Item 2

24th September 2024

Glasgow City Council

Net Zero and Climate Progress Monitoring City Policy Committee

Report by Executive Director of Neighbourhoods Regeneration and Sustainability

Contact: Gavin Slater Ext: 78347

ANNUAL PROGRESS REPORT ON AIR QUALITY

Purpose of Report:

To provide Committee with Glasgow's 2024 Annual Progress Report on Air Quality.

Recommendations:

The Committee is asked to note:

(a) The content of this report on air quality in the city;
(b) The new data available on pollution levels;
(c) The initial appraisal of the impact of the Glasgow Low Emission Zone on pollution levels; and
(d) The trends in concentrations of nitrogen dioxide.

Ward No(s):	Citywide: ✓
Local member(s) advised: Yes ☐ No ✓	consulted: Yes ☐ No ✓

1. Introduction

1.1 This report presents the findings of Glasgow City Council's Annual Progress Report (APR) on air quality, including an overview of data and trends in air quality across the city in the 2023 calendar year. The full report is provided in Appendix A.

1.2 The Environment Act 1995, which implemented EC Directive 96/62, requires that local authorities regularly review and assess the air quality within their area of responsibility. This review and assessment process is the basis of Local Air Quality Management (LAQM). It is intended to compare current and future concentrations of key air pollutants against the objectives detailed in the regulations.

1.3 In accordance with LAQM requirements, the APR considers monitoring data available since the last round of review and assessment (Air Quality Progress Report 2023), as well as assessing the impact from various potential sources of pollution, such as any major new developments.

2. Background

2.1 Previous rounds of the LAQM review and assessment process have seen Glasgow declare Air Quality Management Areas (AQMA). A local authority is required by law to declare an AQMA where air quality objectives are not being met. In Glasgow these have been due to elevated levels of the air pollutants nitrogen dioxide (NO_2) and particulate matter (PM_{10}).

2.2 The main source of air pollution produced within the city itself comes from road traffic. Airborne particulate matter is more heavily influenced by non-local effects such as prevailing wind conditions over which the city has no control. This pollutant can be transported from continental Europe and beyond. Nitrogen dioxide, however, is more directly attributable to local traffic volumes and engine type – and in particular to diesel engines, which emit comparatively more nitrogen dioxide than petrol engines.

2.3 To date the city has declared four AQMAs, as follows:

- City Centre (NO_2 and PM_{10}) – declared in 2002.
- Parkhead Cross (NO_2) – declared in 2007 and revoked in 2020.
- Byres Road/ Dumbarton Road (NO_2 and PM_{10}) – declared in 2007. Amended in 2020 to remove PM_{10}. Fully revoked in 2024.
- City-wide (PM_{10}) – declared in 2012 and revoked in 2016.

3. Actions to Improve Air Quality

3.1 In response to the implementation of the AQMAs in the city, Glasgow City Council produced Air Quality Action Plans (AQAP) in 2004 and 2009, introducing a range of measures aimed at reducing pollution in the city. The Action Plans considered several measures such as vehicle idling enforcement, vehicle emission testing and initiatives towards cleaner vehicles. Other measures such as sustainable transport initiatives and public information promotion have been incorporated into the reporting process. Progress on actions is reported within the APR in section 2.3.

3.2 A table outlining progress of the Air Quality Action Plan measures in 2022 can be found in Table 2.2 of the APR.

3.3 Following revised guidance and direction from the Scottish Government, a new AQAP was produced and approved by the City Administration Committee on 25th April 2024. Progress on the actions detailed within this updated plan will be reported in future APRs.

3.4 As a result of progress made to address pollution levels, the Citywide AQMA for PM_{10} was revoked in 2016 and the Parkhead Cross AQMA for NO_2 was revoked in 2020 following a prolonged period of achieving the relevant air quality objectives. The Byres Rd / Dumbarton Rd AQMA was amended in 2020 to remove the PM_{10} component and revocation of the NO_2 element, and the entire AQMA, was completed in 2024.

3.5 These developments provide evidence that improvements in air quality continue to be achieved within Glasgow. Currently, the City Centre AQMA remains the only active AQMA in the city.

4. Air Quality Update

4.1 Air quality is a devolved matter, and the Council therefore works to measure and achieve hourly, daily and annual objectives on various pollutants which have been set by the Scottish Government. The full list of air quality objectives can be found in Table 1.1 of the APR. The APR represents the Council's submission on both the current levels of these pollutants and the efforts made to reduce these and achieve full compliance.

4.2 An update on the main pollutants of concern can be summarised as follows:

4.2.1 Particulate Matter (PM_{10})

Levels of PM_{10} recorded across the city in 2023 were satisfactory with both the daily mean and annual mean objectives being met at all monitoring locations. Annual mean concentrations recorded at ten automatic monitoring stations ranged from 8.2ug/m^3 to 12.0ug/m^3 against an objective level of 18ug/m^3. No days recorded a daily mean above 50ug/m^3 in 2023. This continued the trend

of compliance in respect of this pollutant. It should be noted that the Scottish annual mean objective for this pollutant is set at just under half that of the UK and EU limits. The city therefore continues to perform well in this area.

4.2.2 Particulate Matter ($PM_{2.5}$)

Levels of $PM_{2.5}$ recorded across the city in 2023 were satisfactory with the annual mean objective being met at all monitoring locations. Annual mean concentrations recorded at nine automatic monitoring stations ranged from 4.4ug/m^3 to 6.5ug/m^3 against an objective level of 10ug/m^3. As ultra-fine particulate pollution is considered to be a pollutant with significant impact on human health, the city is also performing well in this respect.

4.2.3 Nitrogen Dioxide (NO_2)

Monitoring of NO_2 is undertaken using a combination of both automatic monitoring stations and diffusion tubes. Use of diffusion tubes allows the monitoring of this pollutant at more locations than is economic or practical using automatic stations. Although less accurate that the reference level automatic monitors, this accuracy is improved by use of monthly monitoring to compare against the annual mean objective and by the colocation of diffusion tubes and correction for 'bias'. Levels of NO_2 in 2023 at all automatic monitoring stations were below the objective levels, continuing the trend of compliance observed in 2022. However, it should be noted that the compliance recorded at Glasgow Kerbside (Hope St - see Figure 1 below) remains marginal, recording an annual mean of 39.0ug/m^3 against an objective level of 40ug/m^3.

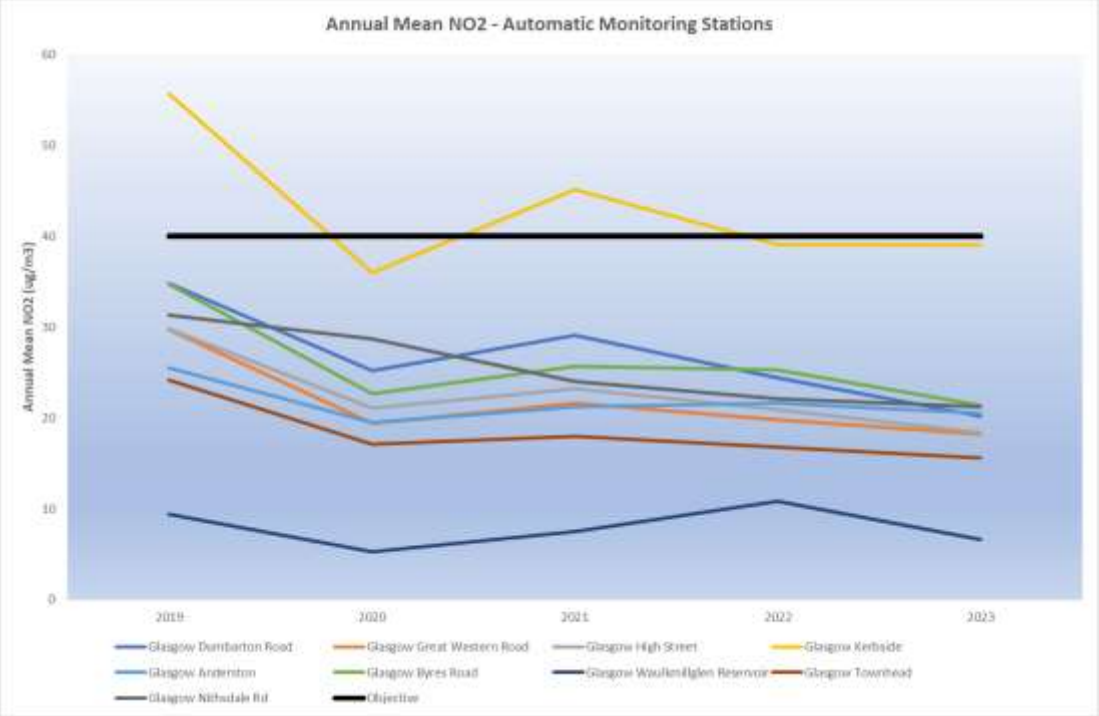
Exceedances of the annual mean objective in 2023 were recorded in monitoring conducted by diffusion tube at two locations (discussed further in section 5.5), down from four locations in 2022. One further location was within 10% of the objective, down from three in 2022.

The hourly mean objective for this pollutant is set at 200ug/m^3 with 18 hours above this level permitted before an exceedance is considered to have been made. No hourly mean levels above 200ug/m^3 were recorded at any of the monitoring stations in 2023.

4.2.4 NO_2 Trends

Levels of NO_2 pollution have been on a downward trend in recent years as a result of improvements in vehicle emissions and the phased introduction of the Glasgow LEZ for scheduled bus services since 2018. NO_2 levels dropped significantly in 2020 due to pandemic restrictions, before increasing in 2021 as these restrictions lessened. However, most automatic stations recorded a slight decrease in NO_2 levels between 2021 and 2022, maintaining a significant decrease on the pre-pandemic levels. These levels fell further in 2023. Figure 1 below shows the trend at automatic stations between 2019 and 2023.

Figure 1: Trends in annual mean NO_2 at selected automatic monitoring stations



4.2.5 City Centre NO_2 Trends

Table 1 below shows results from the city centre monitoring using NO_2 diffusion tubes. NO_2 levels have seen a downward trend, and this accelerated significantly in the pandemic affected year of 2020, where all but one location recorded levels below the annual mean objective. As pandemic restrictions eased in 2021, all but three locations recorded rising levels of NO_2, with two locations exceeding the objective level for this year.

As pandemic restrictions eased further in 2022, NO_2 levels continued to rise as did the number of locations exceeding the annual mean objective.

However, diffusion tube monitoring in 2023 observed a significant reduction in NO_2 levels recorded. The average reduction between 2022 and 2023 within the city centre and the Glasgow Low Emission Zone (which began enforcement on 1st June 2023) was 20.0%. Whilst NO_2 levels reduced across the city, the average reduction for locations outside the city centre was 15.3%.

Table 1: Monitoring results from city centre locations during the period 2019 – 2023

Site ID	Site Name	2019	2020	2021	2022	2023	% reduction 2022 to 2023
CC01	George Square	32.4	19.4	25.0	29.9	22.6	24.4
CC02	Union Street	**47.1**	25.8	37.5	38.4	31.4	18.2
CC03	Bath Street	38.6	23.3	31.7	36.2	29.7	18.0
CC04	Glassford St	**40.1**	24.9	28.6	34.3	30.7	10.5

Site ID	Site Name	2019	2020	2021	2022	2023	% reduction 2022 to 2023
CC05	Buchanan St	38.0	23.9	25.9	32.7	26.5	19.0
CC06	Castle Street	29.2	20.1	24.3	27.5	22.2	19.3
CC07	Hope Street 3	**40.3**	23.4	35.2	**40.4**	35.1	13.1
CC08	Montrose St	28.2	19.1	22.3	27.0	20.3	24.8
CC09	Cochrane St	35.2	21.9	28.6	29.9	22.9	23.4
CC10	Renfield Street	**41.7**	28.2	33.1	38.6	30.3	21.5
CC11	George Street	32.1	18.1	24.6	29.7	25.8	13.1
CC12	North Street	26.9	20.6	19.3	22.8	19.8	13.2
CC13	Hope Street 1	**55.5**	**40.3**	**43.5**	**44.9**	39.0	13.1
CC14	Gordon Street	**58.8**	36.3	**40.2**	**50.0**	**42.1**	15.8
CC15	Hielanman's Umbrella North	**52.1**	26.9	35.6	**42.3**	**40.9**	3.3
CC16	Saltmarket	30.8	23.0	26.2	31.8	21.2	33.3
CC17	High Street	**42.0**	25.9	25.3	34.8	25.7	26.1
CC18	Dobbies Loan	22.9	18.7	21.8	23.6	17.9	24.2
CC20	Dundasvale St	28.2	20.6	24.0	24.5	20.6	15.9
CC21	Royston Road	28.6	21.4	23.8	28.8	21.5	25.3
CC22	St Mungo Ave	25.7	19.9	21.0	23.7	19.6	17.3
CC23	Brown Street	24.3	16.7	19.3	21.0	15.7	25.2
CC24	Broomielaw	36.7	22.5	31.8	36.2	26.7	26.2
CC25	McLeod Street	29.6	22.2	22.1	29.3	20.7	29.4
CC26	Sauchiehall St	31.7	21.2	23.8	28.5	23.4	17.9
CC28	St Mungo's PS	24.0	18.6	14.7	19.2	14.6	24.0
CC29	Garnetbank PS	29.3	21.3	21.6	23.1	18.2	21.2

**Exceedances of annual mean shown in bold.

Table 2 and Figure 2 below show those monitoring locations which were exceeding or within 10% of the annual mean objective in the last full pre-pandemic year of 2019 and the results for these locations in the subsequent years. Diffusion tube results show a clear upward trend since the pandemic affected year of 2020 with all locations showing increases between 2021 and 2022. This is then followed by a significant decrease in 2023 as the enforcement of the Glasgow LEZ begins.

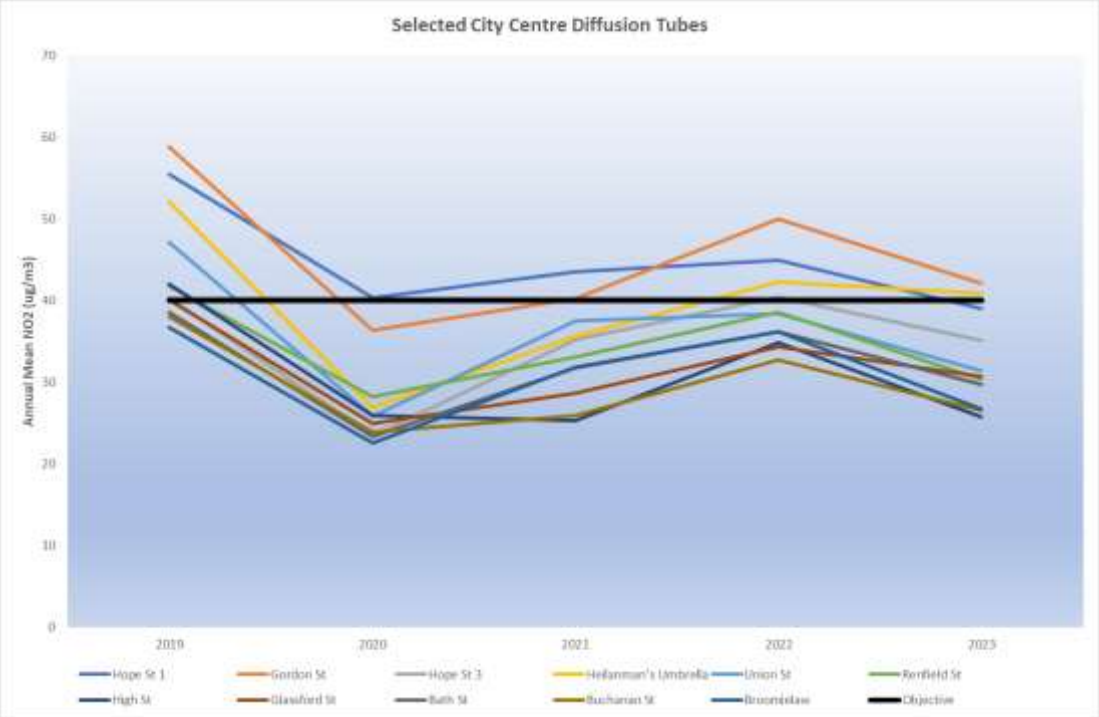
Table 2: Selected monitoring results from city centre locations exceeding or within 10% of the objective during the period 2019 – 2023

Site ID	Site name	Location Description	Annual Mean NO_2 (µg/m^3)				
			2019	2020	2021	2022	2023
CC13	Hope St 1	Road canyon – next to taxi rank	**55.5**	**40.3**	**43.5**	**44.9**	**39.0**
CC14	Gordon St	Road canyon – next to taxi rank	**58.8**	**36.3**	**40.2**	**50.0**	**42.1**
CC07	Hope St 3	Road canyon – general traffic	**40.3**	23.4	35.2	**40.4**	35.1
CC15	Heilanman's Umbrella	Sheltered location – poor dispersion	**52.1**	26.9	35.6	**42.3**	**40.9**

Site ID	Site name	Location Description	Annual Mean NO_2 (µg/m^3)				
			2019	2020	2021	2022	2023
CC02	Union St	Bus gate – buses and commercial traffic	**47.1**	25.8	**37.5**	**38.4**	31.4
CC10	Renfield St	Road canyon – general traffic	**41.7**	28.2	33.1	**38.6**	30.3
CC17	High St	General traffic	**42.0**	25.9	25.3	34.8	25.7
CC04	Glassford St	General traffic	**40.1**	24.9	28.6	34.3	30.7
CC03	Bath St	General traffic	**38.6**	23.3	31.7	**36.2**	29.7
CC05	Buchanan St	Bus gate – buses and taxis	**38.0**	23.9	25.9	32.7	26.5
CC24	Broomielaw	General traffic	**36.7**	22.5	31.8	**36.2**	26.7

*Exceedances of annual mean shown in red. Monitoring within 10% of objective shown in bold.

Figure 2: Selected monitoring results from city centre locations exceeding or within 10% of the objective during the period 2019 – 2023



5 Glasgow Low Emission Zone

5.1 Enforcement of the Glasgow LEZ began on 1st June 2023 following the mandatory one-year grace period after formal introduction of the zone on 31st May 2022. Therefore, the 2024 APR, is the first to report on post-LEZ air quality levels.

5.2 The LEZ was enforced for seven months of the 2023 reporting period; however it should be noted that residents of the zone were subject to a further year grace period and were therefore exempt from the LEZ for this period. The Glasgow taxi fleet were also eligible for a time-limited exemption, with 776 exemptions until 31st May 2024 issued to operators.

5.3 As the Glasgow LEZ was only enforced for part of the calendar year and was not universal in scope due to the above grace periods and exemptions, it is not yet possible to determine the full impact of the LEZ on the annual mean objective from the observed 2023 monitoring results.

5.4 However, initial results from 2023 are positive, with significant reductions in the monitored levels of NO_2 recorded across the city and particularly within the area of the LEZ, as can be seen in the information provided in Section 4 above.

5.5 In 2023, two locations (CC14 & CC15) within the LEZ continued to record exceedances of the NO_2 annual mean objective. However, these were marginal, with a maximum recorded level of 42.1ug/m^3 at CC14 – Gordon St. This location is mainly used by taxis servicing Glasgow Central train station and as a result taxis are the main source of emissions in the immediate area. Taxis were also afforded additional time to move towards LEZ compliance with 778 exemptions issued for the first year of the LEZ. It should also be noted that location CC15, under the railway bridge at Heilanman's Umbrella is subject to poor dispersion and is not suitable for direct comparison with the objectives. However, as it reflects a busy area to which the public have general access, it will continue to be monitored and reported.

5.6 The Scottish Environment Protection Agency (SEPA) is undertaking an update to the air pollution dispersion modelling conducted in advance of the introduction of the LEZ. This study is expected to be completed by November 2024 and will be made available on the LEZ website. This will provide more up to date modelling of the anticipated pollution levels for a full calendar year of the operational LEZ.

6 Conclusions

6.1 Reporting of air pollution levels is a statutory function for local authorities, particularly in relation to any breaches of the air quality objectives.

6.2 Results from automatic monitoring stations in 2023 show full compliance with the relevant objectives for all pollutants, with general reductions over the levels observed in 2022.

6.3 Improvements in levels of NO_2 are of particular note, especially from monitoring locations within the city centre and LEZ. Monitoring results reflect the calendar year during which the Glasgow LEZ was in operation for a period of seven months. It is therefore expected that results from 2024, when the LEZ will have been in place for the full reporting year and apply to a wider scope of vehicles following the end of the resident's grace period and other exemptions, are likely to show further improvements.

6.4 Continued interventions to improve air quality will be required as small exceedances of the annual mean NO_2 objective continue to be recorded. LAQM Guidance states in relation to the revocation of Air Quality Management Areas, *"A minimum requirement however will normally be at least three consecutive*

years where the objectives of concern are being achieved and where monitoring data demonstrates that further exceedances of the objectives are unlikely to occur."

6.5 The Glasgow Air Quality Progress Report will be submitted to the online reporting portal for independent assessment. Monitoring and air quality action plan measures will continue and will be reported within the 2025 APR.

7 Policy and Resource Implications

Resource Implications:

Financial:	There are no new financial implications arising from the report.
Legal:	The report raises no new legal issues.
Personnel:	LAQM duties are undertaken utilising GCC personnel.
Procurement:	No relevant procurement issues.
Council Strategic Plan:	This work supports the key aims of Grand Challenge 3, Mission 2 of the Council Strategic Plan.

Equality and Socio-Economic Impacts:

Does the proposal support the Council's Equality Outcomes 2021-25? Please specify.	LAQM does not impact on any of the Council's service delivery equality outcomes
What are the potential equality impacts as a result of this report?	No significant impact from this report.
Please highlight if the policy/proposal will help address socio-economic disadvantage.	No significant impact from this report.

Climate Impacts:

Does the proposal support any Climate Plan actions? Please specify:	LAQM has many co-benefits and shared actions with the Climate Plan including actions: 22 – development of the LEZ 26 – alternative actions for bus delivery 33 – feasibility study of a Workplace Parking Levy 42 – ban of gas heating in new developments 51 - delivery of a comprehensive active travel network 52 - enable a rapid and strategic shift to electric vehicles through increasing the current rate of deployment of EV charging infrastructure 53 – support transition to cleaner public transport 54 – transition GCC fleet to electric 55 – transition private hire fleet to zero emissions by2030 56 - reduce the need to own and use a car through measures in the City Development Plan 2, Glasgow Transport Strategy and the Liveable Neighbourhoods
What are the potential climate impacts as a result of this proposal?	The APR includes an update on action plan measures, many of which have slight beneficial climate impacts.
Will the proposal contribute to Glasgow's net zero carbon target?	Measures progressed and reported within the APR have slight beneficial climate impacts, especially in relation to transport, and therefore contribute to the net zero carbon target.
Privacy and Data Protection Impacts:	No data protection or privacy implications. This report presents analysis of publicly available data and does not represent any privacy or data protection issues.

8 Recommendations

8.1 It is recommended that Committee note;

(a) The content of this report on air quality in the city;
(b) The new data available on pollution levels;
(c) The initial appraisal of the impact of the Glasgow Low Emission Zone on pollution levels; and
(d) The trends in concentrations of nitrogen dioxide.