Dublin Airport Air Quality Monitoring
Q3 2020

Sustainability Department

November 2020

# Dublin Airport Air Quality Monitoring Quarter 3 Report 2020

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## Glossary

| Abbreviation | Definition |
|---|---|
| EPA | Environmental Protection Agency |
| NO | Nitrogen Oxide |
| $NO_2$ | Nitrogen Dioxide |
| NOx | Oxides of Nitrogen |
| $PM_{10}$ | Airborne particulate Matter, particle size less than 10 micron. |
| AQIH | Air Quality Index for Health |
| The Regulations | Ambient Air Quality Standards Regulations 2011 |

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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 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 2020. Air monitoring locations are listed in Table 1 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 Communications, Climate Action and the Environment and to the European Commission. The latest EPA Report entitled: Air Quality in Ireland 2019, Key Indicators of Ambient Air Quality was published in 2020 and is available on the EPA website. 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 focus on transparency of information, daa air quality monitoring station can be viewed on the EPA website: https://www.epa.ie/air/quality/.

This report highlights the air quality levels around Dublin Airport from January to September 2020. During Q3 reporting period July - September 2020, the continued lack of activity at and in the environs of the airport due to COVID-19 had an impact on our air quality around Dublin Airport. As seen in Q2, the restriction of movement in Ireland had an impact in air quality nationally, with large scale reduction in vehicular traffic. The most notable change was the reduction in $NO_2$ readings at the airport bus depot (sample location A11) which can be attributed mainly to the government restriction of movement reduced the number of buses servicing the airport during this period.

# 1.0 Introduction

## 1.1 Background

Dublin Airport (DAP) is located approximately 10km 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 2.5km 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 external monitoring locations in the vicinity of the airport in Q3 2020. 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.

The Regulations 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 ($SO_2$)
- Oxides of nitrogen $NO_x$ (NO and $NO_2$)
- Carbon monoxide (CO)
- Ozone ($O_3$)
- Particulate Matter ($PM_{10}$)

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

- Sulphur dioxide
- Nitrogen dioxide
- 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 ($NO_2$) and Particulate Matter ($PM_{10}$) at the DAP automatic station; and
- Nitrogen Dioxide ($NO_2$) and Benzene using diffusion tubes at 11 offsite locations.

## 2.0 Monitoring Locations

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

| Ref | Location | Method | Parameter |
|---|---|---|---|
| **On-site** | Dublin Airport. | Continuous analyser[1] | **$NO_2$**<br>**$PM_{10}$** |
| **A1** | Forrest Little Golf Club. | Passive Tubes | **$NO_2$**<br>**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 | Passive Tubes | |
| **A8** | St. Nicholas of Myra School, Malahide Road. | Passive Tubes | |
| **A9** | Naomh Mearnóg GAA Club, | Passive Tubes | |
| **A10** | Oscar Papa Site, Portmarnock. | Passive Tubes | |
| **A11** | Dublin Airport Bus Depot. | Passive Tubes | |

**Table 1** 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 ($NO_2$) and Benzene ($C_6H_6$)

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 1. 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 on a monthly basis. The monitoring station undergoes a full service twice yearly. During monthly 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 monthly calibration process takes approximately 24 hours, data collection resumes after this 24-hour period. In Q3 2020, our $PM_{10}$ monitor malfunction and had to be repaired, therefore, only 54% of the $PM_{10}$ data was gathered in this quarter. A power connection issue with the air quality station led to loss of 6 days of $NO_2$ data. Year to date, due to down times during calibration and equipment malfunctioning, approximately 91% of $NO_2$ data was captured, the capture of $PM_{10}$ data was approximately 81%.

### 3.2.2 Nitrogen Dioxide ($NO_2$)

Onsite monitoring of $NO_2$ is carried out on a continuous basis at the stationary airport monitoring station. Measurement of $NO_2$ is carried out using a Horiba APNA-370 ambient NOx monitor which employs a cross-flow modulated chemiluminescence method.

### 3.2.3 Particulate Matter ($PM_{10}$)

$PM_{10}$ is defined as airborne particulate matter with an aerodynamic diameter equal to or less than 10µm. $PM_{10}$ is monitored on a continuous basis at the airport monitoring station. This $PM_{10}$ instrument automatically measures and records airborne particulate concentration levels using the principle of beta ray attenuation. The sampler monitors the $PM_{10}$ 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 $PM_{10}$ sampling. The results are expressed in µg/m³.

## 4.0 Monitoring Results

### 4.1 Offsite $NO_2$ Monitoring Results

Figure 2 presents the annual mean $NO_2$ concentration from January to September. The Regulations mandate an annual mean limit value of 40 µg/m³ for $NO_2$. As can be seen from Figure 2, all sampling locations are within compliance limits. It should be noted that the reduction in emission levels at A11 is coincides with a material reduction in vehicle traffic at the bus depot. Due to continued Covid 19 restrictions, bus operations at Dublin Airport have been significantly reduced.

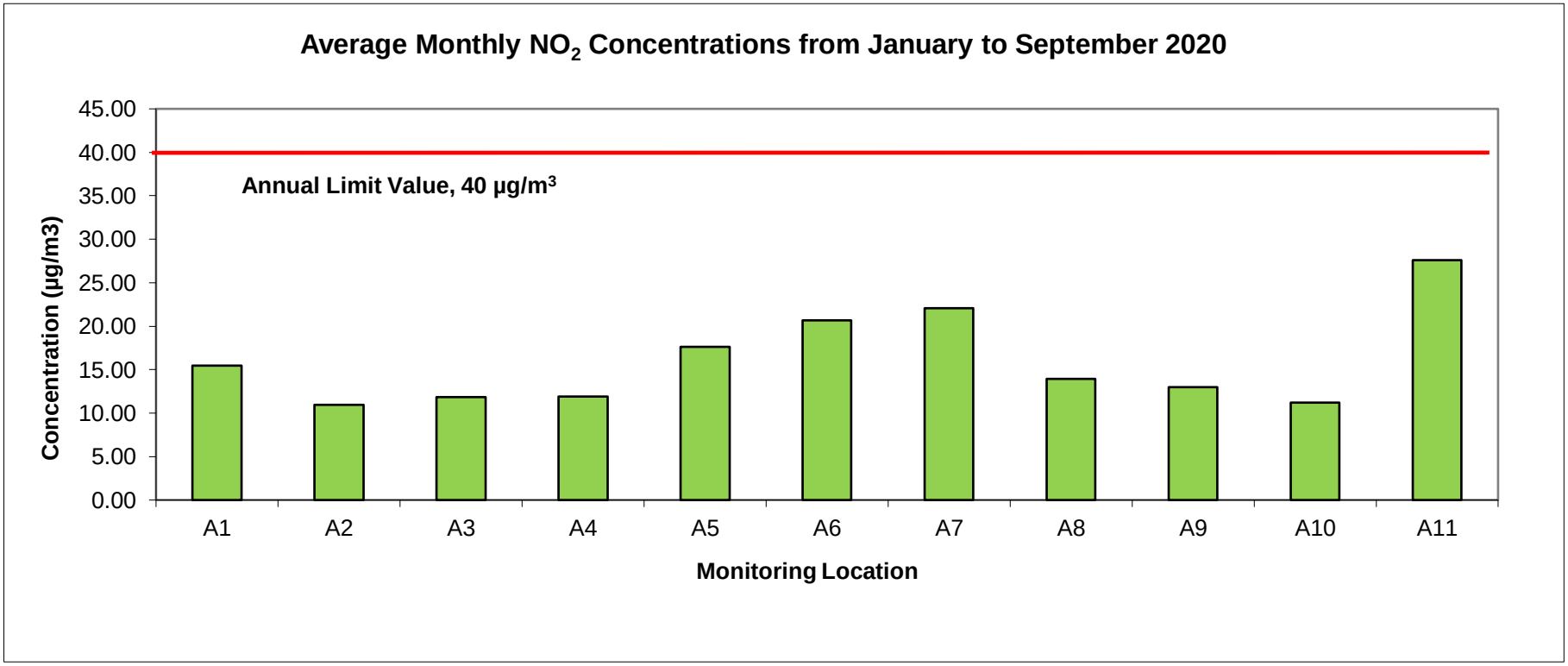


**Figure 2** Average Monthly $NO_2$ Concentrations Q3 2020

## 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 and less than 1 µg/m³ at all monitoring locations.

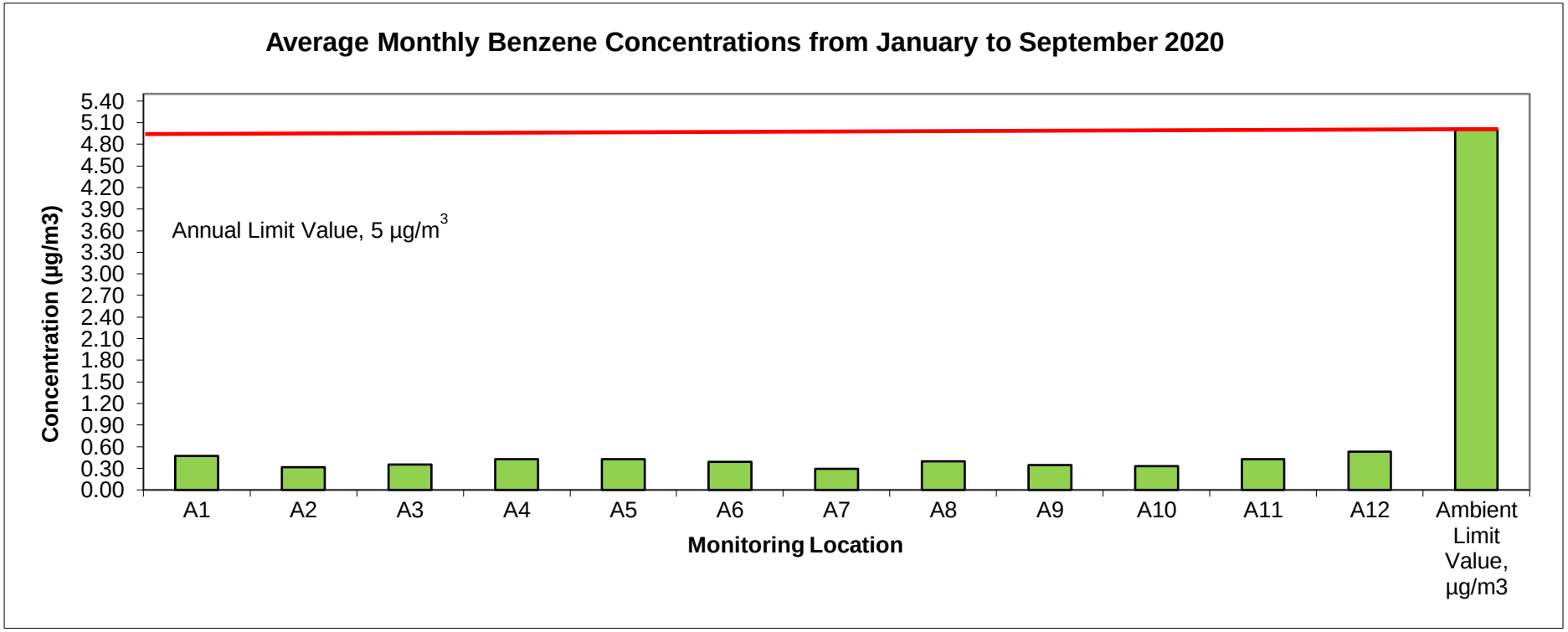


**Figure 3** Average Monthly Benzene ($C_6H_6$) Concentrations Q3 2020

## 5.0 On-site Airport Monitoring Station Results

### 5.1 On-site Airport Monitoring Station Results: Daily Average $NO_2$

$NO_2$ concentrations are measured at the automatic station at Dublin Airport. Figure 4 presents the daily average $NO_2$ concentrations measured during Q3 2020. The equivalent daily average was calculated as 21 µg/m$^3$, which is a 30% reduction from the same period last year. As noted last year, these data had been adversely by proximate construction traffic. A minor issue arose in Q3 with the power connection to the $NO_2$ analyser which led to 6 days loss of $NO_2$ data.

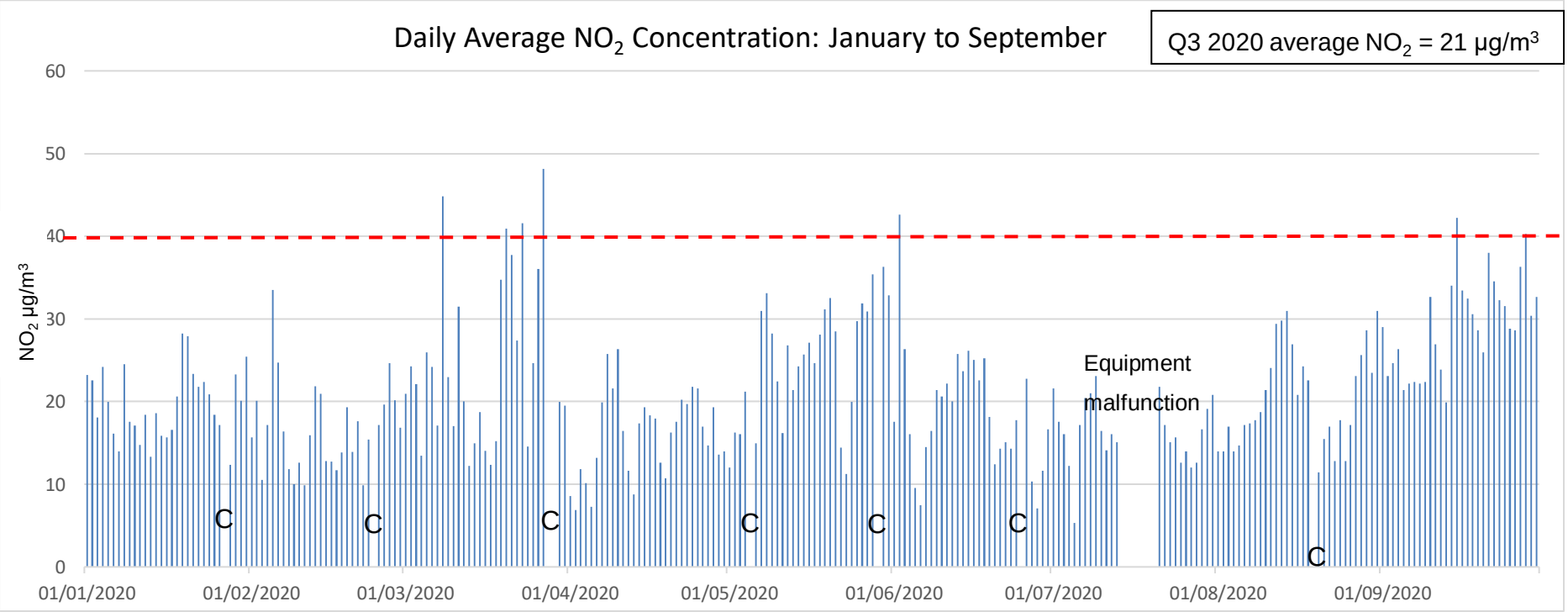


Figure 4 Daily Average $NO_2$ Q3 2020

C = Calibration

## 5.2 On-site Airport Monitoring Station Results: $PM_{10}$

Daily average $PM_{10}$ concentrations recorded at the automatic station in DAP in Q3 2020 are presented in Figure 5. The $PM_{10}$ monitor malfunctioned and had to be repaired during Q3 which resulted in 46% loss in data for Q3. The average $PM_{10}$ from recorded data was calculated as 17 µg/m$^3$ for this period, as compared with a value of 19 µg/m$^3$ in 2019. The Regulations set a 24-hour $PM_{10}$ limit value of 50 µg/m$^3$, and an annual mean limit value of 40 µg/m³ as shown in Table 2.

| 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 |

**Table 2** $PM_{10}$ Limit Values

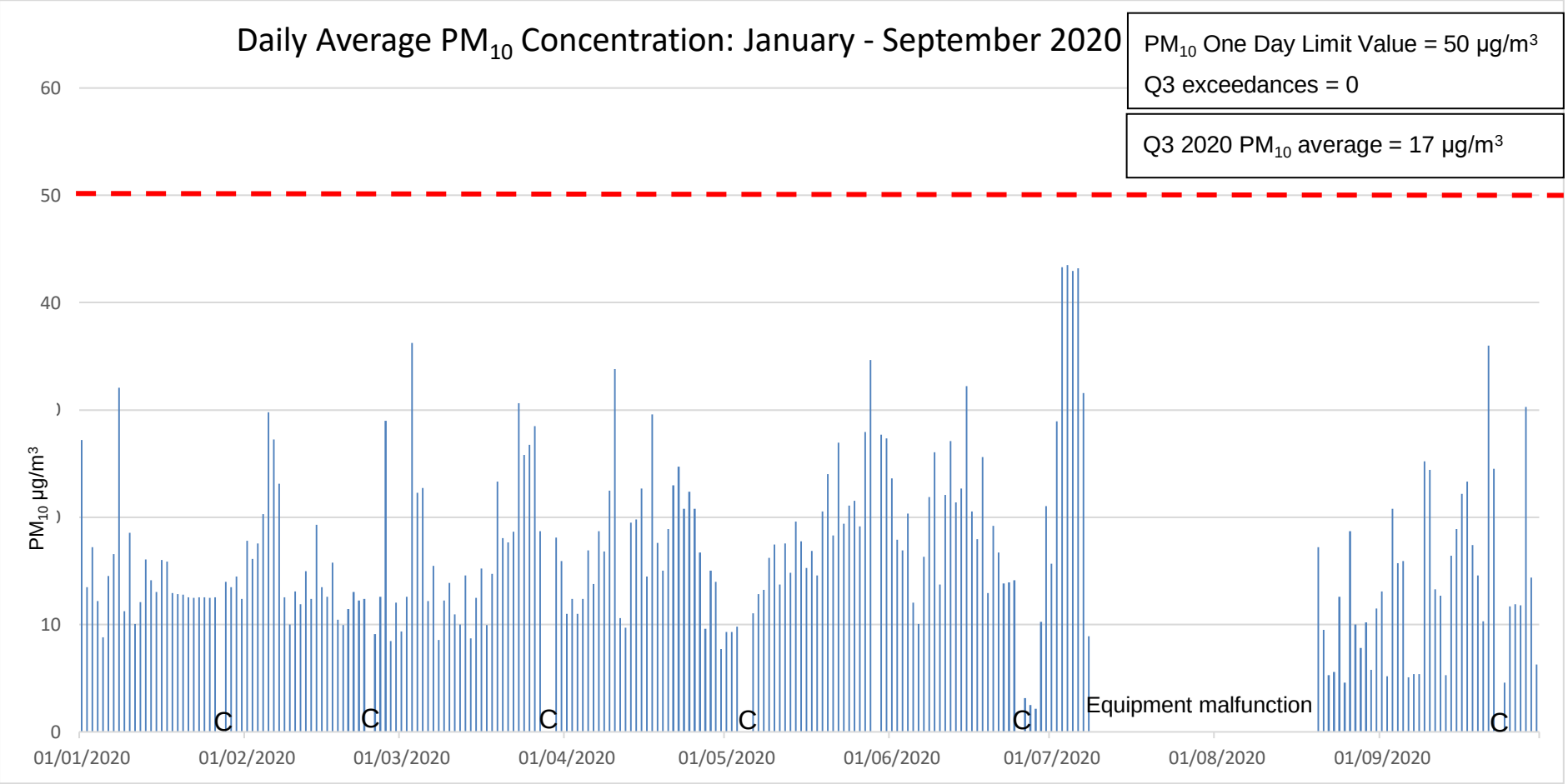


Figure 5 Daily Average $PM_{10}$ Q3 2020 C=Calibration

### 5.3 Odours

Fuel odours may arise from many sources including road traffic, ground handling equipment as well as aircraft on the ground. Depending on weather conditions odours from fuel (hydrocarbons) may be detected at locations close to the airport. As discussed in section 4.2 of this report, diffusion tubes results for benzene indicate that the average concentrations are well below the national limit value at all locations, and the reduced level of operations at the airport did not lead to any consistent or material reduction in the readings at the various monitoring points, suggesting other factors impact significantly on these results.

## 6.0 Conclusion

This report highlights the air quality levels around Dublin Airport from January to September 2020. During Q3 reporting period July – September 2020, to the situation was similar to that in Q2, where restrictions arising from the COVID-19 pandemic had a significant impact on the level of operations at Dublin Airport. While there was indeed an improvement in the level of air quality during this period relative to last year, at most of the stations, the reduction in $NO_2$ and $PM_{10}$ readings were of a much smaller magnitude than the reduction in air traffic movements or the level of routine activity by ground vehicles at Dublin Airport.

Onsite Monitoring: The results of the $NO_2$ and $PM_{10}$ 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. The $PM_{10}$ monitor malfunctioned and had to be repaired during Q3 which resulted in 46% loss in data for Q3. There was also a minor issue with power connectivity to the air quality station, which led to the loss of 6 days of $NO_2$ data.

Offsite Monitoring: All diffusion tube results for $NO_2$ are within the EPA compliance limits, however, the results highlight that the average year to date highest concentrations are recorded at the bus depot at the airport. The bus depot at the airport is Ireland’s busiest bus depot. As seen in Q2, Covid 19 restrictions continue to impact on the level of vehicular traffic around the airport and surrounding area. The most notable reduction identified by the diffusion tube monitoring was the

observed at sample point A11, and this reduction was linked to the scale down of operations by bus operators. Diffusion tube results for benzene indicate that concentrations at all locations are well below the annual average limit value.