
3.1 Summary of Monitoring Undertaken

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.

Glasgow City Council undertook automatic (continuous) monitoring at 12 sites during 2018. The locations are shown in Figure 3.1 below. Station information including pollutants monitored are shown Table A.2 in Appendix A.

Figure 3.1 Location of Automatic Monitoring Sites



Maps and photographs showing the location of the monitoring sites are provided at http://www.scottishairquality.co.uk/. Monitoring data from both Glasgow's network and nationally across Scotland can also be accessed at this link.

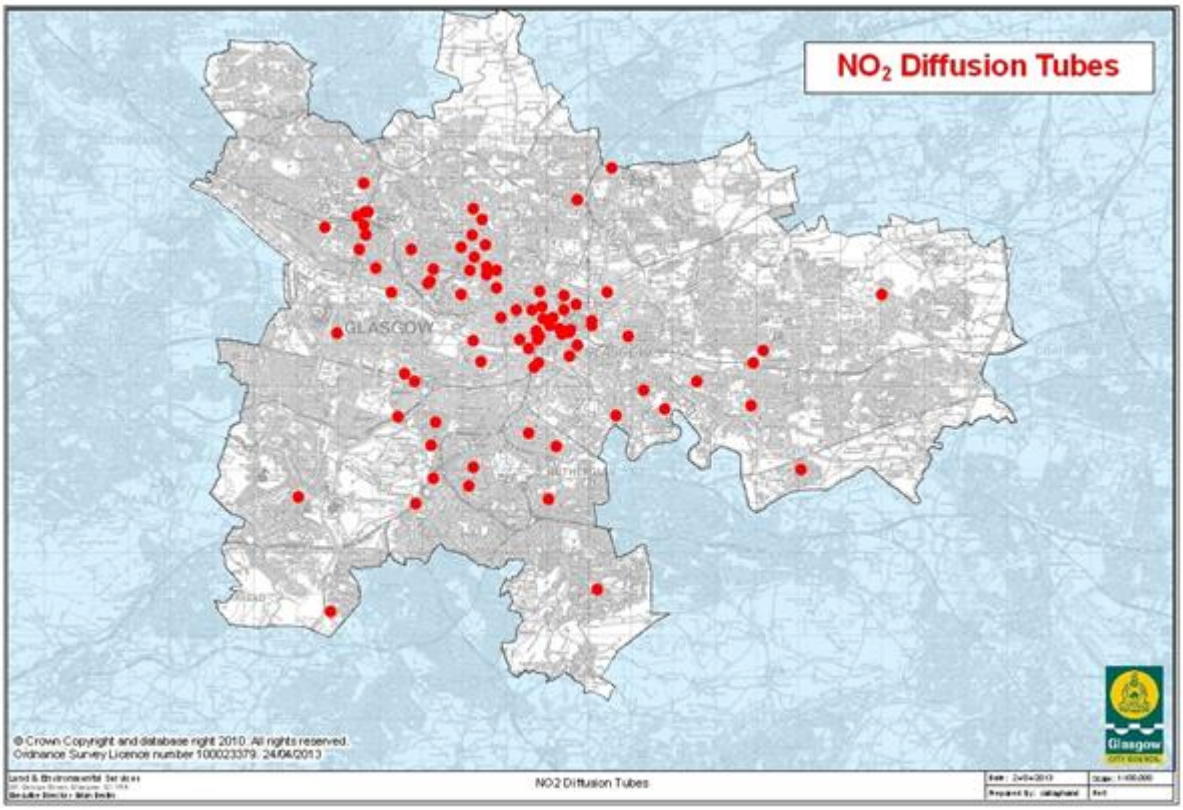
Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Glasgow City Council undertook non - automatic (passive) monitoring of Nitrogen Dioxide NO_2 at 102 sites and Benzene (C_6H_6) at 4 locations during 2018. Whilst concentrated within the City Centre AQMA, NO_2 diffusion tubes are also widely dispersed throughout the city as shown in Figure 3.2 following.

Table A.3 in Appendix A. shows the details of the sites.

Figure 3.2 Location of Nitrogen Dioxide (NO_2) Diffusion Tubes



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 (NO_2)

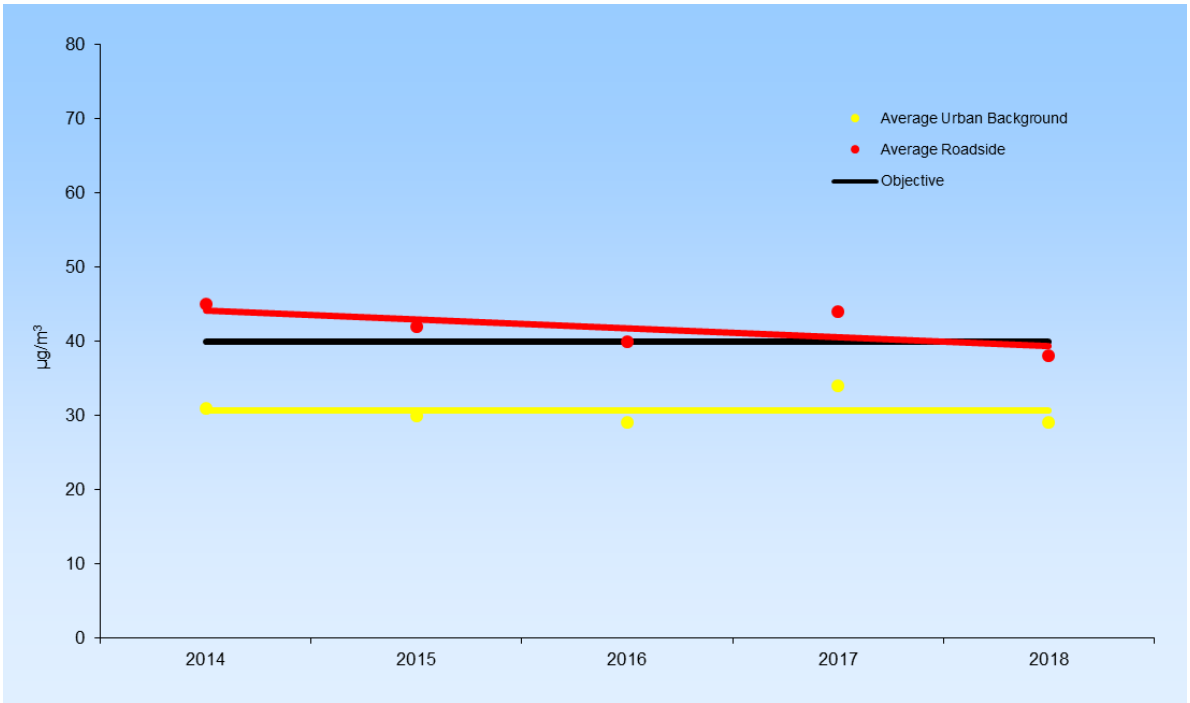
Table A.4 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

During 2018, Glasgow City Council measured concentrations of NO_2 above the Annual Mean Objective at one automatic monitoring station, Kerbside (GLA4) this station is within the existing City Centre Air Quality Management Area. The Annual Mean Objective was also exceeded at several locations (7), by diffusion tube, within the existing City Centre AQMA. The number of diffusion tube exceedences showed a noteable reduction from the previous year 2017 (12).

Figure 3.3 Trends in Annual Mean Nitrogen Dioxide Concentration Within City Centre AQMA (Diffusion Tube) Comparison with Annual Mean Objective (40μg/m³)



The Hourly Mean Objective was not exceeded at any of the automatic monitoring stations. One diffusion tube location (CC13) returned an annual mean >60μg/m³ (63μg/m³) which indicates a possible exceedance of the Hourly Mean Objective at this location. Note however, that CC13 is approx. 100m from the automatic monitoring station on Hope St. (GLA4) with a common pollutant source, i.e. traffic using Hope St. The number of exceedances of the Hourly Mean Objective measured at GLA4 has not exceeded the objective limit (18 hours) in recent years.

3.2.2 Particulate Matter (PM_{10})

Table A.6 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 18μg/m³.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50μg/m³, not to be exceeded more than 7 times per year.

Neither the Annual Mean Objective for PM_{10} nor the Daily Mean Objective was exceeded at any monitoring location during 2018.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A compares the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years with the air quality objective of 10µg/m^3.

For Scottish Local Authorities particulates at $PM_{2.5}$ have now been prescribed in regulation with an Annual Mean Objective of 10µg/m^3 by 2020. This objective was not exceeded at any monitoring location during 2018.

3.2.4 Benzene (C_6H_6)

Table A.9 in Appendix A shows the monitored C_6H_6 annual mean concentrations with the air quality objective of 3.25µg/m^3. The Annual Mean Objective was not exceeded at any monitoring location during 2018.

3.2.5 Carbon Monoxide (CO2), Sulphur Dioxide (SO2), Lead and 1,3-Butadiene

Monitoring of these pollutants has been discontinued in Glasgow.

4. New Local Developments

No new local developments have been identified which require consideration in this report.

4.1 Road Traffic Sources

No new road traffic sources have been identified which require consideration in this report.

4.2 Other Transport Sources

No significant new transport sources have been identified which require consideration in this report.

4.3 Industrial Sources

No significant new industrial sources have been identified which require consideration in this report.

4.4 Commercial and Domestic Sources

No significant new commercial and domestic sources have been identified which require consideration in this report.

4.5 New Developments with Fugitive or Uncontrolled Sources

No significant new developments with fugitive or uncontrolled sources have been identified which require consideration in this report.

5. Planning Applications

There have been several planning applications for residential developments within the last year which required air quality assessments due to the introduction of new receptors or increased emissions due to additional vehicle movements. None of the assessments predicted significant adverse air quality impacts or new exceedances of the objectives. The most significant of these is a residential development for around 500 units located in the Carmyle area of Glasgow (Planning reference: 17/02961/DC). The air quality assessment of this development indicated minor adverse impacts at a small number of local receptors in terms of NO_2, PM_{10} and $PM_{2.5}$. However, modelled pollutant concentrations were significantly below the relevant air quality objective levels.

A planning application and associated air quality assessment has been submitted in respect of a proposed plastic recycling facility at Fifty Pitches Rd. This assessment has been rejected due to not considering the major air pollution source from the development and the application has also been recommended for rejection by SEPA due to insufficient information regarding the permissible nature of the processes within the application. The developers have indicated that a new assessment will be submitted addressing these issues and this will be considered once available.

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

Automatic analyser and diffusion tube monitoring indicates that concentrations of NO_2 are likely to continue to exceed the NO_2 Annual Mean Objective at locations within the existing City Centre AQMA.

There were no exceedences of this Objective within the existing Byres Road/Dumbarton Road and Parkhead Cross AQMA's. Nor at any other location outwith the City Centre AQMA. Proposals to revoke the AQMA currently in place in respect of the Annual Mean Objective for NO2 at Parkhead Cross will be prepared for committee approval later in 2019. It is not considered that any further amendment to the remaining AQMA's is necessary or that any new areas require more detailed investigation.

There were no exceedances of the NO_2 Hourly Mean Objective at any of the automatic monitoring stations; one diffusion tube within the City Centre AQMA produced an annual mean concentration in excess of 60$\mu g/m^3$. Consideration has been given to proceeding to the revocation of this AQMA. However this decision will now be delayed pending review of the impact of proposed traffic changes around Central station (Sept 19) which may impact on hourly NO_2 concentrations in this area. No further amendment to this AQMA is necessary nor any new areas identified that require more detailed analysis.

There were no exceedances of the PM_{10} Annual Mean Objective. Proposals to revoke the AQMA currently in place in respect of the Annual Mean Objective for PM_{10} at Byres Road/Dumbarton Road will be prepared for committee approval later in 2019.

It is not considered that any amendment to the remaining AQMA is necessary or that any new areas require more detailed investigation.

There were no exceedances of the PM_{10} 24hour Mean Objective, neither did the 90^{th} percentile value from those sites with <90% data capture indicate that this objective would have been exceeded.

There were no exceedances of the $PM_{2.5}$ Annual Mean Objective.

6.2 Conclusions relating to New Local Developments

No new local developments have been identified which require consideration in this report.

6.3 Proposed Actions

Proposals to revoke the AQMA's currently in place in respect of the Annual Mean Objective for NO_2 at Parkhead Cross and the Annual Mean Objective for PM_{10} at Byres Road / Dumbarton Road will be prepared for committee approval later in 2019.

During 2019 Glasgow will proceed in partnership with the Scottish Government to deliver Scotland's first Low Emission Zone (LEZ). From 31 December 2018 the LEZ requires that 20% of bus journeys through the city centre meet the Euro VI emission standard. This target is to be increased by 20% each year leading to all vehicles entering the zone, including private cars, being fully compliant by the end of 2022.

It is anticipated that work will commence on a revised Air Quality Action Plan later in 2019.

Appendix A: Monitoring Results

Table A.2 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
GLA4	Glasgow Kerbside	Kerbside	258708	665200	NO_2	City Centre	Chemiluminescent	0	1	3
GLKP	Glasgow Townhead	Urban Background	259675	665900	NO_2 PM_{10} $PM_{2.5}$ O_3	City Centre	Chemiluminescent FDMS TEOM UV Photometric	0	120	3
GGWR	Glasgow Great Western Road	Roadside	258007	666649	NO_2	No	Chemiluminescent	0	5	2
GHSR	Glasgow High Street	Roadside	260013	665346	NO_2 PM_{10} $PM_{2.5}$	City Centre	Chemiluminescent FDMS TEOM	0	3	3
GLA5	Glasgow Anderston	Urban Background	257925	665487	NO_2 PM_{10} $PM_{2.5}$	City Centre	Chemiluminescent FDMS TEOM(3)	0	40	3
GLA6	Glasgow Byres Road	Roadside	256526	666933	NO_2 PM_{10} $PM_{2.5}$	Byres Rd Dumbarton Rd	Chemiluminescent FIDAS	0	3	3
GL9	Glasgow Dumbarton Road	Roadside	255030	666608	NO_2 PM_{10} $PM_{2.5}$	Byres Rd Dumbarton Rd	Chemiluminescent FIDAS	0	3	2
GL6	Glasgow Burgher Street	Roadside	262550	664164	NO_2 PM_{10}	Parkhead	Chemiluminescent FDMS TEOM	0	3	2

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
GL1	Glasgow Abercromby Street	Roadside	260420	664175	PM_{10}	No	FDMS TEOM	0	3	2
GL3	Glasgow Broomhill	Roadside	255030	667195	PM_{10} $PM_{2.5}$	No	FIDAS(4)	0	3	2
GL2 (5)	Glasgow Nithsdale Road	Roadside	257883	662673	NO_2 PM_{10} $PM_{2.5}$	No	Chemiluminescent FIDAS	0	3	2
GLA7	Glasgow Waulkmillglen Reservoir	Rural	252461	658154	NO_2 PM_{10} $PM_{2.5}$ O_3	No	Chemiluminescent FIDAS UV Photometric	N/A	N/A	3

(1) 0 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.

(3) GLA5 FDMS TEOM (01/01/2018 to 28/11/2018), FIDAS (29/11/2018 to 31/12/2018).

(4) GL3 FIDAS (29/11/2018 to 31/12/2018).

(5) Mobile monitoring station located at Nithsdale Rd. (12/02/2018 to 31/12/2018).

Table A.3 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
CC01	George Square	Urban Background	259296	665389	NO_2	Yes	N/A	30	No
CC02	Union Street	Roadside	258828	665204	NO_2	Yes	0	3	No
CC03	Bath Street	Roadside	258374	665826	NO_2	Yes	3	3	No
CC04	Glassford Street	Roadside	259361	665252	NO_2	Yes	0	3	No
CC05	Buchanan Street	Roadside	259055	665468	NO_2	Yes	0	3	No
CC06	Castle Street	Roadside	260068	665589	NO_2	Yes	0	3	No
CC07	Hope Street 3	Kerbside	258856	665940	NO_2	Yes	N/A	1	No
CC08	Montrose Street	Roadside	259536	665313	NO_2	Yes	0	3	No
CC09	Cochrane Street	Roadside	259430	665316	NO_2	Yes	0	3	No
CC10	Renfield Street	Roadside	258896	665637	NO_2	Yes	0	3	No

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
CC11	George Street	Kerbside	259551	665380	NO_2	Yes	N/A	1	No
CC12	North Street	Roadside	257906	665672	NO_2	Yes	N/A	3	No
CC13	Hope Street 1	Roadside	258730	665322	NO_2	Yes	0	3	No
CC14	Gordon Street	Roadside	258756	665346	NO_2	Yes	N/A	3	No
CC15	Heilanmans Umbrella North	Roadside	258770	665120	NO_2	Yes	0	3	No
CC16	Saltmarket	Roadside	259545	664739	NO_2	Yes	0	3	No
CC17	High Street	Roadside	259732	664991	NO_2	Yes	0	3	No
CC18	Dobbies Loan	Urban Background	259415	666194	NO_2	Yes	0	3	No
CC20	Dundasvale Street	Urban Background	258820	666306	NO_2	Yes	0	15	No
CC21	Royston Road	Roadside	260429	666264	NO_2	Yes	5	3	No

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
CC22	St Mungo Avenue	Urban Background	259392	665866	NO_2	Yes	0	5	No
CC23	Brown Street	Roadside	258336	665122	NO_2	Yes	0	3	No
CC24	Broomielaw	Roadside	258562	664933	NO_2	Yes	N/A	3	No
CC25	McLeod Street	Urban Background	260077	665481	NO_2	Yes	0	8	No
CC26	Sauchiehall Street	Urban Background	258639	665852	NO_2	Yes	N/A	N/A	No
CC28	St Mungo's PS	Roadside	259983	665834	NO_2	Yes	10	1	No
CC29	Garnetbank PS	Roadside	258240	666033	NO_2	Yes	5	1	No
GE01	Westmuir Street	Roadside	262589	664139	NO_2	Yes	0	3	No
GE02	Hillcrest Road	Roadside	265075	662001	NO_2	No	5	3	No
GE03	Main Street (Bridgeton)	Roadside	260650	663319	NO_2	No	0	5	No
GE04	Westercraigs	Urban Background	260942	665226	NO_2	No	0	15	No

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
GE06	Sacone SW	Urban background	263920	664569	NO_2	No	0	20	No
GE07	Easterhouse	Roadside	267005	666217	NO_2	No	0	5	No
GE10	Tollcross Park	Roadside	263864	663544	NO_2	No	0	3	No
GE14	St Michaels Lane	Roadside	262472	664214	NO_2	Yes	0	3	No
GE16	Ellismuir Road	Roadside	268413	663872	NO_2	No	9	1	No
GE17	Carmyle Avenue	Roadside	264792	662418	NO_2	No	0	7	No
GE18	Barrowfield Street	Roadside	261705	663993	NO_2	No	3	1	No
GE19	Dalmarnock Station	Roadside	261013	663169	NO_2	No	N/A	1	No
GN01	Springburn Road	Roadside	260541	669268	NO_2	No	0	6	No
GN02	Kippen Street	Urban Background	259731	668488	NO_2	No	5	3	No
GN03	Ryeside Road	Roadside	261778	668122	NO_2	No	10	1	No

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
GS02	Bridge Street	Roadside	258702	664480	NO_2	Yes	3	3	No
GS04	Haggs Road	Roadside	256295	661792	NO_2	No	0	3	No
GS06	Oxford Street	Roadside	258798	664570	NO_2	No	0	3	No
GS07	Dougrie Road	Roadside	260203	659128	NO_2	No	N/A	3	No
GS08	Aikenhead Road	Roadside	259225	662579	NO_2	No	0	6	No
GS09	Langside Primary School	Roadside	257138	661617	NO_2	No	5	3	No
GS10	Paisley Road West	Roadside	255599	664313	NO_2	No	0	3	No
GS11	Sutherland Avenue	Urban Background	256343	663153	NO_2	No	10	5	No
GS12	Mallaig Place	Urban background	253989	665298	NO_2	No	20	6	No
GS13	Govanhill Street	Roadside	258678	662901	NO_2	No	3	3	No

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
GS14	Invergarrie Road	Urban Background	253821	658590	NO_2	No	5	3	No
GS16	Silverburn	Roadside	253047	661349	NO_2	No	0	5	No
GS18	Paisley Rd West 2	Roadside	257415	664616	NO_2	No	0	3	No
GS19	Hampden	Urban Background	259038	661285	NO_2	No	0	3	No
GS20	45 Clifford Street	Roadside	256262	664308	NO_2	No	0	3	No
GS21	608 Scotland Street West	Roadside	256948	664270	NO_2	No	0	1	No
GS22	17 Kilbride Street	Roadside	259732	663032	NO_2	No	0	3	No
GS23	2 Myrtle Drive	Roadside	259246	661979	NO_2	No	0	3	No
GS24	183 Crossloan Road	Roadside	254724	665407	NO_2	No	0	3	No
GS25	234 Berryknowes Road	Urban Background	253542	664443	NO_2	No	0	15	No
GS27	Battlefield Road	Roadside	258084	661642	NO_2	No	0	3	No

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
GS28	128 Mennock Road	Roadside	259871	660618	NO_2	No	0	3	No
GS30	Govan Road	Roadside	254021	665943	NO_2	No	0	2	No
GS31	Govan Road (Hospital)	Roadside	253865	666006	NO_2	No	2	2	No
GS34	1220 Govan Road	Roadside	254372	665902	NO_2	No	0	2	No
GS35	Shieldhall Road	Roadside	253554	665176	NO_2	No	0	3	No
GS36	Wallace Street	Roadside	258108	664514	NO_2	No	0	3	No
GS37	Dumbreck Road	Roadside	255477	663644	NO_2	No	7	1	No
GS45	Ben Glas Place	Urban Background	253609	659958	NO_2	No	5	1	No
GS46	Kirriemuir Avenue	Roadside	253471	663587	NO_2	No	20	1	No
GS47	1214 Paisley Road West	Roadside	254818	664109	NO_2	No	10	1	No
GW01	Dumbarton Road	Roadside	256209	666525	NO_2	Yes	3	3	No

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
GW02	Lawrence Street	Roadside	256295	666816	NO_2	Yes	5	2	No
GW04	Finnieston Street	Roadside	257235	665108	NO_2	No	N/A	3	No
GW06	Napiershall Street	Roadside	257790	666791	NO_2	No	0	4	No
GW07	Queen Margaret Drive 2	Roadside	257216	667639	NO_2	Yes	0	3	No
GW08	Queen Margaret Drive 3	Roadside	257012	667433	NO_2	Yes	0	3	No
GW09	Anniesland Cross	Roadside	254613	668886	NO_2	No	0	15	No
GW10	Balshagray Avenue	Roadside	254498	667291	NO_2	No	0	10	No
GW11	Thornwood Drive	Roadside	254903	666855	NO_2	No	0	3	No
GW12	Belmont Street	Roadside	257533	667418	NO_2	No	N/A	3	No
GW13	Glasgow Harbour	Urban Background	255287	666276	NO_2	No	0	30	No

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
GW14	Crow Road	Roadside	254640	668203	NO_2	No	0	3	No
GW15	Hyndland Road	Roadside	255764	667297	NO_2	No	0	4	No
GW16	Park Road	Roadside	257555	666896	NO_2	No	0	3	No
GW18	Maryhill Road	Roadside	257243	668285	NO_2	No	0	3	No
GW19	Scotstoun	Urban Background	253592	667771	NO_2	No	0	>10	No
GW21	Milner Road	Roadside	254456	668108	NO_2	No	0	3	No
GW22	Gibson Street	Roadside	257166	666787	NO_2	No	0	3	No
GW26	Great Western Road	Roadside	257255	667112	NO_2	No	0	3	No
GW30	South Street	Roadside	253193	667219	NO_2	No	0	2	No
GW31	Harland Street	Roadside	253139	667333	NO_2	No	2	3	No

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
GW32	Partick Bus Station	Roadside	255692	667333	NO_2	Yes	0	2	No
GW33	Great George Street	Roadside	256663	667100	NO_2	No	0	3	No
GW34	Blairdardie Road	Roadside	253080	670199	NO_2	No	8	1	No
GW35	Cadder Road	Roadside	257373	669164	NO_2	No	10	1	No
GW36	New City Road	Urban Background	258309	666457	NO_2	No	N/A	1	No
GW37	676 Dumbarton Road	Roadside	254946	666612	NO_2	No	0	1	No
GW38	1545 Dumbarton Road	Roadside	252993	667615	NO_2	No	0	5	No
GW39	Primrose Court	Roadside	253475	667289	NO_2	No	0	13	No
CCB1	Heilanman's Umbrella North	Roadside	258770	665121	C_6H_6	No	0	3	No
CCB2	Hope Street	Kerbside	258738	665167	C_6H_6	No	3	1	No

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
GWB1	Ochiltree Avenue	Roadside	254839	669295	C_6H_6	No	3	5	No
GSB1	Pollokshaws Road	Roadside	255869	661185	C_6H_6	No	3	3	No

(1) 0 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.4 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
GLA4	Kerbside (Kerbside)	Automatic	99	99	**66**	**60**	**65**	**59**	**61**
GLKP	Townhead (U Background)	Automatic	99	99	27	26	26	25	24
GGWR	Gt. Western Rd (Roadside)	Automatic	99	99	31	31	32	31	29
GHSR	High St (Roadside)	Automatic	98	98	-	32	34	35	31
GLA5	Anderston (U Background)	Automatic	82	82	18	-	20	22	24
GLA6	Byres Rd (Roadside)	Automatic	92	92	**41**	38	38	37	34
GL9	Dumbarton Rd (Roadside)	Automatic	95	95	38	**41**	**45**	**43**	34
GL6	Burgher St (Roadside)	Automatic	99	99	27	27	33	26	25
GL2	Nithsdale Road (Roadside)	Automatic	88	88	-	-	-	-	32
GLA7	Waulkmillglen (Rural)	Automatic	99	99	11	9	11	9	9

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
CC01	George Sq. (U Background)	Diffusion Tube	83	83	**41**	38	30	37	35
CC02	Union St (Roadside)	Diffusion Tube	75	75	**61**	**65 ***	**49**	**50 ***	**47**
CC03	Bath St (Roadside)	Diffusion Tube	100	100	**44**	39	40	**42**	**41**
CC04	Glassford St (Roadside)	Diffusion Tube	100	100	**46**	**42**	37	**41**	40
CC05	Buchanan St (Roadside)	Diffusion Tube	100	100	**41**	39	39	**42**	**41**
CC06	Castle St (Roadside)	Diffusion Tube	100	100	29	27	29	34	31
CC07	Hope St 3 (Kerbside)	Diffusion Tube	100	100	**52**	**48**	**43**	**45**	40
CC08	Montrose St (Roadside)	Diffusion Tube	100	100	38	35	36	36	29
CC09	Cochrane St (Roadside)	Diffusion Tube	92	92	39	34	32	39	35
CC10	Renfield St (Roadside)	Diffusion Tube	100	100	**56**	**57**	**46**	**51**	**45**
CC11	George St (Kerbside)	Diffusion Tube	67	67	**41**	39	40	40	39 *

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2014	2015	2016	2017	2018
CC12	North St (Roadside)	Diffusion Tube	83	83	30	22	23	28	30
CC13	Hope St 1 (Roadside)	Diffusion Tube	100	100	**67**	**63**	**65**	**68**	**63**
CC14	Gordon St (Roadside)	Diffusion Tube	100	100	**68**	**67**	**58**	**64**	**60**
CC15	Heilanmans Umbrella N (Roadside)	Diffusion Tube	100	100	**64**	**69**	**60**	**54**	**48**
CC16	Saltmarket (Roadside)	Diffusion Tube	92	92	37	32	31	38	27
CC17	High St (Roadside)	Diffusion Tube	92	92	**43**	40	**45**	**43**	40
CC18	Dobbies Loan (U Background)	Diffusion Tube	92	92	26	24	24	27	27
CC20	Dundasvale St (U Background)	Diffusion Tube	100	100	32	30	29	34	30
CC21	Royston Rd (Roadside)	Diffusion Tube	100	100	34	34	35	34	29
CC22	St. Mungo Ave. (U Background)	Diffusion Tube	100	100	28	28	29	32	27
CC23	Brown St (Roadside)	Diffusion Tube	83	83	27	23	24	27	29

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2014	2015	2016	2017	2018
CC24	Broomielaw (Roadside)	Diffusion Tube	92	92	**41**	**41**	37	**44**	39
CC25	McLeod St (U Background)	Diffusion Tube	100	100	30	31	31	35	31
CC26	Sauchiehall St (U Background)	Diffusion Tube	92	92	36	35	31	**41**	31
CC28	St Mungo's PS	Diffusion Tube	100	100	-	-	-	26	26
CC29	Garnetbank PS	Diffusion Tube	100	100	-	-	-	31	31
GE01	Westmuir St (Roadside)	Diffusion Tube	100	100	33	32	35	36	32
GE02	Hillcrest Rd (Roadside)	Diffusion Tube	100	100	19	16	17	20	16
GE03	Main St Bridgeton (Roadside)	Diffusion Tube	100	100	21	20	19	20	22
GE04	Westercraigs (U Background)	Diffusion Tube	75	75	20	18	17	20	21
GE06	Sacone SW (U Background)	Diffusion Tube	100	100	16	16	15	20	20
GE07	Easterhouse (Roadside)	Diffusion Tube	100	100	24	16	17	19	16

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
GE10	Tollcross Park (Roadside)	Diffusion Tube	100	100	19	16	19	20	22
GE14	St. Michaels Lane (Roadside)	Diffusion Tube	92	92	-	37	39	37	35
GE16	Ellismuir Rd	Diffusion Tube	100	100	-	-	-	20	19
GE17	Carmyle Ave	Diffusion Tube	100	100	-	-	-	34	32
GE18	Barrowfield St	Diffusion Tube	83	83	-	-	-	21	20
GE19	Dalmarnock Station	Diffusion Tube	83	83	-	-	-	22	20
GN01	Springburn Rd (Roadside)	Diffusion Tube	100	100	24	21	22	24	23
GN02	Kippen St (U Background)	Diffusion Tube	92	92	19	18	20	22	19
GN03	Ryeside Rd	Diffusion Tube	100	100	-	-	-	17	19
GS02	Bridge St (Roadside)	Diffusion Tube	100	100	31	30	31	34	30
GS04	Haggs Rd (Roadside)	Diffusion Tube	100	100	24	22	28	26	27

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
GS06	Oxford St (Roadside)	Diffusion Tube	100	100	28	25	24	31	27
GS07	Dougrie Rd (Roadside)	Diffusion Tube	100	100	16	22	18	18	18
GS08	Aikenhead Rd (Roadside)	Diffusion Tube	100	100	22	18	23	24	21
GS09	Langside PS (Roadside)	Diffusion Tube	100	100	16	15	20	15	17
GS10	Paisley Rd West (Roadside)	Diffusion Tube	83	83	29	25	27	32	26
GS11	Sutherland Ave (U Background)	Diffusion Tube	100	100	15	13	13	16	16
GS12	Mallaig Pl (U Background)	Diffusion Tube	100	100	19	19	18	19	20
GS13	Govanhill St (Roadside)	Diffusion Tube	92	92	24	23	23	26	21
GS14	Invergarrie Rd (U Background)	Diffusion Tube	92	92	14	13	14	12	13
GS16	Silverburn (Roadside)	Diffusion Tube	100	100	17	14	19	19	21
GS18	Paisley Rd West 2 (Roadside)	Diffusion Tube	92	92	33	30	32	36	36

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
GS19	Hampden (U Background)	Diffusion Tube	92	92	16	16	19	15	19
GS20	Clifford St (Roadside)	Diffusion Tube	92	92	24	24	27	29	29
GS21	Scotland St West (Roadside)	Diffusion Tube	100	100	27	27	28	33	29
GS22	Kilbride St (Roadside)	Diffusion Tube	100	100	20	20	21	25	25
GS23	Myrtle Dr (Roadside)	Diffusion Tube	100	100	18	16	20	22	20
GS24	Crossloan Rd (Roadside)	Diffusion Tube	100	100	-	22	23 *	26	23
GS25	Berryknowes Rd (U Background)	Diffusion Tube	100	100	-	22	25	25	24
GS27	Battlefield Rd (Roadside)	Diffusion Tube	100	100	-	26	29	29	26
GS28	Mennock Rd (Roadside)	Diffusion Tube	100	100	-	21	21	24	24
GS30	Govan Rd (Roadside)	Diffusion Tube	92	92	-	-	34	33	31
GS31	Govan Rd Hospital (Roadside)	Diffusion Tube	100	100	-	-	35	38	32

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
GS34	1220 Govan Rd (Roadside)	Diffusion Tube	92	92	-	-	26	28	24
GS35	Shieldhall Rd (Roadside)	Diffusion Tube	100	100	-	-	25	25	23
GS36	Wallace St	Diffusion Tube	100	100	-	-	-	40	36
GS37	Dumbreck Rd	Diffusion Tube	100	100	-	-	-	24	27
GS45	Ben Glas Pl	Diffusion Tube	92	92	-	-	-	14	15
GS46	Kirriemuir Ave	Diffusion Tube	50	50	-	-	-	16	16 *
GS47	1214 Paisley Rd West	Diffusion Tube	100	100	-	-	-	24	23
GW01	Dumbarton Rd (Roadside)	Diffusion Tube	100	100	28	26	30	33	33
GW02	Lawrence St (Roadside)	Diffusion Tube	100	100	21	19	21	24	24
GW04	Finnieston St (Roadside)	Diffusion Tube	100	100	29	26	29	29	29
GW06	Napiershall St (Roadside)	Diffusion Tube	100	100	27	27	28	28	26

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2014	2015	2016	2017	2018
GW07	Queen Margaret Dr 2 (Roadside)	Diffusion Tube	100	100	35	25	26	32	29
GW08	Queen Margaret Dr 3 (Roadside)	Diffusion Tube	100	100	33	34	30	37	32
GW09	Anniesland Cross (Roadside)	Diffusion Tube	100	100	23	23	23	27	23
GW10	Balshagray Ave (Roadside)	Diffusion Tube	100	100	31 *	24	26	28	28
GW11	Thornwood Dr (Roadside)	Diffusion Tube	100	100	18	17	19	20 *	17
GW12	Belmont St (Roadside)	Diffusion Tube	100	100	18	18	16	21	19
GW13	Glasgow Harbour (U Background)	Diffusion Tube	100	100	21	20	24	24	23
GW14	Crow Rd (Roadside)	Diffusion Tube	92	92	34	28	32	32	32
GW15	Hyndland Rd (Roadside)	Diffusion Tube	100	100	26	21	21	25	24
GW16	Park Rd (Roadside)	Diffusion Tube	92	92	28	24	27	30	29

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
GW18	Maryhill Rd (Roadside)	Diffusion Tube	92	92	34	30	28 *	33	31
GW19	Scotstoun (U Background)	Diffusion Tube	92	92	20	16	19	20	22
GW21	Milner Rd (Roadside)	Diffusion Tube	100	100	16	16	18	18	19
GW22	Gibson St (Roadside)	Diffusion Tube	100	100	27	30	28	33	27
GW26	Gt Western Rd (Roadside)	Diffusion Tube	75	75	30	25 *	30	29	30
GW30	South St (Roadside)	Diffusion Tube	100	100	-	-	25	27	24
GW31	Harland St (Roadside)	Diffusion Tube	100	100	-	-	24	23	25
GW32	Partick Bus Station (Roadside)	Diffusion Tube	100	100	-	-	26	25	26
GW33	Gt George St (Roadside)	Diffusion Tube	100	100	-	-	27	27	25
GW34	Blairdardie Rd	Diffusion Tube	100	100	-	-	-	16	15
GW35	Cadder Rd	Diffusion Tube	100	100	-	-	-	19	19

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2014	2015	2016	2017	2018
GW36	New City Rd	Diffusion Tube	92	92	-	-	-	33	31
GW37	676 Dumbarton Rd	Diffusion Tube	100	100	-	-	-	-	36
GW38	1545 Dumbarton Rd	Diffusion Tube	100	100	-	-	-	-	29
GW39	Primrose Ct	Diffusion Tube	100	100	-	-	-	-	22

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.**

(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) 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.

(4) * means have been "annualised" as (3)

Table A.5 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2014	2015	2016	2017	2018
GLA4	Kerbside (Kerbside)	Automatic	99	99	11	4	4	3	2
GLKP	Townhead (U Background)	Automatic	99	99	0	0	2	0	0
GGWR	Gt. Western Rd (Roadside)	Automatic	99	99	0(119)	0	0	0	0
GHSR	High St (Roadside)	Automatic	98	98	-	0(110)	6	0	0
GLA5	Anderston (U Background)	Automatic	82	82	0(55)	-	0	0	0(93)
GLA6	Byres Rd (Roadside)	Automatic	92	92	7 (162)	0	2	9	0
GL9	Dumbarton Rd (Roadside)	Automatic	95	95	0 (117)	0	3	0	0
GL6	Burgher St (Roadside)	Automatic	99	99	0	0	0 (141)	0	0
GL2	Nithsdale Road (Roadside)	Automatic	88	88	-	-	-	-	0
GLA7	Waulkmillglen (Rural)	Automatic	99	99	0	0(92)	0	0	0

Notes: Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold.**

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

Table A.6 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
GLKP	Townhead (U Background)	96	96	13	12	12	13	11
GHSR	High Street (Roadside)	98	98	-	16	13	13	14
GLA5	Anderston (U Background)	67	67	18	-	15	15	12
GLA6	Byres Road (Roadside)	95	95	11	10	12	13	14
GL9	Dumbarton Road (Roadside)	99	99	17	17	15	15	14
GL6	Burgher Street (Roadside)	97	97	16	16	16	12	13
GL1	Abercromby Street (Roadside)	71	71	17	14	14	14	16
GL3	Broomhill (Roadside)	100	8	15	15	15	15	12
GL2	Nithsdale Road (Roadside)	88	88	15	14	13	15	14
GLA7	Waulkmillglen (Rural)	98	98	13	11	9	11	9

Notes: Exceedances of the PM_{10} annual mean objective of 18µg/m^3 are shown in **bold.**

(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) 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.

Table A.7 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2014	2015	2016	2017	2018
GLKP	Townhead (U Background)	96	96	0(31)	0(33)	0	1	0
GHSR	High Street (Roadside)	98	98	-	0	0	0	0
GLA5	Anderston (U Background)	67	67	0(42)	-	0(22)	0(35)	0(29)
GLA6	Byres Road (Roadside)	95	95	0(24)	0	2	0	0
GL9	Dumbarton Road (Roadside)	99	99	0	3	0	3	0
GL6	Burgher Street (Roadside)	97	97	3	3	0(22)	0	0
GL1	Abercromby Street (Roadside)	71	71	0(34)	1	0	0	2(40)
GL3	Broomhill (Roadside)	100	8	0	2	2	0(38)	0(18)
GL2	Nithsdale Road (Roadside)	88	88	2(36)	1	0	0(32)	1
GLA7	Waulkmillglen (Rural)	98	98	0(22)	0(34)	0(16)	1	0

Notes: Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 7 times/year) are shown in **bold.**

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

Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
GLKP	Townhead (U Background)	94	94	7	7	7	8	7
GHSR	High Street (Roadside)	98	98	-	8	8	7	8
GLA5	Anderston (U Background)	100	9	-	-	-	-	7
GLA6	Byres Road (Roadside)	95	95	-	-	-	-	8
GL9	Dumbarton Road (Roadside)	99	99	-	-	-	-	7
GL3	Broomhill (Roadside)	100	8	-	-	-	-	8
GL2	Nithsdale Road (Roadside)	88	88	-	-	-	-	8
GLA7	Waulkmillglen (Rural)	98	98	-	-	-	-	5

Notes: Exceedances of the PM_{10} annual mean objective of 10µg/m^3 are shown in **bold.**

(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) 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.

Table A.9 – Annual Mean Benzene (C_6H_6) Monitoring Results

Site ID	Site Name (Type)	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	C_6H_6 Annual Mean Concentration μg/m³
CCB1	Heilanman's Umbrella North (Roadside)	100	100	0.8
CCB2	Hope Street (Kerbside)	100	100	0.7
GWB1	Ochiltree Avenue (Roadside)	100	100	0.7
GSB1	Pollokshaws Road (Roadside)	100	100	0.9

Notes: Exceedances of the Benzene annual mean objective of 3.25 μg/m³ are shown in **bold**.

(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 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results for 2018

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
CC01 (George Sq.)	52	47	47	43	30	32	34	30	28			45	39	33
CC02 (Union St.)	67	62	59		51	44		33	53	46		58	52	45
CC03 (Bath St.)	60	60	54	53	40	16	36	31	42	41	67	57	46	40
CC04 (Glassford St.)	61	53	54	48	39	23	46	37	35	39	48	52	45	38
CC05 (Buchanan St.)	61	52	58	51	42	34	29	36	40	26	62	56	46	39
CC06 (Castle St.)	49	42	45	38	28	25	24	22	26	33	42	42	35	30
CC07 (Hope St.3)	62	47	54	53	48	28	47	35	36	27	55	53	45	39
CC08 (Montrose St.)	47	37	42	41	18	15	26	28	29	30	39	41	33	28

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
CC09 (Cochrane St.)	30	53	44	39	16		33	33	40	42	51	51	39	34
CC10 (Renfield St.)	75	67	58	38	56	30	51	42	49	40	60	45	51	44
CC11 (George St.)	58	59	50					23	43	40	42	40	44	38
CC12 (North St.)	43	46	47	36	35	11	23	16		33		49	34	29
CC13 (Hope St.1)	90	76	90	80	60	34	61	43	69	74	93	79	71	61
CC14 (Gordon St.)	82	77	61	75	70	37	62	45	55	80	91	76	68	58
CC15 (HUN)	67	59	64	70	54	31	51	48	56	41	60	49	54	47
CC16 (Saltmarket)	43	45	43	31	27	13	30	25	28	14		40	31	27
CC17 (High St.)	61	54	49	50	45	31	44		29	33	52	52	45	39
CC18 (Dobbies Loan)	41	41	36	33	24		19	17	22	28	39	29	30	26

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
CC20 (Dundasvale St.)	48	45	39	33	27	17	23	19	27	36	43	40	33	29
CC21 (Royston Rd.)	39	41	45	27	24	11	27	33	36	30	37	41	32	28
CC22 (St. Mungo Ave.)	48	44	32	31	20	10	26	26	26	34	33	35	31	26
CC23 (Brown St.)	48	38	29	30	24	13			37	31	41	37	33	28
CC24 (Broomielaw)	60	55	53	47	41	25	33		42	29	44	55	44	38
CC25 (McLeod St.)	46	48	42	39	35	19	31	25	27	23	44	46	35	30
CC26 (Sauchiehall St.)	52	47	46	45	30	18	26	14	21		46	44	35	30
CC28 (St. Mungo's PS)	43	32	58	32	14	8	12	17	14	34	41	44	29	25
CC29 (Garnetbank PS)	47	45	39	37	30	15	24	26	23	33	51	45	35	30
GE01 (Westmuir St.)	49	47	45	34	31	14	37	22	30	44	39	44	36	31

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
GE02 (Hillcrest Rd.)	32	27	24	21	10	7	13	7	12	17	27	27	19	16
GE03 (Main St. Bridg'n)	49	28	26	19	27	9	21	16	19	21	37	28	25	22
GE04 (Westercraigs)	34	27	26	21			14	18	16	28	31		24	20
GE06 (Sacone SW)	29	28	24	18	38	7	11	15	16	24	26	31	22	19
GE07 (Easterhouse)	30	23	17	17	15	6	13	17	14	13	23	27	18	15
GE10 (Tollcross Pk.)	32	34	27	22	14	8	24	27	14	28	33	33	25	21
GE14 (St. Michaels L.)	37	49	53	34	43	11	40		33	32	54	41	39	33
GE16 (Ellismuir Rd.)	34	29	22	18	15	11	18	17	16	25	30	23	21	18
GE17 (Carmyle Ave.)	46	47	41	35	32	16	24	25	33	37	51	44	36	31
GE18 (Barrowfield St.)	36		22	24	17	7	19	12		30	34	29	23	20

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
GE19 (Dalmarnock Stn.)	36		31	21	20	7	19	17	19	29		30	23	19
GN01 (Springburn Rd.)	42	35	34	27	26	9	15	15	15	27	36	31	26	22
GN02 (Kippen St.)	35	31	26		18	4	12	18	14	19	27	33	21	18
GN03 (Ryeside Rd.)	31	38	24	18	15	6	13	11	15	24	27	31	21	18
GS02 (Bridge St.)	44	53	43	42	31	14	30	25	26	30	48	26	34	29
GS04 (Haggs Rd.)	49	46	38	29	23	19	22	17	20	16	41	41	30	26
GS06 (Oxford St.)	55	42	33	30	18	13	27	21	27	34	35	34	31	26
GS07 (Dougrie Rd.)	43	26	20	22	12	10	17	12	11	16	27	23	20	17
GS08 (Aikenhead Rd.)	36	43	26	30	9	10	15	13	17	24	35	28	24	20
GS09 (Langside PS)	37	27	24	19	13	11	10	12	11	17	29	26	20	17

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
GS10 (Paisley Rd. W)	42		35	33	18	12	26	21	26		42	40	29	25
GS11 (Sutherland Ave.)	50	25	18	17	15	4	9	6	9	12	24	24	18	15
GS12 (Mallaig Pl.)	33	33	20	22	17	12	15	9	17	24	31	38	22	19
GS13 (Govanhill St.)		36	30	26	21	11	16	13	13	28	35	35	24	21
GS14 (Invergarrie Rd.)	27	22	18	13	10	8	9	7		7	18	19	14	12
GS16 (Silverburn)	46	26	28	20	21	17	13	18	11	21	34	27	23	20
GS18 (Paisley Rd. W 2)	50	55	49		34	20	31	28	27	42	60	48	40	35
GS19 (Hampden)	37	28	22	18	14	22	3		10	19	35	29	21	18
GS20 (Clifford St.)	50	46	37	33	20	19		19	24	32	42	41	33	28
GS21 (Scotland St. W)	46	41	34	32	24	11	29	27	20	37	46	40	32	28

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
GS22 (Kilbride St.)	47	35	27	30	18	19	21	15	26	29	31	34	28	24
GS23 (Myrtle Dr.)	49	29	23	23	17	13	13	11	17	22	31	17	22	19
GS24 (Crossloan Rd.)	34	37	28	28	22	12	17	14	10	30	38	43	26	22
GS25 (Berryknowes Rd.)	39	38	33	31	20	7	18	16	16	27	44	35	27	23
GS27 (Battlefield Rd.)	47	45	41	32	29	10	21	2	17	32	39	39	29	25
GS28 (Mennock Rd.)	51	35	31	28	20	14	18	15	14	25	48	30	27	24
GS30 (Govan Rd.)	46	40	36	35		10	28	30	25	44	45	40	34	30
GS31 (Govan Rd. Hosp.)	51	41	44	41	34	12	30	21	33	40	47	43	36	31
GS34 (1220 Govan Rd.)	42	36	25	31		13	16	15	26	30	37	33	27	24
GS35 (Shieldhall Rd.)	45	39	22	28	21	9	21	14	20	31	38	28	26	23

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
GS36 (Wallace St.)	48	59	47	46	38	14	33	28	40	36	58	36	40	34
GS37 (Dumbreck Rd.)	55	37	33	30	22	28	19	15	15	28	41	40	30	26
GS45 (Ben Glas Pl.)	30	21	20	17	12	7		7	7	15	26	22	17	14
GS46 (Kirriemuir Ave.)	27	21	21	18	13		8						18	16
GS47 (1214 Paisley Rd. W)	47	24	35	29	18	12	21	17	15	30	37	33	26	23
GW01 (Dumbarton Rd.)	65	46	45	42	32	16	22	25	24	33	43	48	37	32
GW02 (Lawrence St.)	54	29	35	29	23	12	13	15	19	25	33	32	27	23
GW04 (Finnieston St.)	58	42	34	35	28	15	34	18	24	21	40	46	33	28
GW06 (Napiershall St.)	37	40	38	35	32	13	18	7	22	23	45	41	29	25
GW07 (QMD2)	46	40	38	34	38	13	23	21	28	31	39	41	32	28

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
GW08 (QMD3)	54	44	42	36	17	21	31	27	31	46	44	41	36	31
GW09 (Anniesland X.)	39	36	32	29	26	9	17	14	21	22	35	38	26	23
GW10 (Balshagray Ave.)	44	40	39	32	25	14	24	21	24	36	43	36	31	27
GW11 (Thornwood Dr.)	26	27	23	19	20	11	14	14	14	19	28	23	20	17
GW12 (Belmont St.)	47	27	27	19	15	11	13	6	14	19	28	29	21	18
GW13 (Glasgow Hbr.)	40	32	30	23	25	9	20	15	18	24	36	36	26	22
GW14 (Crow Rd.)	42	47	49	35		17	25	21	22	42	52	43	36	31
GW15 (Hyndland Rd.)	32	34	37	29	41	12	16	10	17	30	34	30	27	23
GW16 (Park Rd.)	8	46	39	35	40		23	17	21	34	48	41	32	28
GW18 (Maryhill Rd.)	60	45	42	31		29	22	19	21	40	40	41	35	30

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
GW19 (Scotstoun)	44	28	30	20	16		14	11	16	25	30	36	24	21
GW21 (Milner Rd.)	27	24	24	18	14	9	14	11	17	26	28	38	21	18
GW22 (Gibson St.)	39	39	40	34	20	7	23	21	13	36	44	46	30	26
GW26 (Gt. Western Rd.)	48		46	36		16	29	21	27	40	41		34	29
GW30 (South St.)	37	32	31	27	21	8	17	17	22	31	38	35	26	23
GW31 (Harland St.)	56	32	31	23	24	19	23	16	16	30	34	36	28	24
GW32 (Partick Terminus.)	41	38	42	34	21	11	17	17	20	35	41	37	29	25
GW33 (Gt. George St.)	41	38	35	27	24	8	19	19	26	34	37	32	28	24
GW34 (Blairdardie Rd.)	31	18	19	15	12	4	14	14	13	22	23	18	17	15
GW35 (Cadder Rd.)	34	29	21	19	17	8	28	13	13	25	29	26	22	19

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
GW36 (New City Rd.)	52		41	36	20	12	21	30	33	44	54	40	35	30
GW37 (676 Dumbarton Rd.)	62	46	48	44	36	15	32	29	31	45	51	48	41	35
GW38 (1545 Dumbarton Rd.)	48	33	39	36	29	10	33	22	13	42	48	40	33	28
GW39 (Primrose Ct.)	40	27	30	24	21	10	21	18	13	25	33	34	24	21

(1) See Appendix C for details on bias adjustment

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

C.1 Air Quality Monitoring Data QA/QC

The 12 permanent monitoring stations in Glasgow form part of the Air Quality in Scotland monitoring network. Instruments are calibrated by the Local Site Operators according to the specific site guidelines, audits are carried out every six months by Ricardo Energy and Environment. All of the automatic air quality data gathered is independently ratified by Ricardo and made available for viewing by the public at the Scottish Government funded air quality website at:
http://www.scottishairquality.co.uk

This webpage also provides access to the relevant QA/QC information relevant to LAQM report requirements. The instrument UKAS calibration certification generated by the six monthly audit programme for Glasgow's monitoring stations is available here at:
http://www.scottishairquality.co.uk/laqm/certificates-calibration

Individual site statistics for each monitoring station and instrument is available here at:
http://www.scottishairquality.co.uk/laqm/statistics-pdf

For 2018 the GSS (20% TEA in Water) annual bias adjustment used was **0.89**. Note, this figure is the amended value released by Bureau Veritas (June 19). The NO_2 diffusion tubes used in Glasgow Councils NO_2 diffusion tube network are provided and analysed by GCC Scientific Services. Measured NO_2 concentrations are adjusted by an annual bias adjustment value taken from the National Diffusion Tube Bias Adjustment Factor Spreadsheet. Further information on bias adjustment and laboratory proficiency (WASP) is available here at:
http://www.scottishairquality.co.uk/laqm/tools

There is one location within the GCC network of NO_2 diffusion tube monitoring for which a distance correction was considered to be justified i.e. a single primary road source with a residential receptor set back from the measurement site. A corrected value for this location is shown in Table C.4.1 following. Information and guidance on the Nitrogen Dioxide Fall off with Distance Calculator is also available here at: http://www.scottishairquality.co.uk/laqm/tools

Table C.1 – Diffusion Tube Locations Corrected for Distance

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Distance to Relevant Exposure (m)	Measured Annual Mean (μg/m^3)	Corrected Annual Mean at Receptor (μg/m^3)
GS31	Govan Road (Hospital)	Roadside	253865	666006	2	31	27

For 2018, data capture from two diffusion tube monitoring locations CC11 and GS46 were below 75%, results from these locations have been annualised in Table A.3, in line with the method outlined in LAQM TG16 Box 7:10 Annualising NO2 Diffusion Tube Monitoring Data.
http://www.scottishairquality.co.uk/laqm/technical-guidance

Appendix D Air Quality Action Plan Summary

Table D.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
1	Vehicle Idling Council will expand programme of vehicle idling enforcement	Public Information	Regular scheduled patrols to enforce and/or educate regarding vehicle idling	2003 onwards	Low	Council continues to promote awareness and benefits in regard to reduction of vehicle idling via billboards and advertising campaign on PSV vehicles, around schools and bus stops.	Ongoing
2	Emission Testing	Public Information	Council will continue a programme of roadside emission testing	2003 onwards	Low	40000+ vehicles tested	Ongoing
3	Low Emission Zones	Promoting Low Emission Transport	The Council will undertake a detailed feasibility study with a view to introducing LEZs in Glasgow	2009 / 2009-2010	Medium	Feasibility study into LEZs in Glasgow was completed in 2010.	Completed 2010
3	Low Emission Zones	Promoting Low Emission Transport		2014	Medium	Trial of LEZ camera technology completed.	Completed 2014

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
3	Low Emission Zones	Promoting Low Emission Transport	Cleaner Air for Scotland (CAFS) National Low Emission Framework (NELF)	2015 / 2022	Medium	2016 CAFS Progress Report published --- LEZ received committee approval in 2017/18 --- Traffic Regulation Condition application submitted. --- Glasgow City Council have agreed to implement Scotland's first LEZ in an area broadly equivalent to the city centre AQMA. --- From December 2018 Phase 1 of the LEZ requires that 20% of bus journeys through the city centre meet the Euro VI emission standard.	2022

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
4	Cleaner Taxis	Vehicle Fleet Efficiency	Council will prepare an emissions strategy to reduce emissions from taxi and private hire vehicles Proposals to limit the maximum age and increase the emission testing frequency for taxis researched and discussed with interested parties	2009 /	Low / Medium	Taxis have been preferentially selected for roadside emissions testing. ----- Liaison with Taxi Operators Association and Licensing authority with regard to emission limits, maximum age and eco-driver training. -------- Glasgow Taxi's Group covering 885 taxi and private hire vehicles has joined the Glasgow Eco Stars scheme	Ongoing
5	Council Workplace Travel Plan	Promoting Travel Alternatives	Council will prepare a workplace travel plan for all employees	2009 / 2011	Low	The travel plan has been completed, however it is a living document, tasks have no finite life span	Ongoing

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
5	Council Workplace Travel Plan	Promoting Travel Alternatives	Travel Plan was relaunched in an updated form.	2014	Low	Cycling Infrastructure improvements --- Lift share, car share facility for GCC --- Pool bike scheme Site Bike Scheme --- Cycle to work scheme --- Improvements at council premises including secure parking facilities.	Ongoing

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
6	Car Clubs	Alternative to Private Vehicle Use	The Council will make on street spaces available for car club vehicles.	2009 / 2010 Onwards	Low	Car club has 41 vehicles including 5 full electric vehicles including an EV Van in operation within Glasgow located on street in council provided bays. ---------- 2018/19 saw a focus on creating additional users / memberships for the scheme, together with the bidding for funding to provide additional electric vehicles at housing association sites. This has been successful and will see and additional 19 EV's become available at new locations for public use.	Ongoing

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
7	Public Service Vehicles	Vehicle Fleet Efficiency	The Council will pursue the use of traffic regulation conditions to control bus emissions within AQMAs. The Quality Partnership Scheme in the city requires that buses have to meet set emission standards by pre-agreed dates on certain routes.	2009 / 2012	Medium	From January 2014 100% of each operator's streamline journeys within Glasgow City boundary will be operated with vehicles meeting EURO III emission engine standard for particulates (PM10). ---------- From June 2014 a minimum of 20% of total scheduled journeys within City Centre AQMA to be operated with vehicles meeting full Euro IV emission standards.	2019

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
7	Public Service Vehicles	Vehicle Fleet Efficiency	The Council will pursue the use of traffic regulation conditions to control bus emissions within AQMAs. The Quality Partnership Scheme in the city requires that buses have to meet set emission standards by pre-agreed dates on certain routes.	2009 / 2015	Medium	The implementation of the Fastlink route linking the City Centre and the new Southern General Hospital introduced emission standards. Initially Euro IV or V. becoming a minimum of Euro V on all sections by 2018.	2021
7	Public Service Vehicles	Promoting Low Emission Transport	Glasgow City Council have agreed to implement Scotland's first LEZ in an area broadly equivalent to the city centre AQMA.	2016 / 2022	Medium	From December 2018 Phase 1 of the LEZ requires that 20% of bus journeys through the city centre meet the Euro VI emission standard.	2022

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
8	Boiler Emissions	Promoting Low Emission Plants	The Council will raise awareness and provide information to assist in energy efficiency in the home and workplace	2010 / 2011 onwards	Low	Biomass Guidance produced 2011 addressing boiler emissions --- Glasgow Home Energy Advice Team (G-HEAT) has been established to provide independent advice on energy related issues to householders in the city --- Attention of developers continues to be drawn to biomass guidance at the planning stage	Ongoing
9	Planning Guidance	Policy Guidance and Development Control	The Council will produce revised planning guidance	2010 / 2012	Medium	Guidance complete and available on council website	

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
9	Planning Guidance	Policy Guidance and Development Control	Glasgow City Council is in the process of replacing its current Planning Guidance with more formal Supplementary Planning Guidance in respect of air quality (SPG).	2015 /	Medium	Preparation of Consultation Document Ongoing	Ongoing
10	Air Quality Information	Public Information	The Council will provide data and information regarding current and longer term air quality monitoring on our web site and at variable message signs throughout the city	2010 / 2012 ongoing	Low	All air quality review and assessment reports are available on the GCC website. Further reports, guidance documents and links to be added when complete. --------- Daily Update of Air Quality Data now also published on the GCC website. ------- Appropriate VMS messaging now in place on Transport Scotland motorway VMS network.	Ongoing

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
10	Air Quality Information	Public Information	The Council will provide data and information regarding current and longer term air quality monitoring on our web site and at variable message signs throughout the city	2016	Low	The Council secured funding to install two CityTrees in city centre Air Quality Management Area. These installations contain information on and links to air quality information sources. -------- Recurring issues with irrigation and connectivity contributed to repeated die back of the plants and for now these installations have been removed.	2017
11	Construction Sites	Policy Guidance and Development Control	The Council will produce a code of practice for construction / demolition contractors	2011 / 2012	Low	Guidance produced and available on Council web site	2012

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
12	Fire Reduction	Public Information	The Council will investigate multi agency strategic level actions aimed at reducing the number of fires and harmful emissions	2011	Low	The Council have promoted and facilitated educational visits to schools to highlight the dangers of fires and fire starting to children.	2011
13	Cycling Strategy	Promoting Travel Alternatives	Air Quality grants will be sourced for funding cycling improvements in the city.	2011 / 2012 Ongoing	Low	Grants have been obtained from Scottish Govt. and used for provision of cycling infrastructure such as bike shelters and stances across the city. Continued investment in cycling infrastructure including community centred projects, secure bike storage at schools and investment in the Permeable Streets programme	Ongoing

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
14	Bus Retro-fit Scheme	Promoting Low Emission Transport	Grant funding to retro-fit Buses with new exhaust tech to reduce harmful emissions. Grant of ~ £250k agreed from Scottish Government Discussions with bus operators / SPT / Retrofit companies and procurement	2011 / 2014	Low	Follow up proposals rejected by bus companies. Funding redirected towards joint purchase with SPT of 2 fully electric buses for use on Route 100 to Transport museum.	Completed
15	Tree Planting		The Council will investigate the potential for a programme of tree planting as a means of city centre PM10 reduction	/ 2016	Low	Programme of tree planting within the city continues with particular impact focussed on the City Deal funded Avenues programme.	Ongoing
16	CARBOTRAF	Traffic Management	EU funded project to bring about real-time reduction in traffic pollution through active traffic management.	2011 / 2014	Low	Demonstrator in two cities to show relationship between black carbon and real time traffic management .	Completed

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
17	Promote Greener Vehicles		The Council will investigate the potential for reduced rate street parking for electric and hybrid vehicles	2012 / 2012	Low	Glasgow City Council has introduced a network of public charging points, presently 93 each point is capable of simultaneously charging 2 vehicles. Charging points have also been provided within council car parking facilities. Parking charges apply in line with local restrictions however GCC will continue to supply the electricity free of charge.	Ongoing

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
18	Leading by Example		The Council will demonstrate best practice in the operation of its vehicle fleet The Council have introduced a fleet of electric vehicles through a government backed scheme and trained staff in the efficient use of these vehicles.		Low	Expanded the use of electric vehicles within the fleet including new Nissan Leaf vehicles. ------- 'Fuel Efficient Driver' training undertaken by members of staff, who regularly drive on business. ------ Council currently has a total of 18 electric vehicles.	Ongoing

Measure No.	Measure	Category	Focus	Planning and Implementation Phase	Target Pollution Reduction in the AQMA	Progress to Date	Completion Date
18	Leading by Example		The Council will demonstrate best practice in the operation of its vehicle fleet The Glasgow ECO Stars Fleet Recognition Scheme is being promoted by Glasgow City Council. The scheme is designed to raise awareness with both public and private organisations of the important role they can play in helping to improve air quality	2014	Low	The scheme has been operating since September 2014 and has currently recruited almost 200 members encompassing approximately 8000 fleet vehicles including two of the largest bus companies operating within Glasgow. Glasgow Taxi's Group covering 885 taxi and private hire vehicles has joined the Glasgow Eco Stars scheme.	Ongoing

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
LEZ	Low Emission Zone
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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