

# Air quality monitoring results

## 2022

This document provides the results of air quality monitoring undertaken at and near to Manchester Airport in 2022. It also explains where and how we monitor air quality. Information is also provided about Government's health-based air quality objectives.

[manchesterairport.co.uk](https://manchesterairport.co.uk)



# Air quality monitoring at Manchester Airport

## Overview

We provide information about air quality and airport-related emissions on our website [www.manchesterairport.co.uk/emissionsinfo](http://www.manchesterairport.co.uk/emissionsinfo). Here you can find our Emissions Information Pack which gives information on emissions from activities associated with Manchester Airport and how they contribute to local air quality. More information about air quality is also provided in our Sustainable Development Plan. The Sustainable Development Plan sets the airport's air quality objective which is to "closely monitor local air quality and seek ways to reduce emissions from our operations".

This document summarises the results of air quality monitoring undertaken at and near to Manchester Airport in 2022. It compares measured concentrations of air pollutants against health-based air quality objectives which are set by Government.

## Methodology

We have been measuring air quality at the airport since the 1990's. We do this in two ways:

### Continuous monitoring

Automatic analysers continuously measure real-time concentrations of air pollutants. These monitors are complex to install and operate, but allow detailed analysis of air quality, where this is required. Analysers are visited by service engineers at least once a month, and are independently calibrated twice a year. We undertake continuous air quality monitoring in partnership with Manchester City Council.

The [UK-Air](#) and [Air Quality England](#) websites provide near to real-time measurements of the following pollutants:

- nitrogen dioxide (NO<sub>2</sub>)
- sulphur dioxide (SO<sub>2</sub>)
- ozone (O<sub>3</sub>)
- Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>)

We used continuous monitoring equipment to measure air quality at Styal Road (Site 10) until January 2016, when the equipment moved to Daisy Bank Lane (Site 14) due to redevelopment at the old location.

## Diffusion tubes

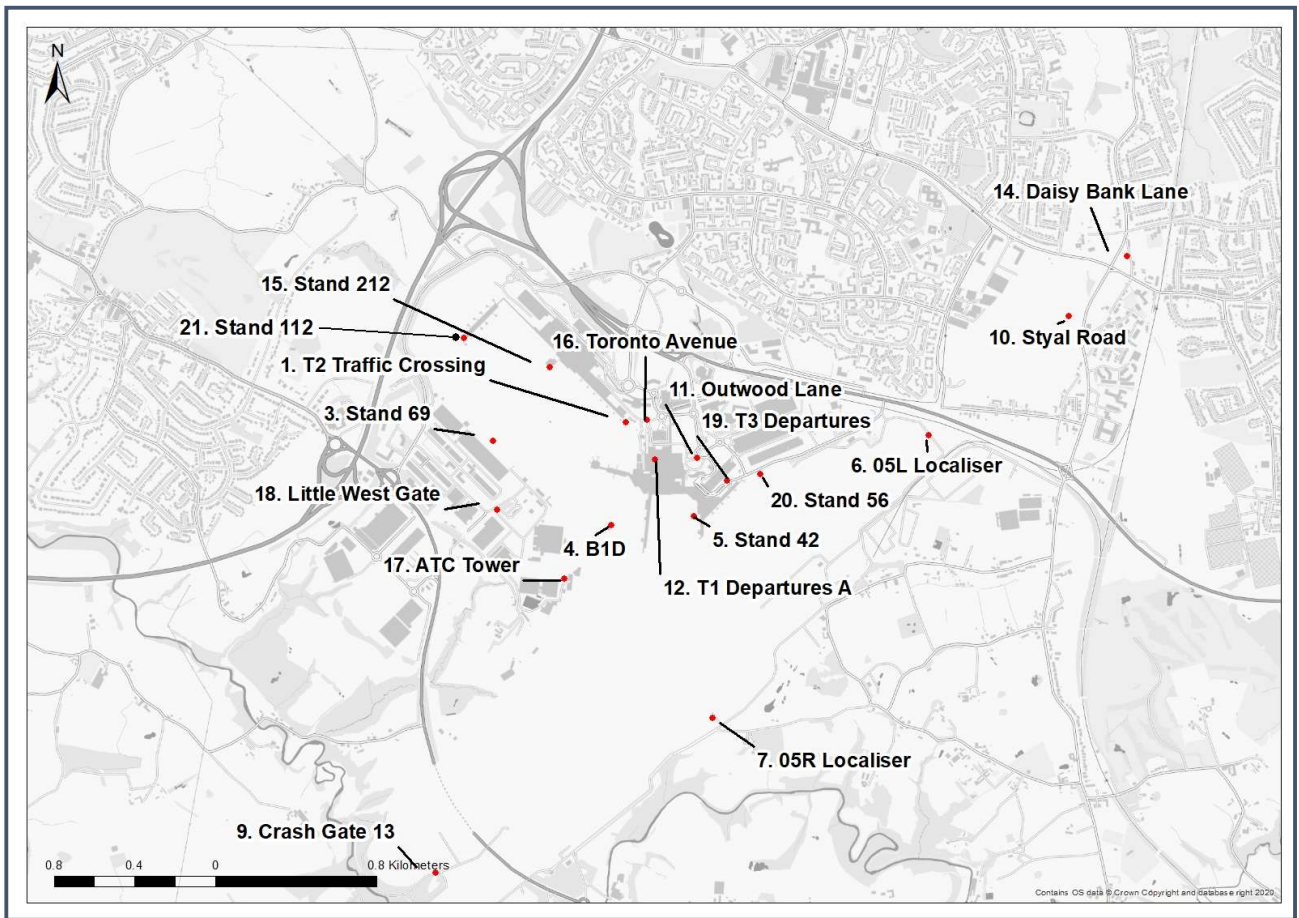
Diffusion tubes measure the average concentration of pollutants over longer periods of time. Pollutants are collected in an absorbent material within diffusion tubes which are chemically analysed at a laboratory to calculate the average concentration during the time that the tube was exposed.

Diffusion tubes are quick and easy to install compared to continuous air quality monitors. They are useful for cost effective monitoring of air quality over a long period of time. We use diffusion tubes to measure indicative concentrations of nitrogen dioxide (NO<sub>2</sub>).

We have followed Government guidance and 'bias adjusted' the diffusion tube monitoring results we publish. This means that the results can be compared to other locations. We calculate our 'local bias adjustment factor' by co-locating three diffusion tubes at the independently calibrated Daisy Bank Lane continuous monitor. The bias adjustment factor is then applied to the results of our diffusion tube monitoring. The local bias adjustment has been compared against the 'national bias adjustment factor' released by the Government's Department for Environment, Food and Rural Affairs (Defra) in April 2023. This step compares the laboratory's national diffusion tube performance against diffusion tubes co-located at the Daisy Bank Lane continuous monitoring site. The 'local bias adjustment' resulted in a factor of 0.865 and the 'national bias adjustment' is 0.76. This year we have used the local bias adjustment factor because it is considered more robust than the national bias adjustment. Following Government guidance, we also remove monitoring results which are unusually high or low. Removing 'outliers' in this way avoids annual air quality results from being skewed by unrepresentative results. Further to this, one monitoring location's monthly results was rejected due to contamination of the diffusion tube result, for example in April monitoring location 3 was found on the floor so this will not be representative. All monitoring locations presented had sufficient data capture for the year for the results to be representative of the entire year (≥75%).

## Where we measure air quality

The locations where we currently monitor air quality are shown below. Diffusion tubes are used to monitor nitrogen dioxide (NO<sub>2</sub>) at all locations. Both continuous monitoring and diffusion tubes are used at Site 14. Daisy Bank Lane.



## Air quality objectives

The Government has set health-based air quality objectives. Local authorities have a responsibility to monitor air quality and put plans in place to meet health-based objectives in areas where members of the public may spend a significant amount of time. These locations are generally homes or care homes for example. Air quality objectives do not necessarily apply in a work place, or at the airport itself as people only spend short times here.

Air quality objectives are set individually for different air pollutants. They apply to a calendar year, running from January to December. Some types of air pollution have more than one objective, although all must be met, these are often reported individually - for example:

- long-term averages which must be met over a whole year.
- short-term averages, such as hourly or daily averages, which cannot be exceeded more than a certain number of times a year.

### What are $\mu\text{g}/\text{m}^3$ ?

Air quality is measured in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). This is a measure of the weight of a pollutant in a space of air.

There are a thousand micrograms ( $\mu\text{g}$ ) in a gram, or a billion micrograms in a kilogram.

A cubic meter ( $\text{m}^3$ ) is a thousand liters of air.

One microgram per cubic ( $1\mu\text{g}/\text{m}^3$ ) meter of pollutant is a billionth of a kilogram in a thousand liters of air.

Below are the air quality objectives for the pollutants we monitor.

Pollutant	Long-term annual objective (limit as an annual average)	Short term objective(s)
Nitrogen dioxide ( $\text{NO}_2$ )	$40 \mu\text{g}/\text{m}^3$	No more than 18 cases of an hourly average $> 200 \mu\text{g}/\text{m}^3$ each year
Particulate matter ( $\text{PM}_{10}$ )	$40 \mu\text{g}/\text{m}^3$	No more than 35 cases of a daily average $> 50 \mu\text{g}/\text{m}^3$ each year
Particulate matter ( $\text{PM}_{2.5}$ )	$20 \mu\text{g}/\text{m}^3$	-
Sulphur dioxide ( $\text{SO}_2$ )	-	No more than 35 cases of a 15-minute average $> 266 \mu\text{g}/\text{m}^3$ each year No more than 24 cases of an hourly mean $> 350 \mu\text{g}/\text{m}^3$ each year No more than 3 cases of a daily mean $> 125 \mu\text{g}/\text{m}^3$ each year
Ozone ( $\text{O}_3$ )	-	Cases of 8hr mean $> 100 \mu\text{g}/\text{m}^3$ , not to be exceeded on more than 10 days each year

## Air quality monitoring results

### Impact of the COVID-19 pandemic

We have compared the results of our air quality monitoring in 2022 to one pre-covid year (2019) as this shows where post-pandemic concentrations are in compared to pre-pandemic levels. During 2022, activity at the airport was recovering following the removal of travel restrictions associated with the COVID-19 pandemic. The number of passengers using the airport in 2022 was 80% of 2019. Our comparison shows that concentrations of air pollutants decreased at all monitoring locations. The decreases ranged from 18-44%. These changes are consistent with air quality observations at other locations across the UK and likely associated with reduced activity since the COVID-19 pandemic. The average 2022 concentrations compared to 2020 show that most sites (16 of 18) experience an increase in concentrations (0 to 50%), with two locations experiencing a decrease (-2 to -14%) in NO<sub>2</sub> concentrations. There has been a 232% increase in Passenger numbers between 2020 and 2022 due to the removal of air travel restrictions. NO<sub>2</sub> Concentrations from 2022 have been compared against 2020, as this shows the change in concentrations since the first year (2020) affected by the pandemic.

### Air quality recorded this year

The results of our air quality monitoring during 2022 are outlined below. The results also show whether health-based air quality objectives apply at that location, and if they are met. A comparison between concentrations measured in 2021 and 2022 show concentrations are predominantly increasing (13 of 18 sites) between 6 to 54%, with five sites decreasing ≤-15%. The concentration changes correspond with a 283% growth in passenger numbers between 2021 and 2023 due to the removal of air travel restrictions. This is the first year that concentrations have been reported at stand 112 and this location is also compliant with the NO<sub>2</sub> annual mean. The air quality monitoring record shows that concentrations are increasing since the impact of COVID-19, but have not returned to the pre-COVID peak.

Results of nitrogen dioxide (NO<sub>2</sub>) monitoring using diffusion tubes:

Monitoring location	Recorded annual average ( $\mu\text{g}/\text{m}^3$ )	Air quality objectives apply?	Air quality objectives met?
1. T2 Traffic Crossing	35.3	No	-
3. Stand 69	24.8	No	-
4. B1D	29.9	No	-
5. Stand 42	28.6	No	-

6. 05L Localiser	16.2	No	-
7. 05R Localiser	12.0	No	-
8. 05R Glidepath	8.0	No	-
9. Crash Gate 13	13.0	No	-
10. Styal Road	13.2	No	-
11. Outwood Lane	35.7	No	-
12. T1 Departures A	45.8	No	-
14. Daisy Bank Lane	13.9	Yes	Yes
15. Stand 212	29.2	No	-
16. Toronto Avenue	35.9	No	-
17. ATC Tower	22.8	No	-
18. Little West Gate	21.6	No	-
19. T3 Departures	29.2	No	-
20. Stand 56	27.7	No	-
21. Stand 112	27.8	No	-

Results of continuous air quality monitoring:

	Recorded annual average ( $\mu\text{g}/\text{m}^3$ )	Air quality objectives apply?	Short term objective exceedances	Air quality objectives met?
Nitrogen dioxide ( $\text{NO}_2$ )	15.5	Yes	Hourly Means > $200 \mu\text{g}/\text{m}^3 = 0$	Yes
Particulate matter ( $\text{PM}_{10}$ )	12.6	Yes	Daily Means > $50 \mu\text{g}/\text{m}^3 = 0$	Yes
Particulate matter ( $\text{PM}_{2.5}$ )	7.4	Yes	N/A	Yes
Sulphur dioxide ( $\text{SO}_2$ )	1.6	Yes	15min Means > $266 \mu\text{g}/\text{m}^3 = 0$ Hourly Means > $350 \mu\text{g}/\text{m}^3 = 0$ Daily Means > $125 \mu\text{g}/\text{m}^3 = 0$	Yes
Ozone ( $\text{O}_3$ )	46.5	Yes	8hr Means > $100 \mu\text{g}/\text{m}^3$ =Within 8 Days	Yes

### Long term air quality monitoring results

Previous years monitoring data can be downloaded from our website. Using this information, you can see how air quality has changed over time.

Our website also provides links to websites where you can see detailed results of continuous air quality monitoring in Manchester and the rest of the UK. Please be aware that these websites use different names to describe our monitoring sites: Styal Road (our monitoring site 10) is called 'Manchester South'; and, Daisy Bank Lane (our monitoring site 14) is called 'Manchester Sharston'.

### Want to know more?

Our website ([www.manchesterairport.co.uk/emissionsinfo](http://www.manchesterairport.co.uk/emissionsinfo)) provides more information in a range of formats. These include information sheets, progress reports and useful internet links.

Sign up for our Community newsletter to receive regular updates on our community and noise management activity <https://forms.office.com/r/r9kP56nekC>

If you would like to talk to us you could:

- phone our Freephone number (08000 967 967);
- send an email to [community.relations@manairport.co.uk](mailto:community.relations@manairport.co.uk);