
Dublin Airport Air Quality Monitoring
Q3 2023

Sustainability Department

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Dublin Airport Air Quality Monitoring Quarter 3 Report 2023



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Glossary

Abbreviation	Definition
EPA	Environmental Protection Agency
NO	Nitrogen Oxide
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen
PM ₁₀	Airborne particulate Matter, particle size less than 10 micron.
PM _{2.5}	Airborne particulate Matter, particle size less than 2.5 micron.
AQIH	Air Quality Index for Health
The Regulations	Ambient Air Quality Standards Regulations 2011
WHO	World Health Organisation
AQG	Air Quality Guidelines

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Executive Summary

daa undertakes a programme of air quality monitoring at Dublin Airport (DAP) and in surrounding communities. Monitoring is undertaken using a stationary continuous air monitoring station located within the DAP boundary. Air quality is also monitored at 11 locations within and outside the airport boundary using passive diffusion tube sampling.

This report provides an overview of the results of air quality monitoring undertaken by daa at DAP and environs in Q3 2023. Air monitoring locations are listed in Table 2 and presented as Figure 1 of this report.

The Ambient Air Quality Standards Regulations 2011 (the Regulations), S.I. No. 180 of 2011, implement EU Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe. The Regulations are referred to in this report for comparison purposes only. There is no requirement under the Regulations for individual companies or operators to carry out air monitoring. In Ireland, compliance with the Regulations is the responsibility of the Environmental Protection Agency (EPA), which is deemed to be the competent authority for the purpose of Directive 2008/50/EC. The EPA is required to submit an annual Air Quality report to the Minister of the Environment, Climate and Communications and to the European Commission. The latest EPA Report entitled "Air Quality in Ireland 2022" was published in September 2023 and is available on the [EPA website](#). The 2023 report will be published in 2024.

The World Health Organisation published updated Air Quality Guidelines (AQG) in 2021 based on the impact of air pollutants on health. The 2023 [Clean Air Strategy for Ireland](#) commits Ireland to meeting WHO AQGs by 2040 and outlines interim targets towards achieving final AQG levels to be met by 2026 and 2030. The 2026 and 2040 targets are included on graphs displaying air quality monitoring results within this report.

This report highlights the air quality levels around Dublin Airport from July to September 2023. The results of the NO₂, PM₁₀ and PM_{2.5} concentrations using the online analyser indicate concentrations are below the relevant annual limit values of 40µg/m³ and 20µg/m³ respectively and within the allowed criteria of short-term limit values. The diffusion tube results for NO₂ indicate that the highest concentrations were recorded at the Dublin Airport bus depot which experiences significant vehicular activity.

In collaboration with the EPA, the Dublin Airport continuous air quality monitoring station data is provided to the EPA on a continuous basis. As part of daa's transparency, daa air

quality monitoring station can be viewed on the EPA website: <https://www.epa.ie/air/quality/>.

1.0 Introduction

1.1 Background

Dublin Airport (DAP) is located approximately 10 km north of Dublin city. The areas to the west of the airport are predominantly rural in nature. The airport is surrounded by Swords Village to the north and Santry to the south. The airport is bounded on two sides by the two busiest motorways in the country: the M1 and the M50. The M1 motorway is approximately 1km east of the current location of the airport's onsite air quality monitoring station and the M50 motorway is approximately 2.5 km south of the monitoring location.

1.2 Purpose

The purpose of this report is to present an overview of the results of air quality monitoring conducted onsite at DAP and at 11 monitoring locations in the vicinity of the airport in Q3 2023. The Ambient Air Quality Standards Regulations 2011, S.I. No. 180 of 2011 (the Regulations), implement EU Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe. This report compares the data collected during the daa monitoring programme with limit values contained in the Regulations to assess air quality at each monitoring location. From Q3 2023, WHO AQGs and interim targets outlined in the Clean Air Strategy for Ireland are also presented in this report. Interim and final WHO target values for NO₂, PM_{2.5}, and PM₁₀ are presented in table 1.

Pollutant	Averaging time	unit	EU limit value	WHO interim targets (IT)				
				IT1	IT2	IT3 (2026)	IT4 (2030)	AQG level (2040)
NO ₂	Annual	µg/m ³	40	40	30	20	-	10
PM ₁₀	Annual	µg/m ³	40	70	50	30	20	15
PM _{2.5}	Annual	µg/m ³	20	35	25	15	10	5

Table 1 WHO Air Quality Guideline (AQG) and Interim Targets

The Regulations Clean Air Strategy for Ireland are referred to in this report for comparison and reference purposes only. There is no requirement under the Regulations that companies or operators shall carry out air quality monitoring. In Ireland, compliance with the Regulations is the responsibility of the Environmental Protection Agency (EPA), which is deemed to be the competent authority.

A range of parameters are recorded at DAP's continuous on-site monitoring station as follows:

- Sulphur dioxide (SO₂)
- Oxides of nitrogen NO_x (NO and NO₂)
- Carbon monoxide (CO)
- Ozone (O₃)
- Particulate Matter (PM₁₀)
- Particulate Matter (PM_{2.5})

Diffusion tube samplers located in communities surrounding the airport monitor the following gases:

- Nitrogen Dioxide (NO₂)
- Sulphur dioxide (SO₂)
- Benzene
- Ethylbenzene
- m- and p-Xylene
- o-Xylene
- Toluene
- Ozone

The results of air quality monitoring for all of the above parameters are reviewed by daa on a continuous basis.

To date and in line with air quality reporting at many airports, daa has focussed reporting on the most important parameters:

- Nitrogen Dioxide (NO₂) and Particulate Matter (PM₁₀) at the DAP automatic station; and
- Nitrogen Dioxide (NO₂) and Benzene using diffusion tubes at 11 offsite locations.

From 2023 daa is also reporting Particulate Matter (PM_{2.5}) at the DAP automatic station.

2.0 Monitoring Locations

A list of the ambient air quality sampling locations is presented in Table 2. Sampling locations are presented as Figure 1.

Ref	Location	Method	Parameter
On-site	Dublin Airport.	Continuous analyser	NO₂ PM₁₀ PM_{2.5}
A1	Forrest Little Golf Club.	Passive Tubes	NO₂ Benzene
A2	Kilreesk Lane, St. Margaret's.	Passive Tubes	
A3	Ridgewood Estate West, Swords.	Passive Tubes	
A4	St. Margaret's School and Parish	Passive Tubes	
A5	Fire Station, Huntstown, Dublin Airport.	Passive Tubes	
A6	Southern Boundary Fence, Dublin	Passive Tubes	
A7	Western Boundary Fence, Dublin Airport	Passive Tubes	
A8	St. Nicholas of Myra School, Malahide Road.	Passive Tubes	
A9	Naomh Mearnóg GAA Club, Portmarnock.	Passive Tubes	
A10	Oscar Papa Site, Portmarnock.	Passive Tubes	
A11	Dublin Airport Bus Depot	Passive Tubes	

Table 2 Community ambient air quality monitoring locations

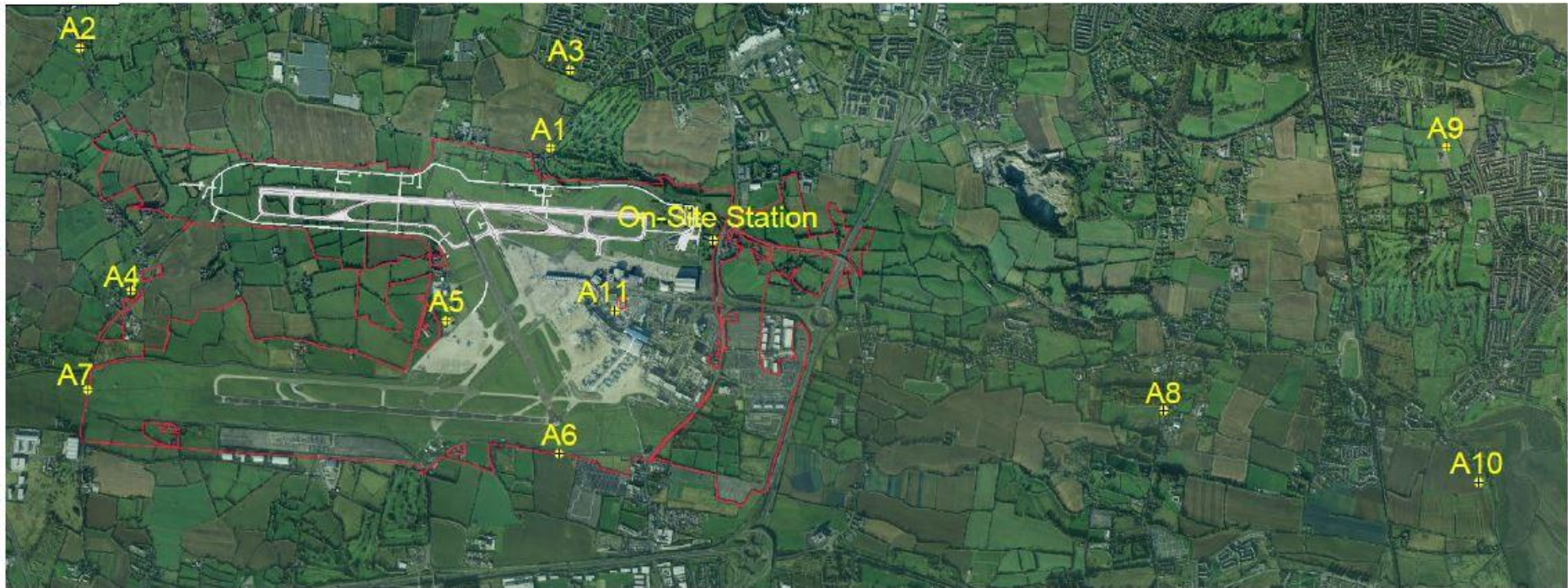


Figure 1 Air Quality Monitoring Locations

3.0 Parameters and Sampling Methodology

3.1 Offsite Passive Sampling:

3.1.1 Nitrogen Dioxide (NO₂) and Benzene (C₆H₆)

daa has installed a network of passive diffusion tube samplers in areas surrounding the airport. Monitoring locations are shown on Figure 1 and listed in Table 2. The diffusion tubes are exposed for approximately 4-week intervals and record monthly mean concentrations. Monthly mean concentrations are averaged to give an annual mean, presented in Figure 2. The tubes are analysed using UV Spectrophotometry at a UKAS (United Kingdom Accreditation Service) accredited laboratory. Results are expressed in µg/m³ (micrograms per cubic metre).

3.2 Onsite Sampling

3.2.1 Equipment Calibration

An external expert service provider undertakes routine servicing of the DAP air quality monitoring equipment. The monitoring station undergoes a full service twice yearly. During routine visits, air filters are replaced, and the instruments are calibrated to EPA gas standards. The technician also inspects the functionality of the station and sampling system. An emergency call out service is also provided by the service provider. The routine calibration process takes approximately 24 hours, data collection resumes after this 24-hour period. In Q3 2023, due to down times during calibration and power and connection issues with the equipment, 76% of NO₂ and 79.3% of PM₁₀ and PM_{2.5} data was captured. Faulty components were replaced during Q3 to resolve an issue causing power to trip at the monitor.

3.2.2 Nitrogen Dioxide (NO₂)

Onsite monitoring of NO₂ is carried out on a continuous basis at the stationary airport monitoring station. Measurement of NO₂ is carried out using a Horiba APNA-370 ambient NOx monitor which employs a crossflow modulated chemiluminescence method. The results are expressed in µg/m³.

3.2.3 Particulate Matter (PM₁₀) and (PM_{2.5})

PM₁₀ and PM_{2.5} are defined as airborne particulate matter with an aerodynamic diameter equal to or less than 10µm and 2.5µm respectively. PM₁₀ and PM_{2.5} are monitored on a continuous basis at the airport monitoring station. The PM₁₀ and PM_{2.5} instruments automatically measure and record airborne particulate concentration levels using the principle of beta ray attenuation. The sampler monitors the PM₁₀ and PM_{2.5} content of air by drawing a measured volume of air through a chamber containing a pre-conditioned and

pre-weighed filter in accordance with the internationally accepted US EPA protocol for PM₁₀ and PM_{2.5} sampling. The results are expressed in µg/m³.

4.0 Monitoring Results

4.1 Offsite NO₂ Monitoring Results

Figure 2 presents the annual mean NO₂ concentration for each location based on the monthly passive tube sampling. The Regulations mandate an annual mean limit value of 40 µg/m³ for NO₂. The WHO AQGs by 2040 outlines interim targets (2026) towards achieving final AQG levels to be met by 2040, which are included in the graph below. As can be seen from Figure 2, the mean NO₂ levels including at the bus depot sampling point A11 are currently below the annual limit. The monthly average NO₂ during Q3 was calculated at 38.12 µg/m³. The high level of NO₂ is related to the volume of vehicular traffic at this location. The NO₂ analysis result for June 2023 at this location is excluded from the below graph. The laboratory completing analysis of the diffusion tubes reported that the tube contained water and the result may be compromised. As the very low NO₂ level recorded in this sample was likely erroneous and an outlier, it is not deemed representative of the air quality in the area during this period and is excluded from reporting.

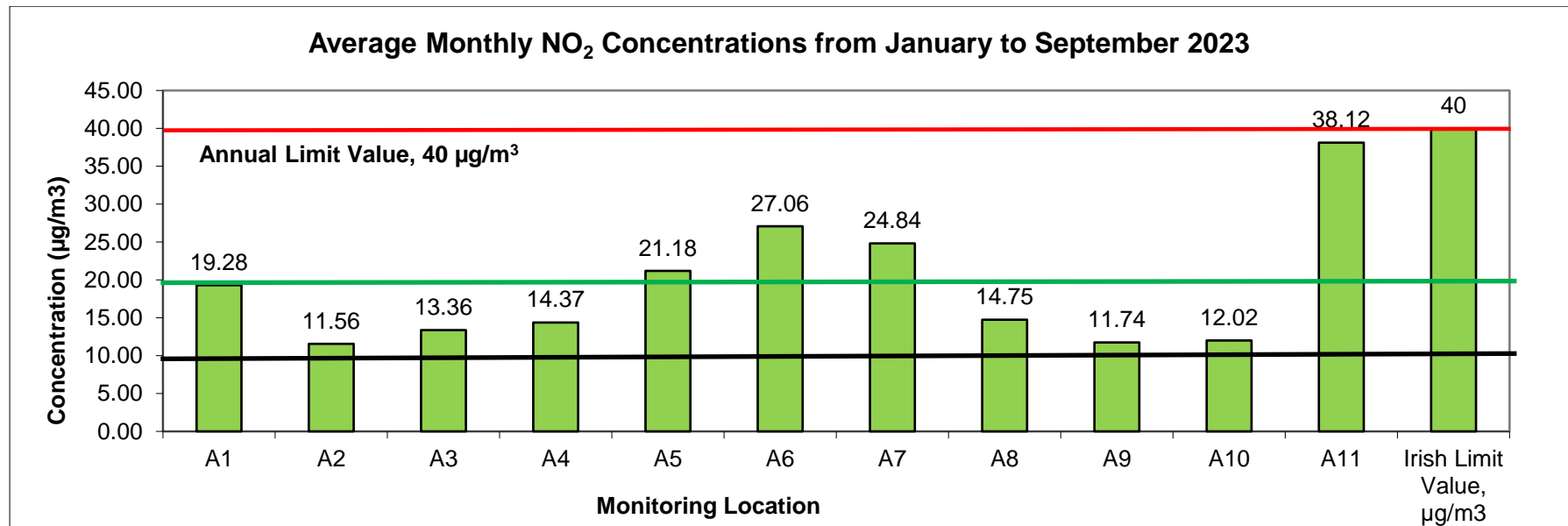
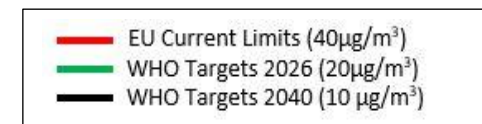


Figure 2 Average Monthly NO₂ Concentrations Q3 2023



4.2 Offsite Benzene Monitoring Results

Figure 3 presents the annual mean Benzene concentration for each location based on the monthly passive tube sampling. The Regulations mandate an annual mean limit value of 5 µg/m³ for Benzene. As can be seen from Figure 3, the annual mean values were below the limit value of 5 µg/m³ at all monitoring locations.

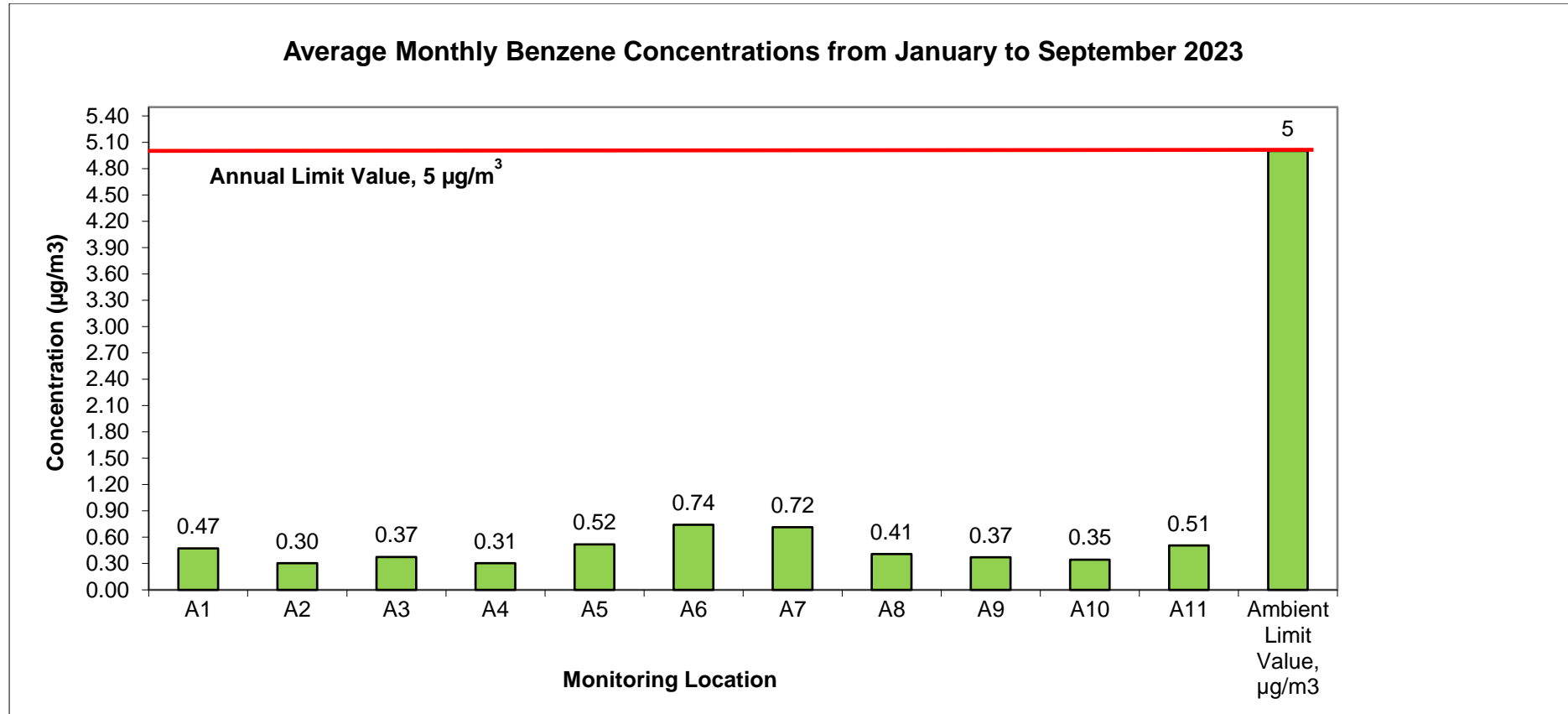


Figure 3 Average Monthly Benzene (C₆H₆) Concentrations Q3 2023

5.0 On-site Airport Monitoring Station Results

5.1 On-site Airport Monitoring Station Results: Daily Average NO₂

NO₂ concentrations are measured at the automatic station at Dublin Airport. Figure 4 presents the daily average NO₂ concentrations measured during Q3 2023. The equivalent daily average was calculated as 16 µg/m³.

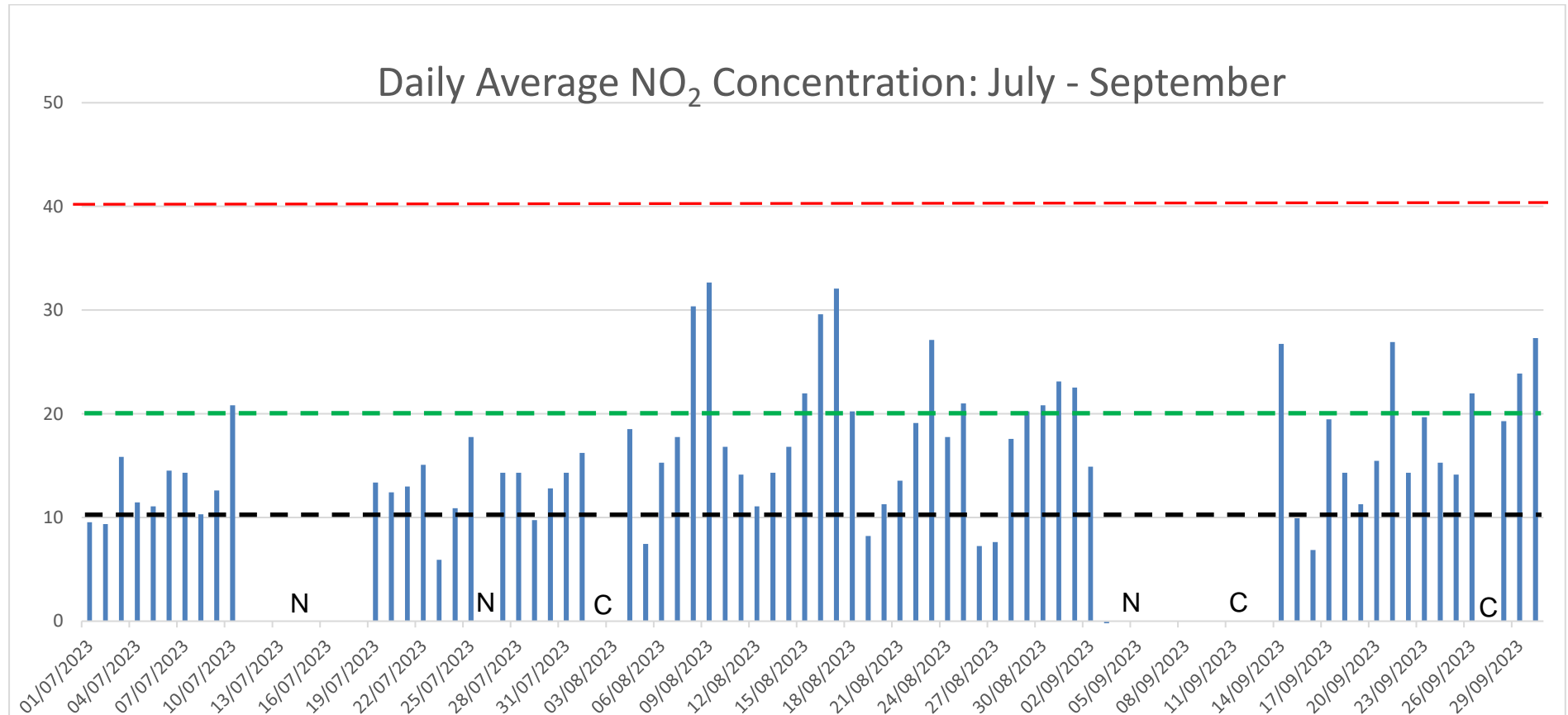


Figure 4 Daily Average NO₂ Q3 2023

C = Calibration	--- EU Current Limit (40µg/m ³)
N = No Data	- - - WHO Target 2026 (20µg/m ³)
	--- WHO Target 2040 (10µg/m ³)

5.2 On-site Airport Monitoring Station Results: PM₁₀

Daily average PM₁₀ concentrations recorded at the automatic station in DAP in Q3 2023 are presented in Figure 5. The average PM₁₀ was calculated as 12 µg/m³.

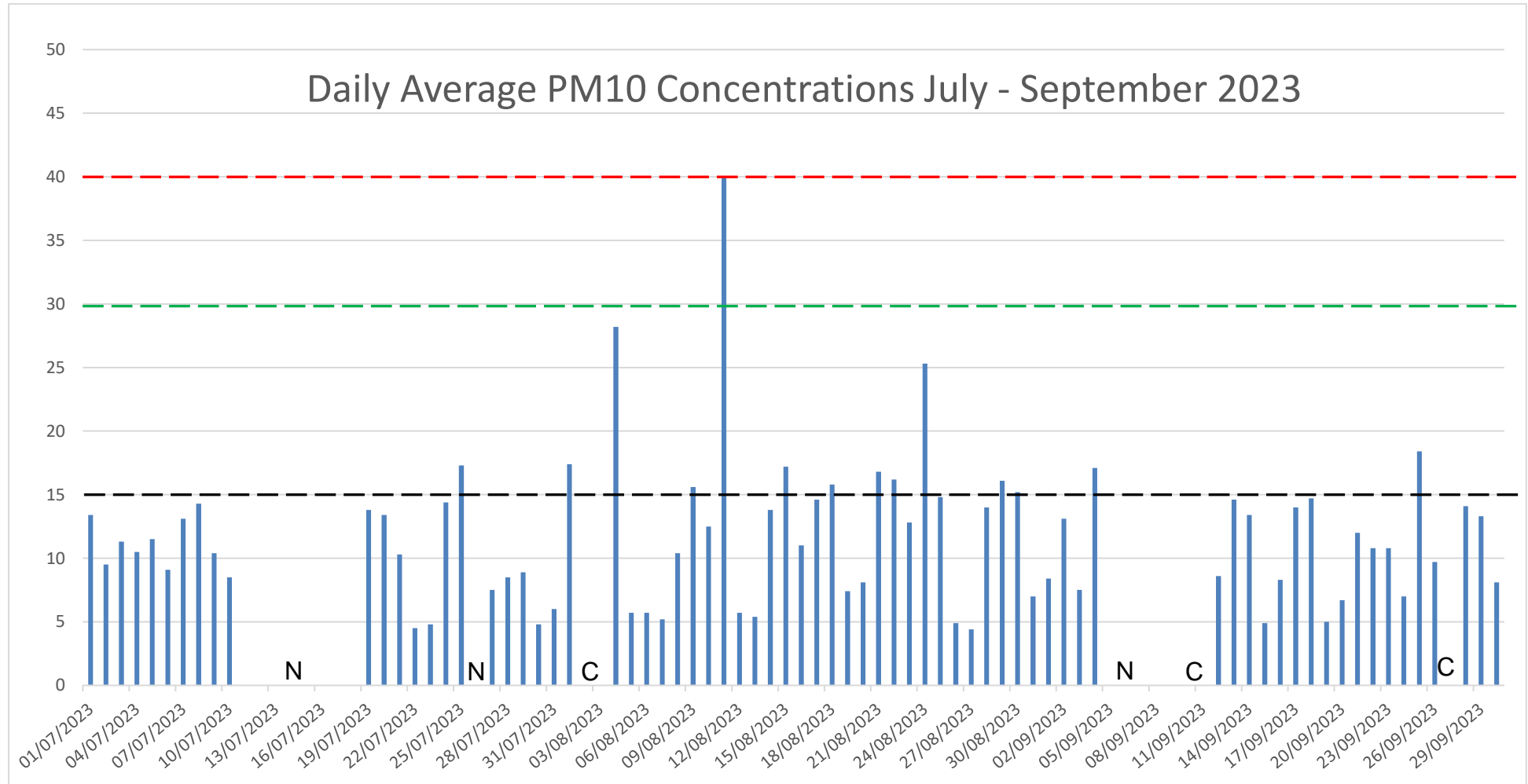


Figure 5 Daily Average PM₁₀ Q3 2023

<p>C = Calibration</p> <p>N = No Data</p>	<p>- - - EU Current Limit (40 µg/m³)</p> <p>- - - WHO Target 2026 (30 µg/m³)</p> <p>- - - WHO Target 2040 (15 µg/m³)</p>
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5.3 On-Site Airport Monitoring Station Results: PM_{2.5}

Daily average PM_{2.5} concentrations recorded at the automatic station in DAP in Q3 2023 are presented in Figure 6. The average PM_{2.5} was calculated as 5 µg/m³.

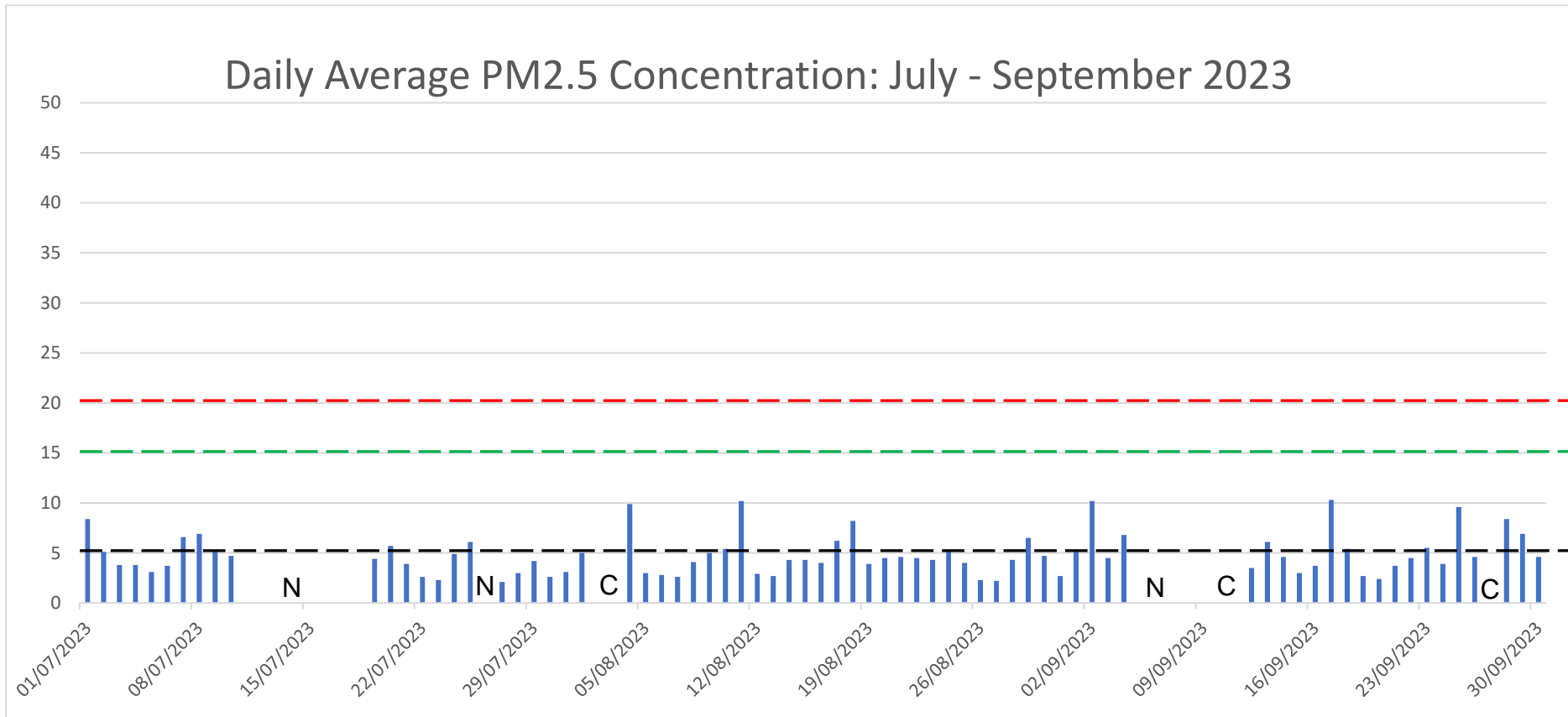


Figure 6 Daily Average PM_{2.5} Q3 2023

C = Calibration
N = No Data

EU Current Limit (20 µg/m³)
WHO Target 2026 (15 µg/m³)
WHO Target 2040 (5 µg/m³)

The Regulations set a 24-hour PM₁₀ limit value of 50 µg/m³ and an annual mean limit value of 40 µg/m³ as shown in Table 2. There is no 24-hour limit value for PM_{2.5} set in the Regulations. The annual mean limit for PM_{2.5} is 20 µg/m³.

Objective	Averaging Period	Limit or Threshold Value (µg/m ³)	No. of Allowed Exceedances	No. of Exceedances (Year to date)
PM ₁₀ Limit Value	24 hour	50	Not to be exceeded on more than 35 days per year	0
PM ₁₀ Limit Value	Calendar Year	40	NA	NA
PM _{2.5} Limit Value	Calendar Year	20	NA	NA

Table 3 PM₁₀ and PM_{2.5} Limit Values

6.0 Conclusion

Onsite Monitoring: The results of the NO₂ and PM₁₀ concentrations using the online analyser indicate concentrations are below the relevant annual limit value of 40µg/m³ and within the allowed criteria of short-term limit values. Additionally, the daily average results are also within the AQG 2026 target levels. The results of the PM_{2.5} concentrations using the online analyser indicate concentrations are below the relevant annual limit value of 20µg/m³ and the AQG 2026 target levels.

Offsite Monitoring: Diffusion tube results for NO₂ indicate that the highest concentrations are recorded at the bus depot at the airport. The bus depot at the airport is Ireland's busiest bus depot. The elevated readings are related to the volume of vehicular activity that occurs in the area.

Diffusion tube results for benzene indicate that concentrations at all locations are well below the annual average limit value.