
Dublin Airport Air Quality Monitoring
Q2 2020

HSSE Environment

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Dublin Airport Air Quality Monitoring Quarter 2 Report 2020



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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.
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 Q2 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 2018, Key Indicators of Ambient Air Quality was published in 2019 and is available on the EPA website, 2019 report will be published in 2020. 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 June 2020. During Q2 reporting period April – June 2020, the 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. The restriction of movement in Ireland had a impact in air quality nationally, with large scale reduction in vehicular traffic. The most notable change was the reduction in NO₂ 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 Q2 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 (SO₂)
- Oxides of nitrogen NO_x (NO and NO₂)
- Carbon monoxide (CO)
- Ozone (O₃)
- Particulate Matter (PM₁₀)

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 (NO₂) and Particulate Matter (PM₁₀) at the DAP automatic station; and
- Nitrogen Dioxide (NO₂) 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	NO₂ PM₁₀
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	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 (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 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 Q2 2020, due to down times during calibration, approximately 97% of NO₂ data was captured, the capture of PM₁₀ data was approximately 96%.

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 NO_x monitor which employs a cross-flow modulated chemiluminescence method.

3.2.3 Particulate Matter (PM₁₀)

PM₁₀ is defined as airborne particulate matter with an aerodynamic diameter equal to or less than 10µm. PM₁₀ is monitored on a continuous basis at the airport monitoring station. This PM₁₀ instrument automatically measures and records airborne particulate concentration levels using the principle of beta ray attenuation. The sampler monitors the PM₁₀ 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 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 for both 2020 and 2019. The Regulations mandate an annual mean limit value of 40 µg/m³ for NO₂. As can be seen from Figure 2, all sampling locations are within compliance limits. It is worth considering the impacts of COVID-19 countermeasures on NO₂ emissions around the airport during the period Jan-June 2020, which can be seen in the comparison with last year's data. During this period, commercial air traffic movements were 55% below the same period last year. It is, however, noteworthy that the observed reductions at locations closest to the airport were in general less than 21% despite this level of air traffic reduction. These trends support the position previously put forward by daa that most of the NO₂ emissions are not due to aircraft but are related to ground vehicular activity. It is also interesting to note that the improvements in air quality during this period were relatively modest given that there was significantly reduced ground vehicle activity at the airport during this period. This supports the suggestion that ground vehicular activity to / from the airport and on-airport may be of less significance to these results than the level of local vehicular traffic activity.

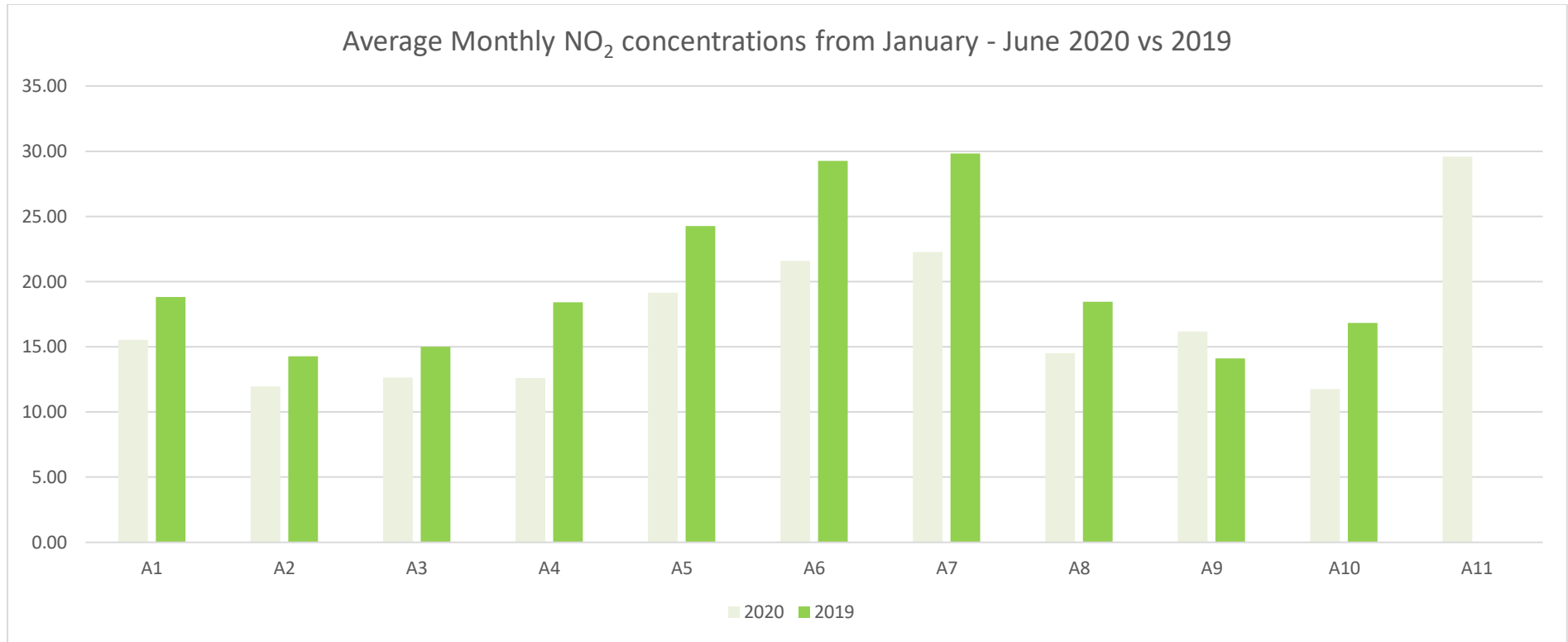


Figure 2 Average Monthly NO₂ Concentrations Q2 2020 & Q2 2019

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. It is worth noting that there is no clear, material or consistent directional change in these results relative to the same period in 2019, so the impact of the change in air traffic and ground vehicular traffic on these air quality results is unclear.

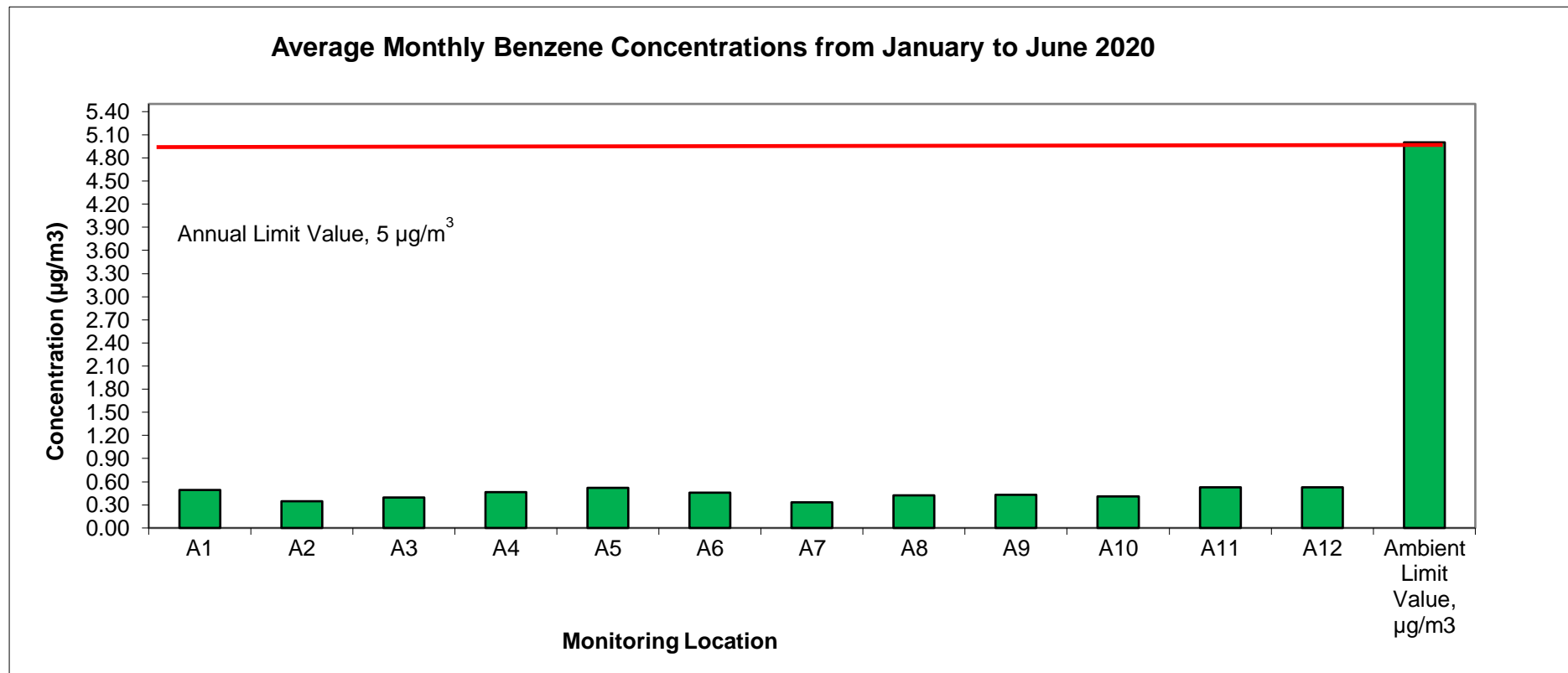


Figure 3 Average Monthly Benzene (C₆H₆) Concentrations Q2 2020

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 Q2 2020. The equivalent daily average was calculated as 22 µg/m³, which is a 33% reduction from the same period last year. As noted last year, these data had been adversely by proximate construction traffic.

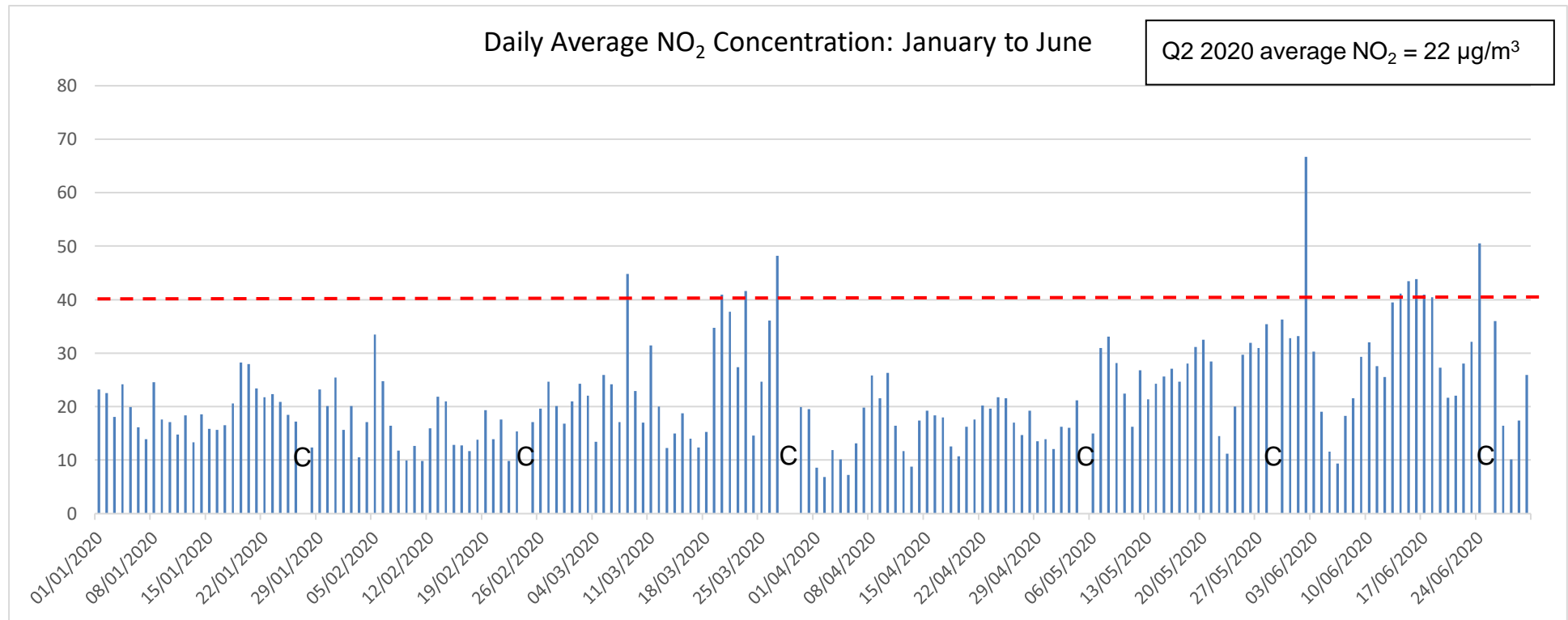


Figure 4 Daily Average NO₂ Q2 2020

C = Calibration

5.2 On-site Airport Monitoring Station Results: PM₁₀

Daily average PM₁₀ concentrations recorded at the automatic station in DAP in Q2 2020 are presented in Figure 5. The average PM₁₀ was calculated as 17 µg/m³ for this period, as compared with a value of 20 µg/m³ in 2019. It is noteworthy that this is a relatively minor reduction in the context of the decreased level of aviation and vehicular activity at the airport during this period. 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.

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 PM₁₀ Limit Values

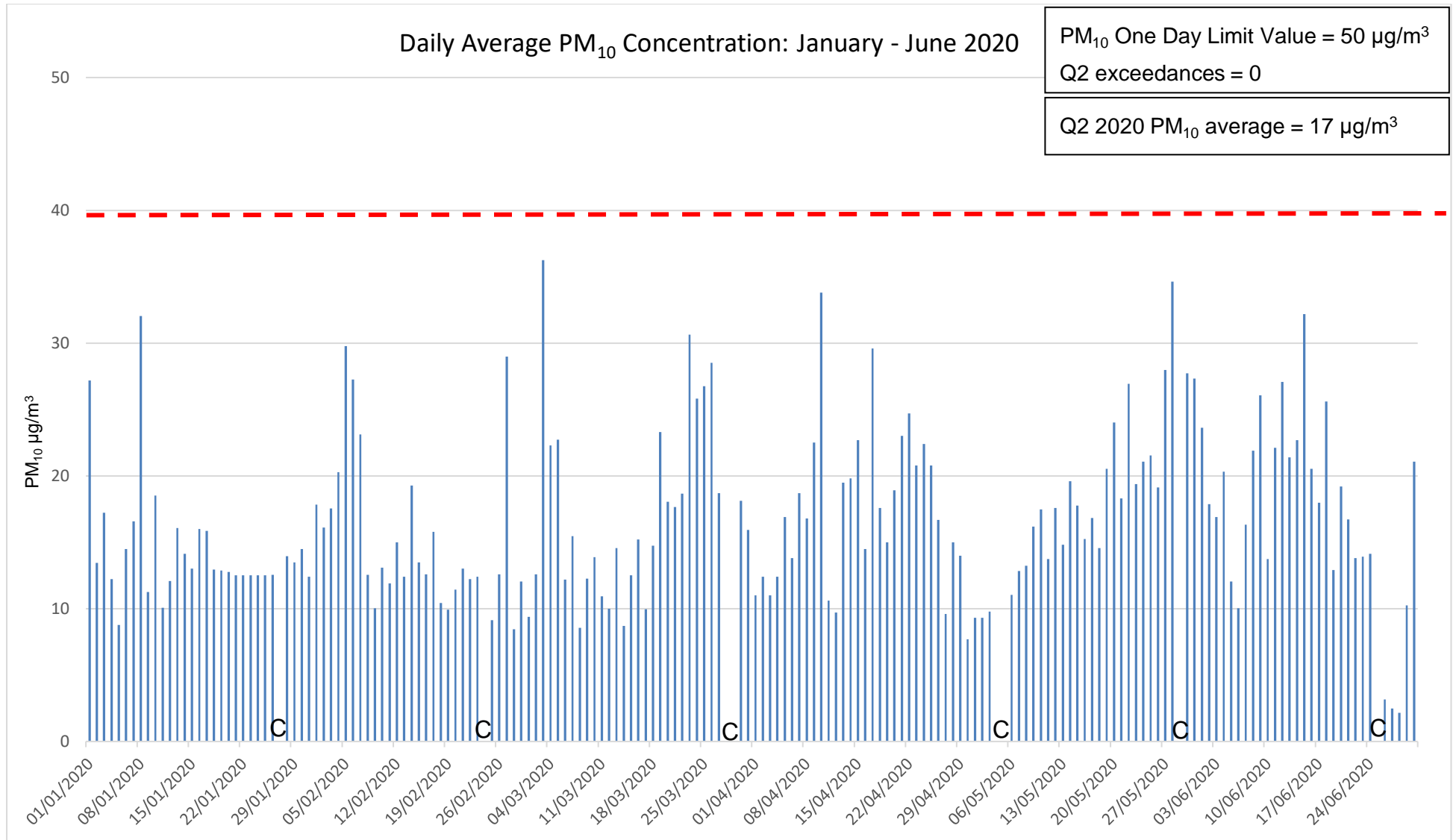


Figure 5 Daily Average PM₁₀ Q2 2020

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 June 2020. During Q2 reporting period April – June 2020, 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, in general the reduction in NO₂ and PM₁₀ 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 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.

Offsite Monitoring: The diffusion tube results for NO₂ indicate 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. During the Covid 19 restrictions, the level of vehicular traffic reduced 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.