
Dublin Airport Air Quality Monitoring
Q3 2019

HSSE Environment & Asset Care

November 2019



Dublin Airport Air Quality Monitoring Quarter 3 Report 2019



Contents

1.0	Introduction	4
1.1	Background.....	4
1.2	Purpose.....	4
2.0	Monitoring Locations	6
3.0	Parameters and Sampling Methodology	8
3.1	Offsite Passive Sampling:	8
3.1.1	Nitrogen Dioxide (NO ₂) and Benzene (C ₆ H ₆).....	8
3.2	Onsite Sampling.....	8
3.2.1	Equipment Calibration	8
3.2.2	Nitrogen Dioxide (NO ₂).....	8
3.2.3	Particulate Matter (PM ₁₀)	9
4.0	Monitoring Results.....	10
4.1	Offsite Benzene Monitoring Results	11
5.0	On-site Airport Monitoring Station Results.....	12
5.1	On-site Airport Monitoring Station Results: Daily Average NO ₂	12
5.2	On-site Airport Monitoring Station Results: PM ₁₀	13
5.3	Odours	15
6.0	Conclusion.....	15

Figures

Figure 1	Air Quality Monitoring Locations.....	7
Figure 2	Average Monthly NO ₂ Concentrations Q3 2019.....	10
Figure 3	Average Monthly Benzene (C ₆ H ₆) Concentrations Q3 2019	11
Figure 4	Daily Average NO ₂ Q3 2019	12
Figure 5	Daily Average PM ₁₀ Q3 2019	14

Tables

Table 1	Community Ambient Air Quality Monitoring Locations.....	6
Table 2	PM ₁₀ Limit Values.....	13

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

Version Control

Issue No	Prepared by	Reviewed by	Date
HSSE-ENV-REP-19091	Asset Care – Environmental Systems Specialist	HSSE – Environmental Manager	November 2019

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 12 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 2019. 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 2017, Key Indicators of Ambient Air Quality was published in 2018 and is available on the EPA website. The results of National Air Monitoring Programmes carried out by the EPA and local authorities and further information relating to air quality such as the Air Quality Index for Health can be found at www.epa.ie.

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 12 external monitoring locations in the vicinity of the airport in Q3 2019. 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 (CAFE). 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 continuous station; and
- Nitrogen Dioxide (NO₂) and Benzene using diffusion tubes at 12 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	Parameters
On-site	Dublin Airport.	Continuous analyser	NO ₂ PM ₁₀
A1	Forrest Little Golf Club.	Passive Tubes	NO ₂ 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	
A12	Portmellick House	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 Q3 2019, due to down times during calibration and an equipment malfunction, approximately 86% of NO₂ data was captured, the capture of PM₁₀ data was approximately 94%.

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. The Regulations mandate an annual mean limit value of 40 µg/m³ for NO₂. As acknowledged in the previous Q2 Air Quality Monitoring Report, a review of diffusion tube locations identified that the location of sampling point A11 did not meet the CAFE criteria; therefore, it was relocated to a more representative sampling location, and results from July 2019 onward are in line with CAFE monitoring criteria. As can be seen below, the annual mean values were below the limit value of 40 µg/m³ at all locations.

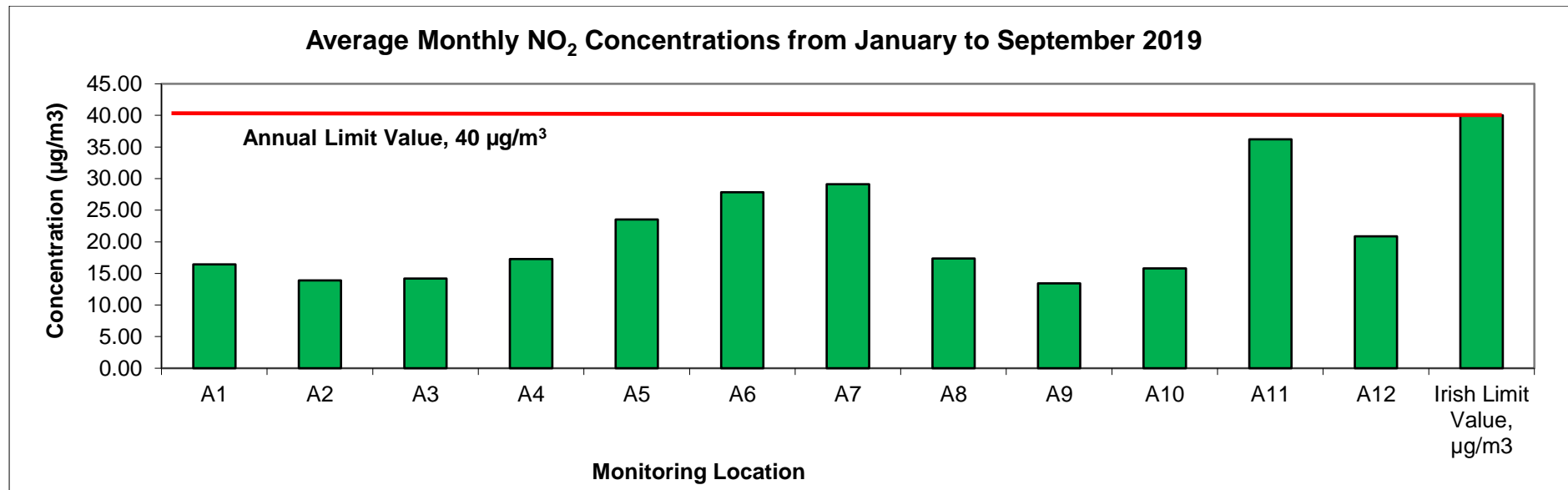


Figure 2 Average Monthly NO₂ Concentrations Q3 2019

Additionally, a new temporary sampling location has been introduced for 6 months at the request of the Dublin Airport Community Liaison Group. The new sampling location – A12 - is at Portmellick House, Dunbro Lane.

4.1 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 $\mu\text{g}/\text{m}^3$ for Benzene. As can be seen from Figure 3, the annual mean values were below the limit value of 5 $\mu\text{g}/\text{m}^3$ and less than 1 $\mu\text{g}/\text{m}^3$ at all monitoring locations.

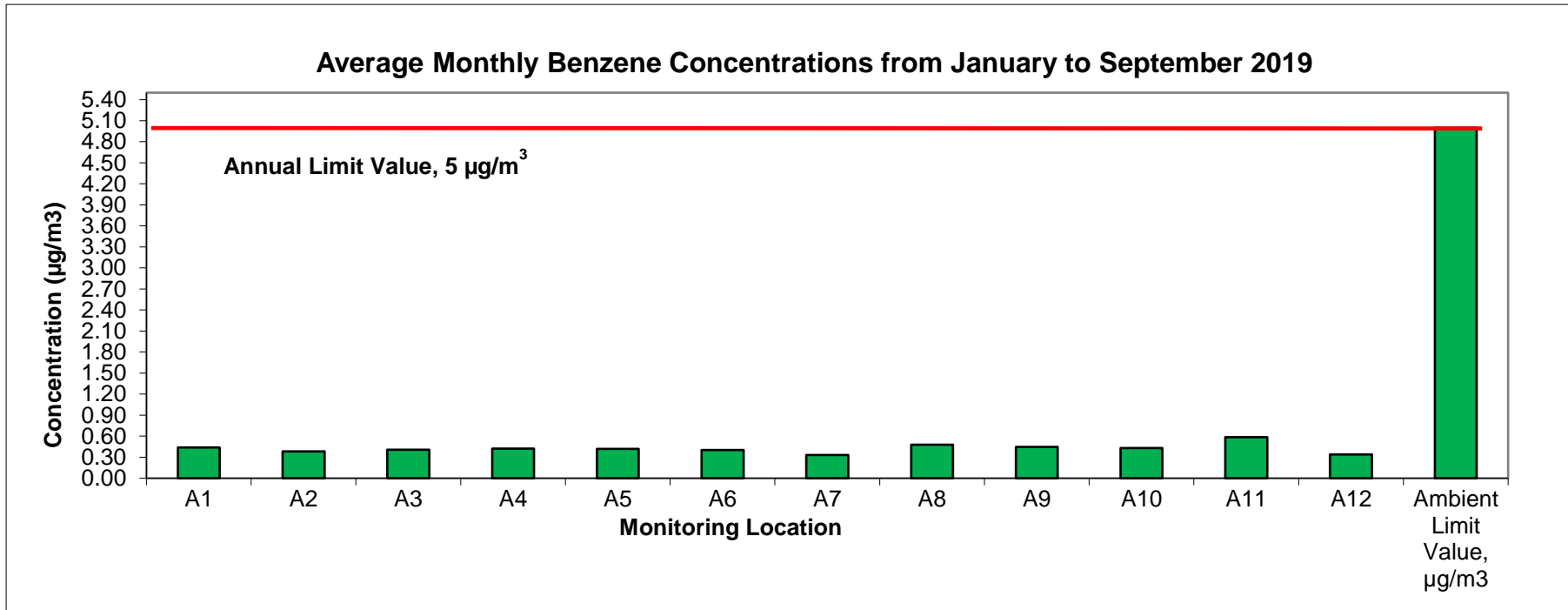


Figure 3 Average Monthly Benzene (C_6H_6) Concentrations Q3 2019

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 2019. NO₂ analyser malfunctioned on the 5th June until 26th June. This was due to a maintenance calibration error.

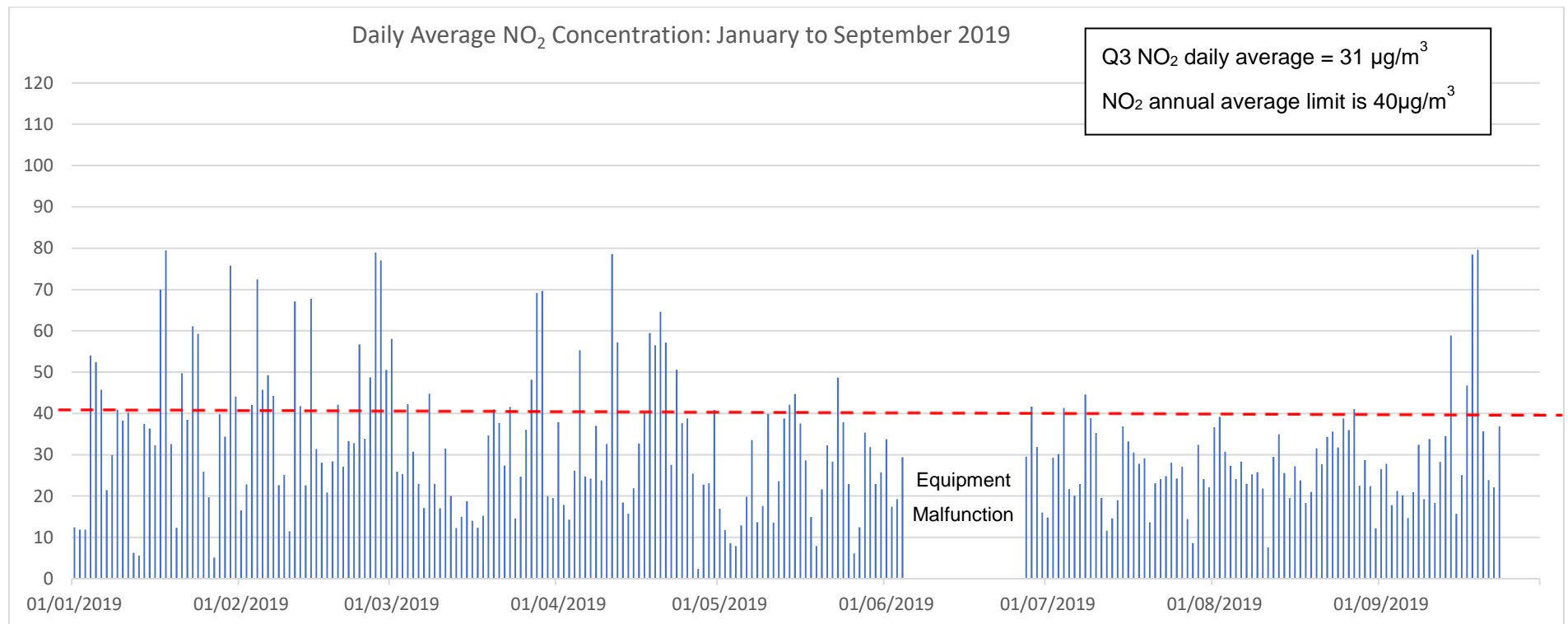


Figure 4 Daily Average NO₂ Q3 2019

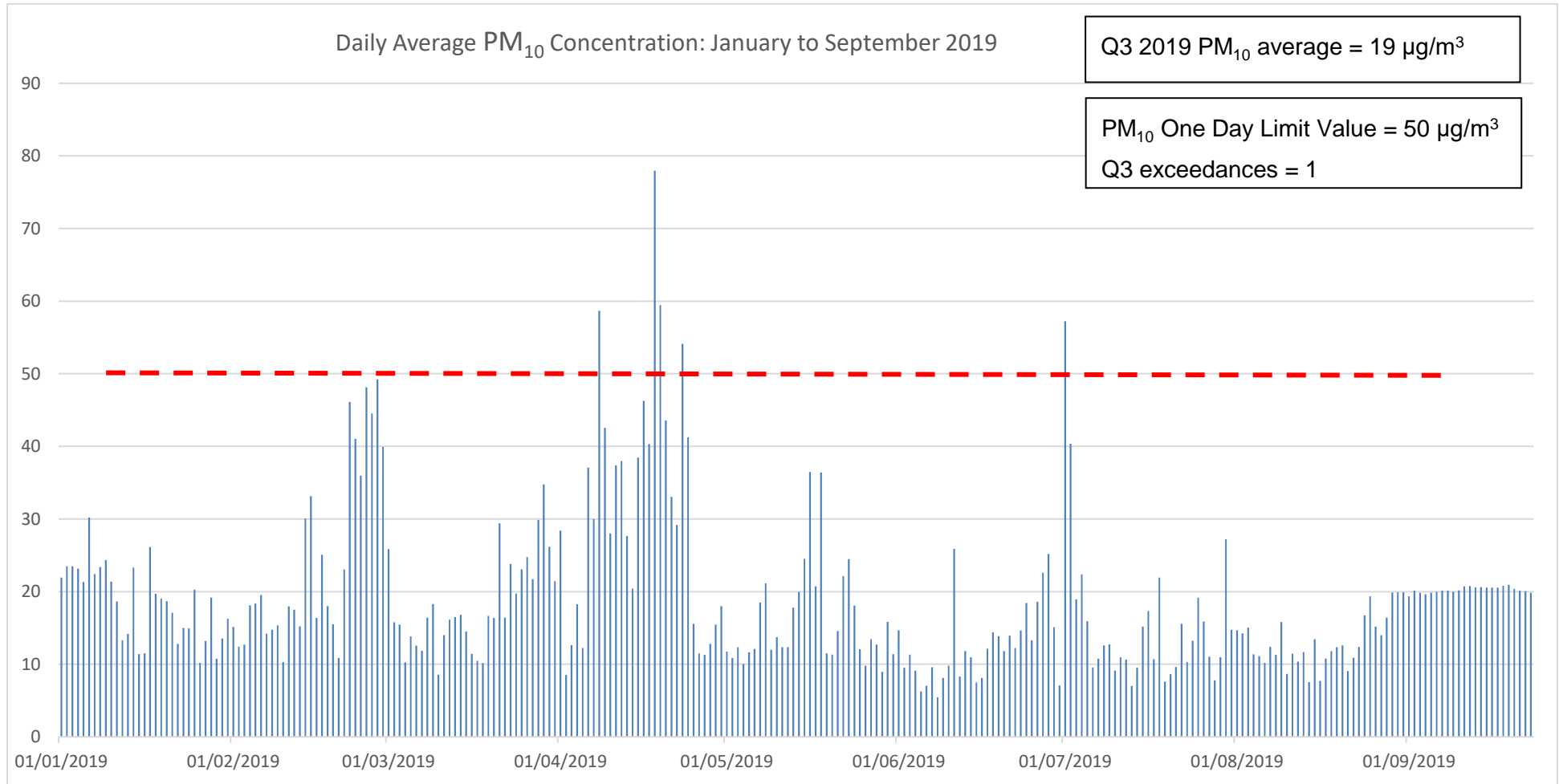
5.2 On-site Airport Monitoring Station Results: PM₁₀

Daily average PM₁₀ concentrations recorded at the automatic station in DAP in Q3 2019 are presented in Figure 5. The average PM₁₀ was calculated as 19 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.

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	5
PM ₁₀ Limit Value	Calendar Year	40	NA	NA

Table 2 PM₁₀ Limit Values

Figure 5 Daily Average PM₁₀ Q3 2019



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 4.1 of this report, diffusion tube results for benzene indicate that the average concentrations are well below the national limit value at all locations.

The human nose is extremely sensitive and can detect very low concentrations of hydrocarbons in the air. Weather also impacts the dispersion of odour and affects the strength of odour and locations affected.

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. However, the increase levels of NO₂ are directly related to the nearby construction activity on the North Apron, which has compromised recent results. Therefore, the continuous on-site monitoring station was relocated to a nearby location in September 2019; it has been moved approximately 200 metres from the original location to Castlemoate House and is still within the DAP boundary. Results from Q4 onwards will reflect this relocation.

Offsite Monitoring: The diffusion tube results for NO₂ indicate that the highest concentrations were recorded at A11; this is located at Dublin Airport Bus Depot – the busiest bus depot in Ireland, and therefore slightly higher readings would be expected at this location. Additionally, a new temporary sampling location has been introduced at Portmellick House for 6 months at the request of the Dublin Airport Community Liaison Group.